



U.S. Fish & Wildlife Service

Elizabeth Hartwell Mason Neck and Featherstone National Wildlife Refuges

*Draft Comprehensive Conservation Plan
and the Environmental Assessment*

December 2010





*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 69 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.



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Potomac River National Wildlife Refuge Complex Vision Statement

The Potomac River National Wildlife Refuge Complex provides exceptional forest, grassland, and wetland habitats for wildlife in a dynamic, highly urbanized region of Northern Virginia. We will maintain and enhance those quality habitats along the middle tidal Potomac River for native wildlife, particularly bald eagles and other species of conservation concern.

The proximity of the Refuge Complex to our Nation's capital provides unparalleled opportunities to demonstrate the importance of the natural world in enhancing the quality of human life, and to raising public awareness about the value of the National Wildlife Refuge System. Through outreach, education, and partnerships, we will foster stewardship of the living resources of the Potomac River and relate their significance to the greater Chesapeake Bay watershed. Visitors will have diverse opportunities for quality, compatible, wildlife-dependent recreation.

Elizabeth Hartwell Mason Neck Refuge Vision Statement

Elizabeth Hartwell Mason Neck National Wildlife Refuge is dedicated to the protection of the bald eagle and exemplifies the significant efforts, contributions and successes of conservationists. The refuge will continue to protect and enhance regionally important habitat for the bald eagle, migratory birds, and native wildlife and plant species. We will provide quality wildlife-dependent recreational and educational opportunities, in particular wildlife viewing and photography. In cooperation with the other public agencies on the Mason Neck Peninsula, we will work to resolve resource issues in the area.

Featherstone Refuge Vision Statement

Featherstone National Wildlife Refuge provides valuable acres of 'wild woods and wetland' which are rapidly disappearing within this region of Northern Virginia. The refuge will continue to protect wetlands, bottomland hardwoods, and associated native wildlife and plants in an otherwise highly urbanized setting. Assuming access issues are resolved, the refuge will provide quality wildlife-dependent recreational opportunities, in particular wildlife viewing, photography, and fishing.



U.S. Fish & Wildlife Service

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Summary

Type of Action: Administrative – Development of a Comprehensive Conservation Plan

Lead Agency: U.S. Department of the Interior, Fish and Wildlife Service

Location: Elizabeth Hartwell Mason Neck National Wildlife Refuge—
Fairfax County, Virginia
Featherstone National Wildlife Refuge—
Prince William County, Virginia

Administrative Headquarters: Potomac River National Wildlife Refuge Complex
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This Draft Comprehensive Conservation Plan (CCP) and the accompanying Environmental Assessment (EA) analyzes three alternatives for managing Elizabeth Hartwell Mason Neck Refuge and two alternatives for managing Featherstone Refuge over the next 15 years. This document also contains six appendixes that provide additional information supporting our analysis. Following is a brief overview of each alternative.

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Alternative A (Current Management): Alternative A satisfies the National Environmental Policy Act (NEPA) requirement of a “no action” alternative, which we define as “continuing current management.” It describes our existing management priorities and activities, and serves as a baseline for comparing and contrasting alternatives B and C.

Alternative B (Improved Management for Federal Trust Resources): Alternative B is the Service-preferred alternative. It combines the actions we believe would best achieve that refuge’s purposes, vision and goals, and respond to public issues. It would enhance our management of refuge habitats to support Federal trust resources and species of conservation concern. In particular, our priority would be to protect the refuge’s upland forests to benefit bald eagles, great blue heron, and other forest-dependent migratory birds and to protect the refuge’s marsh habitat to benefit eagles, waterfowl, waterbirds, and interjurisdictional fish. Our Mason Neck Refuge visitor service’s program would enhance compatible wildlife-dependent activities, with emphasis on wildlife observation and photography. We would improve our current trails and add new trails, observation platforms, and photography blinds. We would also offer a new youth turkey hunt, and expand our interpretive programs and outreach efforts to inform and involve more people in working towards refuge goals.

Alternative C (Enhanced Public Use Management): Alternative C would manage habitat similar to alternative A, but would expand wildlife-dependent public use programs beyond that which is proposed under either alternatives A or B. We would devote more staff time and resources to improving each of the six priority public uses. For example, we would provide additional opportunities by offering a muzzleloader deer hunting season, constructing photography blinds, and offering more guided and self-guided wildlife observation tours and environmental education programs.

Featherstone National Wildlife Refuge

Alternative A (Current Management): Alternative A satisfies the NEPA requirement of a “no action” alternative, which we define as “continuing current management.” It describes our existing management priorities and activities, and serves as a baseline for comparing and contrasting alternative B.

Alternative B (Enhanced Management): Alternative B is the Service-preferred alternative. Under alternative B, the Service would build off the wildlife and habitat actions in alternative A. Increased emphasis would be on monitoring and protecting sensitive areas from human disturbance and monitoring and controlling invasive plants, pests, and pathogens to avoid catastrophic loss or degradation of habitat. Under alternative B, the Service would continue to pursue and evaluate options with Prince William County and other stakeholders to secure public parking, and safe and legal public access to the refuge, including segment of the Potomac Heritage National Scenic Trail. Once public access is secured, and we have additional staff to effectively manage a visitor program, we would provide opportunities for wildlife observation and nature photography on designated refuge trails, and fishing at designated sites. Within 5 years we would also evaluate in detail a proposal to provide hunting opportunities on the refuge.

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Chapter 1



USFWS

Mason Neck Refuge

The Purpose of and Need for Action

- Introduction
- Document Organization
- The Purpose of and Need for the Proposed Action
- Regional Context and Project Analysis Area
- The Service and Refuge System Policies and Mandates Guiding Planning
- Conservation Plans and Initiatives Guiding the Project
- Refuge Management Profiles
- Vision Statements
- Refuge Goals
- The Comprehensive Conservation Planning Process
- Issues, Concerns, and Opportunities

Introduction

This document supports development of a Comprehensive Conservation Plan (CCP) for Elizabeth Hartwell Mason Neck National Wildlife Refuge (Mason Neck Refuge; refuge) and Featherstone National Wildlife Refuge (Featherstone Refuge; refuge). These refuges, together with Occoquan Bay National Wildlife Refuge (Occoquan Bay Refuge), comprise the Potomac River National Wildlife Refuge Complex (Refuge Complex) in northern Virginia (map 1.1). A CCP for Occoquan Bay National Wildlife Refuge was completed in 1997 (USFWS, 1997).

Mason Neck Refuge was established in 1969 as the first national wildlife refuge specifically created to protect a Federal-listed endangered or threatened species. The refuge was created under the authority of the Endangered Species Preservation Act of 1966, the precursor to the current-day Endangered Species Act of 1973. The bald eagle (*Haliaeetus leucocephalus*), which was Federal-listed as threatened in 1969 was, and continues to be, the focal species of concern on the refuge. Due to successful recovery efforts throughout its range, the bald eagle was officially removed from the Federal list in 2007. It continues to be protected, however, under other Federal laws and by the Commonwealth of Virginia. Mason Neck Refuge encompasses 2,277 acres of forest, marsh, and riverine habitat along Occoquan Bay and the mainstem of the tidal Potomac River (map 1.2).

Featherstone Refuge was established in 1979 with land acquired from the District of Columbia. It was further expanded in 1992 with lands donated by Prince William County. It presently encompasses 325 acres of marsh and forested riverine habitat along the southwest edge of Occoquan Bay (map 1.3). Its wetlands are important habitat for bald eagles, wading and waterbirds, and waterfowl, as well as other native species of conservation concern.

Occoquan Bay Refuge was established in 1998, combining land previously acquired as Marumsco Refuge in 1972 and later, military surplus lands. Its 642 acres include extensive grasslands interspersed with marshes and early successional shrub and forest areas that support neotropical migratory birds and grassland-dependent species. For further details on this refuge and its management, please contact refuge headquarters staff or visit the refuge website at <http://www.fws.gov/occoquanbay/index.html>.

In 1998, Mason Neck, Featherstone, and Occoquan Bay Refuges were administratively organized into the Potomac River National Wildlife Refuge Complex. This organization was based in large part on recognizing that Occoquan Bay Refuge had grown to equal Mason Neck Refuge in management complexity. This change necessitated a broader sharing of staff and resources to address the management requirements of all three refuges simultaneously. Given the close proximity of the three refuges, combining their administration made sense from an efficiency standpoint.

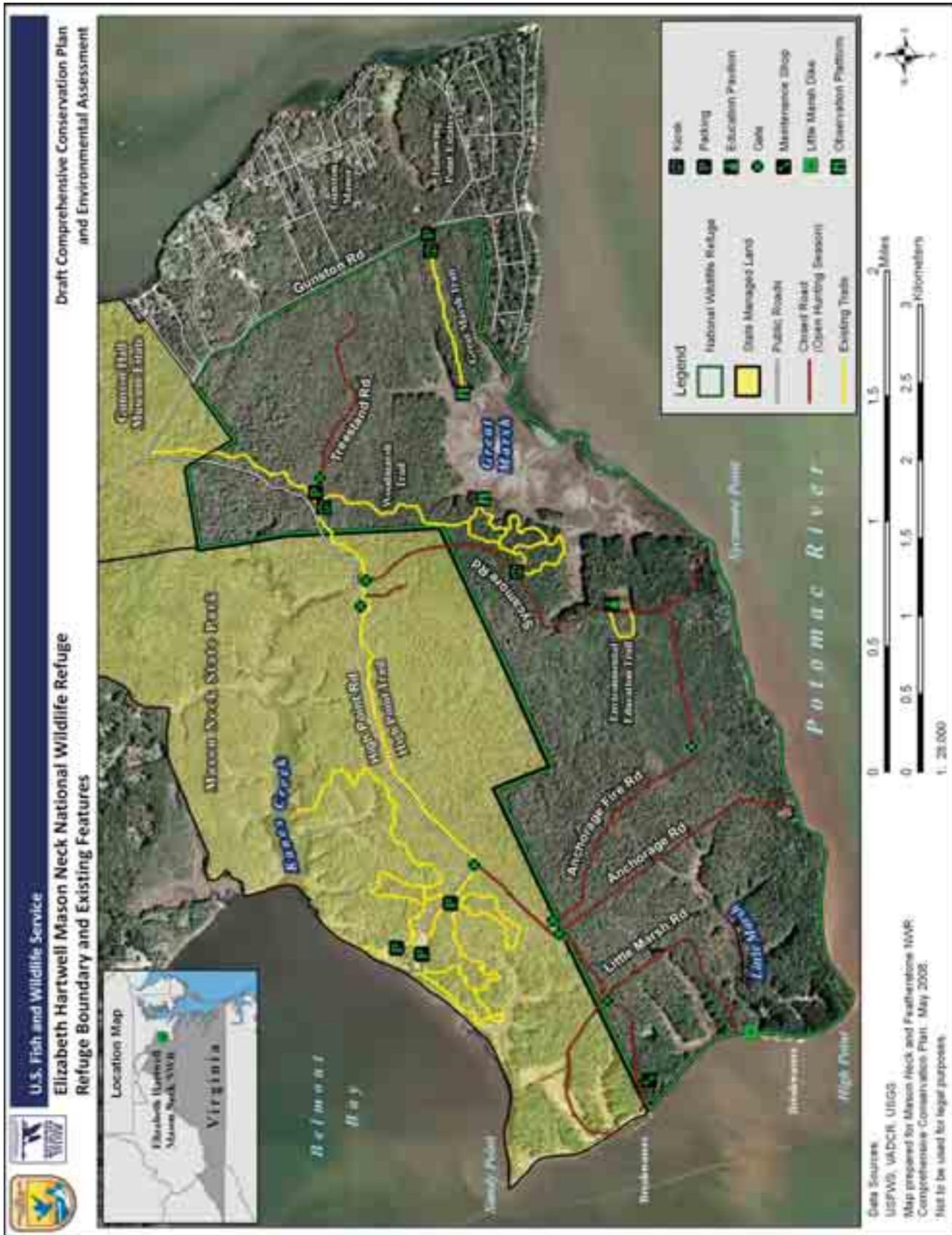
The U.S. Fish and Wildlife Service (Service; we; our) propose to manage Mason Neck and Featherstone Refuges under CCPs developed through a planning process, including an environmental assessment (EA), which meets the requirements of two Federal laws:

- 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 (Pub. L. 105-57; 111 Stat. 1253; Refuge Improvement Act)
- the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq.; 83 Stat. 852), as amended

Map 1.1. Potomac River National Wildlife Refuge Complex



Map 1.2. Mason Neck National Wildlife Refuge Boundary and Features



Map 1.3. Featherstone National Wildlife Refuge Boundary and Features



This draft CCP/EA fully evaluates management alternatives for Mason Neck and Featherstone refuges which differ in how they address goals and the public issues identified during scoping and outlined later in this chapter. Following public review of this document, the Regional Director’s decision on the alternatives will result in final CCPs for each refuge to guide management decisions over the next 15 years. We will also use CCPs to promote understanding and support for refuge management among State agencies in Virginia, our conservation partners, local communities, and the public.

Document Organization

This draft CCP/EA has six chapters and six appendixes. Chapter 1 sets the stage for the rest of the document by:

- describing the purpose of, and need for, a CCP and EA;
- defining our planning analysis area;
- presenting the mission, policies and mandates affecting the development of the plan;
- identifying other conservation plans we used as references;
- clarifying the vision and goals that drive refuge management;
- describing our planning process, including public and partner involvement, and its compliance with National Environmental Policy Act (NEPA) regulations; and,
- identifying public issues or concerns that surfaced during plan development.

Chapter 2, “Description of the Affected Environment,” describes the two refuges’ regional and local settings, physical attributes, habitats and species, and human-built infrastructure.

Chapter 3, “Alternatives Considered, including the Service-preferred Alternative,” presents the three management alternatives we evaluated for Mason Neck Refuge and the two management alternatives for Featherstone Refuge. Each set of alternatives comprises different strategies for meeting the respective refuge’s goals and objectives, and for addressing public issues.

To summarize the alternatives we consider for Mason Neck Refuge:

Alternative A—continuing our present management of the refuge;

Alternative B—managing it to benefit Federal trust resources dependent on mature forests and freshwater wetlands, and maintain quality public use programs; or,

Alternative C—maintaining the current biological program, but expanding public uses.

To summarize the alternatives we consider for Featherstone Refuge:

Alternative A—continuing our present refuge management; or

Alternative B—protecting wetlands and mature forest habitats, and, assuming safe, public access is secured, offering wildlife-dependent public use on the refuge.

For both refuges, we have identified Alternative B as the Service-preferred alternative.

Chapter 4, “Environmental Consequences,” evaluates the environmental effects of implementing each of the management alternatives. That is, it predicts the foreseeable benefits and potential adverse impacts for the socioeconomic, physical, cultural, and biological environments described in chapter 2.

Chapter 5, “Consultation and Coordination with Others,” summarizes how the public and our partners were involved in the planning process. Their involvement is vital for the future management of the refuges.

Chapter 6, “List of Preparers,” credits this plan’s writers and contributors.

Six appendixes provide additional supporting documentation and references:

- Appendix A: Species and Habitats of Conservation Concern, and Other Species Lists For the Refuges
- Appendix B: Findings of Appropriateness and Compatibility Determinations
- Appendix C: Refuge Operations Needs System (RONS) and Service Asset Maintenance Management System (SAMMS)
- Appendix D: Wilderness Review
- Appendix E: Staffing Charts by Alternative
- Appendix F: Archeological and Historical Resources Overview

The Purpose of and Need for the Proposed Action

We propose to develop CCPs for Mason Neck and Featherstone Refuges that, in the Service’s professional judgment, best:

- achieve each refuge’s purposes, vision, and goals;
- contribute to the mission and goals of the National Wildlife Refuge System (Refuge System);
- adhere to Service policies and other mandates;
- address significant issues; and
- incorporate sound principles of fish and wildlife science.

In developing a final plan, NEPA regulations require us to evaluate a reasonable range of alternatives, including our preferred action and “no action.” The no-action alternative can mean either (1) not managing the refuge, or (2) not changing its present management. For both refuges included in this plan, alternative A is the latter which we refer to as “current management.” All alternatives will be evaluated and compared as to how well they meet the purpose of, and the need for, a CCP.

The specific *purpose of* adopting a CCP for each refuge is to accomplish the following goals:

Mason Neck Refuge Goals

Goal 1. Protect, enhance, and restore the biological integrity, diversity, and environmental health of mature hardwood-mixed forests to support native wildlife and plant communities including species of conservation concern.

Goal 2. Protect, enhance, and restore the biological integrity, diversity, and environmental health of wetland habitats and shorelines to support native wildlife and plant communities including species of conservation concern.

Goal 3. Provide quality, compatible wildlife-dependent recreational opportunities with particular emphasis on interpretation and wildlife observation.

Goal 4. Enhance efforts to promote awareness, understanding, and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.

Goal 5. Enhance efforts to protect and interpret refuge cultural resources.

Featherstone Refuge Goals

Goal 1. Protect forest, wetland, and shoreline habitats to support native wildlife and plant communities including species of conservation concern.

Goal 2. Provide compatible, wildlife-dependent recreational opportunities to increase the enjoyment and appreciation of the refuge's resources to visitors and nearby residents.

Goal 3. Promote awareness, understanding, and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.

There are several reasons we identify a *need for* CCPs on these refuges. First, the 1997 Refuge Improvement Act requires us to write a CCP for every national wildlife refuge to help fulfill the mission of the Refuge System. Also, new Service policies providing specific guidance on implementing the Improvement Act have been developed since the refuges were established. A CCP incorporates those policies, and specifically fulfills the need to provide each refuge with strategic management direction for the next 15 years 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 management actions
- ensuring that refuge management conforms to the policies and goals of the Refuge System and legal mandates
- ensuring that present and future wildlife dependent public uses are compatible with the purposes of the refuge
- providing long-term continuity and direction in refuge management
- justifying budget requests for staffing, operating and maintenance funds

In addition, both refuges lack master plans to accomplish the actions above in a regional landscape and economy that has changed considerably since the refuges

were established. Additionally, pressures for public access have continued to grow, and new ecosystem and species conservation plans bearing directly on management of the two refuges have been developed.

Also, in recent years, 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 CCPs to guide us in conserving Federal trust species along the shoreline of the tidal Potomac River that are consistent with the overarching vision of the Potomac River Refuge Complex.

All of these reasons underscore the need for the strategic direction a CCP provides. To help us resolve management issues and public concerns, our planning process incorporates input from State natural resource agencies in Virginia, affected communities, individuals and organizations, our partners and the public.

Regional Context and Project Analysis Area

The regional context (map 1.4) is the Chesapeake Bay and the portion of the Chesapeake Bay watershed drained by the Potomac River.

The project analysis area (map 1.5) includes:

- The local watershed of the three refuges in the Potomac River Refuge Complex—the Middle Potomac–Anacostia–Occoquan sub-watershed
- The migratory bird conservation area defined by the Atlantic Coast Joint Venture (ACJV) as the Tidal Potomac River focus area
- The Lower Potomac River Important Bird Area (IBA) designated by the National Audubon Society (NAS, 2007)
- The Coastal Plain-Potomac Ecological Drainage Unit (EDU), defined by VDGIF for conservation of State aquatic species of concern (VDGIF, 2005)

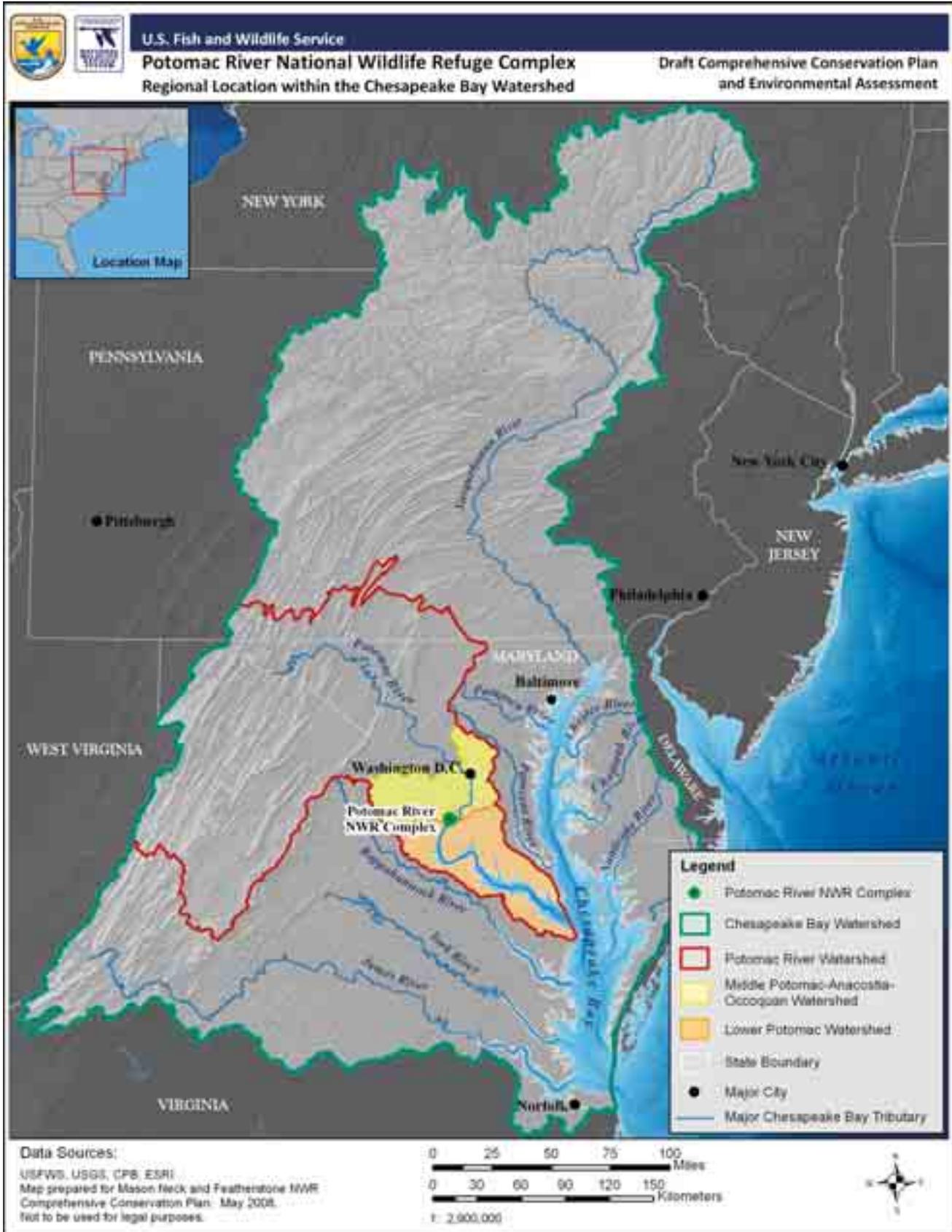
The main stem of the Potomac River is under the jurisdiction of the State of Maryland. Tributaries, embayments and backwaters on the Virginia side—outside of the main stem—such as Occoquan Bay, are under the jurisdiction of the Commonwealth of Virginia.

Socioeconomic Context

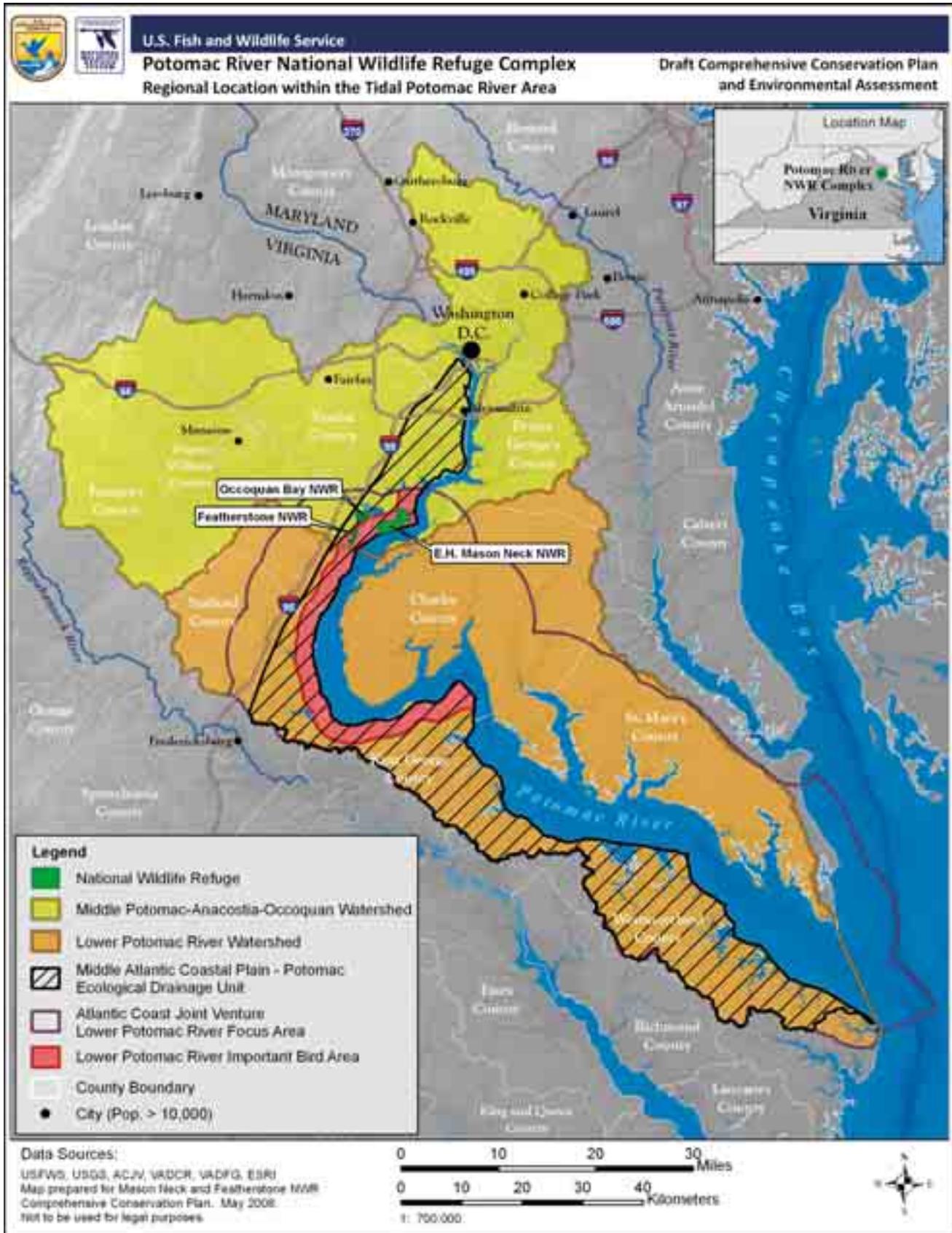
The socio-economic context for both refuges is northern Virginia, which has a geographic area of approximately 1,304 square miles and is home to over 2,000,000 residents (NVRC, 2010). Northern Virginia is a sub-area of both the state of Virginia and the Washington, D.C. metropolitan area. It borders Maryland and Washington, D.C. along the Potomac River and is found at the northeastern reaches of Virginia (map 1.6).

The Northern Virginia Regional Commission (NVRC) compiles a wide range of information regarding the demographic, social and economic characteristics of the northern Virginia population. The NVRC is a regional council of representing the local governments. Its fourteen members comprise four counties: Arlington, Fairfax, Loudoun and Prince William; five independent cities: Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park; and five incorporated towns: Dumfries, Herndon, Leesburg, Purcellville and Vienna. The NVRC's Northern Virginia Databook (2003) presents a range of demographic information including data on income, education, taxes, employment, economics, housing, and transportation. The Databook, with data organized by city and county, is available online from <http://www.novaregion.org/>.

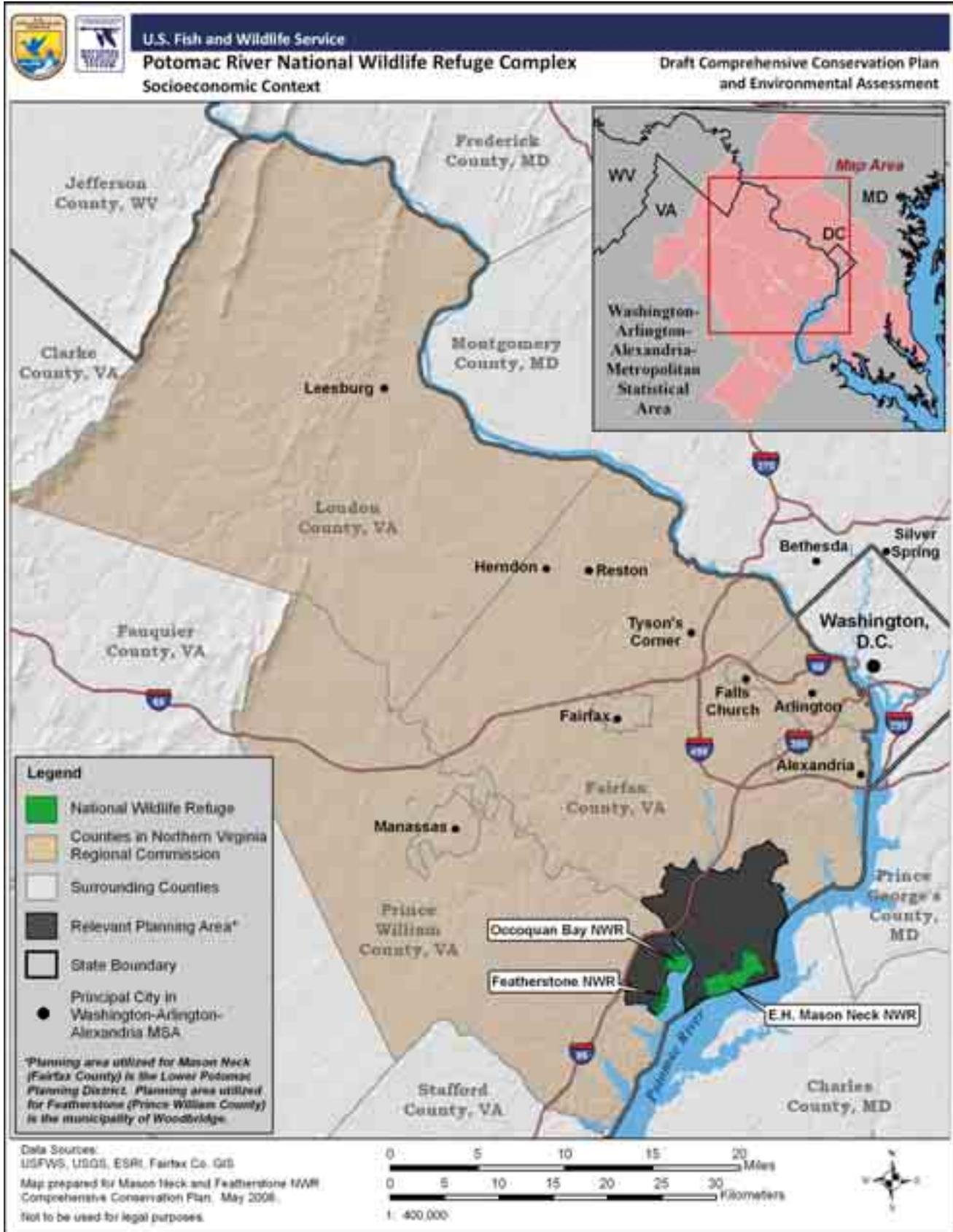
Map 1.4. Potomac River Refuge Complex and its Regional Context



Map 1.5. Mason Neck and Featherstone Refuges Project Analysis Area



Map 1.6. Mason Neck and Featherstone Refuges Socioeconomic Context



The Service and 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. Our 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 and fish;
- Federal-listed endangered or threatened species;
- inter-jurisdictional fish;
- wetlands;
- certain marine mammals; and,
- national wildlife refuges

In addition to national wildlife refuges, the Service 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>).

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 more than 150 million acres of lands and waters in all 50 states and several 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 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. 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 policies and guidelines on enforcing laws. These are a few noteworthy policies instrumental in developing these CCPs.

Policy on the National Wildlife Refuge System Mission, Goals and Purposes

This policy (601 FW 1) sets forth the Refuge System mission noted above, how it relates to the Service mission, and explains the relationship of the Refuge System mission and goals, and the purpose(s) of each unit in the Refuge System. In addition, it identifies the following Refuge System goals:

- conserve a diversity of fish, wildlife, and plants;
- develop and maintain a network of habitats;
- conserve those ecosystems, plant communities, and wetlands that are unique within the United States;
- provide and enhance opportunities to participate in compatible, wildlife-dependent recreation; and,
- help to foster public understanding and appreciation of the diversity of fish, wildlife, plants and their habitats.

This policy also establishes management priorities for the Refuge System:

- conserve fish, wildlife, and plants and their habitats;
- facilitate compatible wildlife-dependent recreational uses; and,
- consider other appropriate and compatible uses.

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 mandates.

This planning policy (602 FW 3) provides guidance, systematic direction, and 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.

Policy on Maintaining Biological Integrity, Diversity, and Environmental Health

This policy (601 FW 3) 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.

Policy on Wildlife-Dependent Recreation

This policy (605 FW 1-7) includes 7 chapters providing Service policies, strategies, and requirements concerning the management of wildlife-dependent recreation programs within the Refuge System. The 1997 Refuge Improvement Act establishes that “compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the Refuge System.” The overarching goal of this policy is to enhance wildlife-dependent recreation opportunities and access to quality visitor experiences on refuges while managing refuges to conserve fish, wildlife and plants and their habitats. New and ongoing recreational uses should help visitors focus on wildlife and other natural resources. These uses should provide an opportunity to make visitors aware of resource issues, management plans, and how the refuge contributes to the Refuge System and Service missions. Thus, we only allow wildlife-dependent recreation on a refuge after we first determine it is appropriate and compatible (see discussions below). Six wildlife-dependent uses were identified in the 1997 Refuge Improvement Act as being priority general public uses of the Refuge System and should receive enhanced consideration over non-priority uses. Those uses are: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Chapters 2 through 7 present guiding principals for each of these respective uses and provides guidance on how to plan for, establish, conduct and evaluate each program.



Green-backed heron

Lee Karney/USFWS

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. A required form documents the decision. 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, or 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) relates to 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 found appropriate, the refuge manager will not allow the use and will not prepare a compatibility determination.

This policy and its regulations, along with a description of the process and requirements for conducting compatibility reviews, can be viewed on-line at <http://www.fws.gov/policy/603fw2.html>. 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 it is allowed 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 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.
- When the refuge manager publishes a compatibility determination, it will stipulate the required maximum reevaluation dates: 15 years for wildlife-dependent recreational uses; or 10 years for other uses.
- However, the refuge manager may reevaluate the compatibility of any use at any time: for example, sooner than its mandatory date, or even before we complete the CCP process, 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 is compatible, based on other considerations such as public safety, policy, or available funding.

Other Mandates

Although Service and Refuge System policy, along with each refuge’s purposes, provides the foundation for its management, there are other Federal laws, executive orders, treaties, interstate compacts, and regulations on conserving and protecting natural and cultural resources that also affect how we manage refuges. A centralized library of Service-wide policies, executive orders, director’s orders, and the “Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service” can be viewed 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 that the CCP for each refuge identify its archaeological and cultural values. The 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; Public Law 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 established detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from Federal or Indian lands. It also establishes civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from Federal or Indian 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; Public Law 86-523,) approved June 27, 1960, (74 Stat. 220) as amended by Public Law 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 a Federal or Federal-assisted, licensed or permitted project may cause loss or destruction of significant scientific, prehistoric or archaeological data. The Act authorizes use of appropriated, donated and/or transferred funds for the recovery, protection and preservation of such 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 Public Law 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 designation, acquisition, administration and protection of such sites. Among other things, National Historic and Natural Landmarks are designated under authority of this Act. More than 30 national wildlife refuges contain such sites.
- The National Historic Preservation Act of 1966 (16 U.S.C. 470-470b, 470c-470n) Public Law 89-665, approved October 15, 1966, (80 Stat. 915) and repeatedly amended, provides for preservation of significant historical features (buildings, objects and sites) through a grant-in-aid program to the States. It established 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 also established an Advisory Council on Historic Preservation, which was made a permanent independent agency in Public Law 94-422, approved September 28, 1976 (90 Stat. 1319). That Act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register. At least 90 historic sites on national wildlife refuges have been placed on the National Register.

The Service also owns and cares for museum properties. The most common are archaeological collections, art, zoological and botanical collections, historical photographs, and historic objects. Each refuge maintains an inventory of its museum property. Our museum property coordinator in Hadley, Massachusetts guides the refuges in caring for that property and helps us comply with the

Native American Grave Protection and Repatriation Act and Federal regulations governing Federal archaeological collections. Our program ensures that Service collections will continue to be available to the public for education and research.

Two other Federal resource laws are also important to highlight as they are integral to developing a CCP. They can be viewed in their entirety at: <http://www.fws.gov/laws/lawsdigest/Resourcelaws.html>.

- The Wilderness Act of 1964 (16 U.S.C. 1131-1136; PL 88-577) established 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 these areas unimpaired for future use and enjoyment as wilderness. The Act also directed the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 or more acres 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 we evaluate the potential for wilderness on refuge lands, as appropriate, during the CCP planning process.
- The Wild and Scenic Rivers Act of 1968, as amended, selects certain U.S. rivers 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 we evaluate the potential for wild and scenic rivers designation on refuge lands, as appropriate, during the CCP planning process.

Chapter 4, “Environmental Consequences,” evaluates this plan’s compliance with the Acts noted above, as well as the Clean Water Act of 1977 as amended (33 U.S.C. 1251 *et seq.*; PL 107-303), Clean Air Act of 1970 as amended (42 U.S.C. 7401 *et seq.*), and the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531-1544), as amended. This draft CCP/EA fulfills the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321-4347), and the Council on Environmental Quality’s (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508).

Our mandates also include orders directed by the President, Secretary of Interior, and/or Director of the U.S. Fish and Wildlife Service. Several of these mandates of special importance to this CCP/EA are:

- Presidential Executive Order 13508—Chesapeake Bay Protection and Restoration (signed 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.” The order also establishes the development of a strategy for coordinated implementation of existing programs and projects and development of 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; 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 requires 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/reports/BCC2008m.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). The Refuge Complex 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 Complex lies within the plan's "Lower Potomac River—Virginia Sub-focus Area" (map 1.5). You can view the plan online at <http://www.acjv.org/planning.htm>.

The waterfowl goal for the ACJV is to "[p]rotect 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/bdjb/>. 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)**

This plan covers the Mid-Atlantic/Southern New England Bird Conservation Region (BCR 30), which extends from southern Maine to coastal Virginia, including the Chesapeake Bay. This region 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 this region.

The purpose of the BCR 30 Plan is to develop common regional goals for bird conservation by integrating information from continental and regional bird conservation initiatives and State wildlife action plans, such as the U.S. Shorebird Conservation Plan, the North American Waterbird Conservation Plan, and the North American Waterfowl Management Plan (see separate discussions of plans below). The specific goals are to (1) identify the highest priority bird species and their specific habitat needs and threats; (2) delineate and define geographic focus areas for priority species; (3) use conservation design methods and modeling approaches to refine identification of important geographic areas; (4) develop models to estimate population and habitat goals for priority species; (5) identify the highest priority monitoring and research needs for birds and habitats; (6) focus resources towards the highest priority birds and the habitats they depend upon; and (7) create a communication platform encouraging dialogue on bird conservation activities both within and between states and partners at the BCR scale.

To help achieve these goals, the plan lists 134 priority bird species for BCR 30 and identifies the region's coastal beaches, wetlands, and forested upland communities as the most important habitat types in need of protection. Throughout the region, the greatest threats to the conservation of these species and habitats are habitat degradation and loss, fragmentation, invasive species, and human disturbance. The plan also:

- Outlines activities and management actions thought to be most useful in addressing these needs and threats;
- Highlights the most important geographic areas to focus conservation action on; and
- Establishes a regional bird conservation initiative with partners across the BCR 30 to communicate and coordinate conservation planning and implementation.

For more information or to view the entire plan, please visit <http://www.acjv.org/bcr30.htm>. 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."

**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. You can access the plan online at <http://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 goals 1 and 2, and while compiling appendix A.



Donna Dewhurst

Green-winged teal

U.S. Shorebird (2001, 2nd edition) 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, and while compiling appendix A.

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/baldeagle.htm>. We referred to these guidelines as we developed management objectives and strategies for bald eagles under goal 1.

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 Bird Conservation Plan (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:

- Forested Wetland: cerulean warbler (*Dendroica cerulean*), Swainson’s warbler (*Limnothlypis swainsonii*), Kentucky warbler (*Oporornis fromosus*), Acadian flycatcher (*Empidonax virescens*), yellow-throated vireo (*Vireo flavifrons*), prothonotary warbler (*Protonotaria citrea*), and Louisiana waterthrush (*Seiurus motacilla*).
- Mixed Upland Forest: cerulean warbler, wood thrush (*Hylocichla mustelina*), Kentucky warbler, Acadian flycatcher, worm-eating warbler (*Helmitheros vermivorum*), eastern wood-pewee (*Contopus virens*), and Louisiana waterthrush.

- Fresh/Brackish Emergent Wetland: American black duck (*Anas rubripes*) and king rail (*Rallus elegans*).
- 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 (*Cygnus columbianus*) 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>.

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.

The Refuge Complex’s tidal marsh and the surrounding shallow water habitats contribute to this goal by providing staging and wintering habitat for tundra swans. We consulted this plan and its recommended management actions as we developed objectives and strategies under goal 2.

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 (*Branta canadensis*) 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. The Refuge Complex provides staging and wintering habitat. We referred to this plan as we developed management objectives and strategies under goal 2.

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 (*Cygnus olor*) 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) as we developed management objectives and strategies for dealing with this invasive species under goals 1 and 2.

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

This plan (USFWS, 2004) 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 we considered management actions to control mute swan. We describe those in chapter 3, under "Actions Common to All Alternatives."

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 VDGIF 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



John Mosesso, Jr., NBII

Eastern ribbon snake

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

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."

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 (*Anguilla 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 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 goal 2, and in creating appendix A, "Species and Habitats of Conservation Concern."

**Virginia Department of
Game and Inland Fisheries,
Virginia's Comprehensive
Wildlife Conservation
Strategy (2005)**

In 2002, Congress created the State Wildlife Grant Program (SWG), and appropriated \$80 million in grants 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 the state's 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 needed to develop a statewide "Comprehensive Wildlife Conservation Strategy" and submit it to the National Advisory Acceptance Team by October 1, 2005. Each plan needed 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 to "keep common species common."

The Virginia Comprehensive Wildlife Conservation Strategy, (VDGIF, 2005) more commonly referred to as the Virginia "Wildlife Action Plan" (WAP), developed from that charge. The goal of this plan is to create a vision for conserving Virginia'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 Virginia WAP supplements and validates the information on species and habitat and their distribution in our analysis area, and helps us identify conservation threats and management strategies for species and habitats of conservation concern in the CCPs. The WAP was invaluable to us during our planning process because of the depth of expertise and amount of public and partnership involvement that went into its development. We used it in developing objectives and strategies for goals 1 and 2, and in developing appendix A, "Species and Habitats of Conservation Concern." These are the eight elements:

- 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

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

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.

A Guide to the Conservation of Forest Interior Dwelling Birds in the Chesapeake Bay Critical Area. (Chesapeake Bay Critical Area Commission—Maryland Department of Natural Resources, 2000)

Forest interior dwelling birds (FIDS) require large tracts of forest for nesting, breeding, and foraging habitat. FIDS are a diverse group of birds, including migratory songbirds, woodpeckers, hawks, and owls. Although many of the FIDS species are still relatively common, populations of some of these species are declining. The loss and fragmentation of forested habitats are major threats to all FIDS species. As the Chesapeake Bay region becomes increasingly more developed, the forests these species rely on are becoming further fragmented.

The Chesapeake Bay Critical Area Commission's, "A Guide to the Conservation of Forest Interior Dwelling Birds in the Chesapeake Bay Critical Area," contains a list of the 25 FIDS species that breed in the Chesapeake Bay area, information on how to identify the presence of FIDS habitat, and conservation guidelines on how to manage for these species. The conservation guidelines focus on regional and local land use planning, site design guidelines for developers and landowners, and ways to mitigate impacts on FIDS. This guide is available online at: http://www.dnr.state.md.us/education/envirothon/wildlife/criticalareareg_FIDS.pdf

We used this guide in identifying species of concern in appendix A.

Chesapeake Bay Program. The Chesapeake Bay Program (<http://chesapeakebay.net>) 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 Environmental Protection Agency, representing the Federal government; and participating advisory groups. Since its inception, the Bay Program's highest priority has been the restoration of the Bay's living resources, including finfish, shellfish, Bay grasses, 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. In April 2007, the Chesapeake Bay 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/publication.aspx?publicationid=15548>). 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.

Potomac Conservancy. Its mission is to protect the health, beauty, and enjoyment of the Potomac River and its tributaries. The Conservancy's primary focus is protection of water quality through land protection and sound land use practices. Because clean water alone is not enough, the Conservancy also works to preserve and restore the Potomac's scenic landscapes, and to enhance river-based recreational opportunities. (<http://www.potomac.org/site/about-us/>)

Fairfax County Comprehensive Plan of 2007. This Comprehensive Plan, required by State law, is a guide to decision-making about the built and natural

Red-tailed hawk



environment by the county’s Board of Supervisors and other agencies, such as the Planning Commission and the Board of Zoning Appeals. It is also a guide for County staff and the public to use in the planning process.

Prince William County Comprehensive Plan of 2003 with Amendments of 2006.

This Comprehensive Plan creates a vision for the future of Prince William County. It is used as a guideline for evaluating and negotiating development applications. Generally, development applications that fail to match Comprehensive Plan goals and actions can be denied. The Comprehensive Plan includes a map that shows planned land uses on a parcel-to-parcel basis. It also lists specific goals and actions that are needed to make the vision a reality.

National Audubon Society’s Important Bird Area Program.

The National Audubon Society participates in a global Important Bird Area (IBA) program which identifies areas that are most important for maintaining bird populations and focuses conservation efforts on protecting these sites. In the U.S., more than 1,200 IBAs in 40 states have been identified. The Virginia Audubon chapters have established the following goals for IBAs in the state:

- Identify, document, and publicly recognize Virginia’s most important areas for birds.
- Engage people in citizen science and avian conservation cooperative projects with land managers to benefit birds and their habitats at IBAs.
- Partner with others to bring conservation tools and resources to IBAs in need of conservation.
- Base all action on the best available scientific criteria.

The refuge lies in the Lower Potomac River IBA (map 1.5). This 281,134 acre area includes the tidal fresh/brackish reach of the Potomac River extending from Mathias Point to just above Fort Belvoir. It supports a variety of habitats including emergent and forested wetlands, extensive tracts of upland hardwoods, and a diversity of other upland habitats.

The upper tidal reach of the Potomac River has been the focus of intensive ornithological observation for 200 years. Over this time period, the landscape and bird community have changed dramatically. Currently, the area supports a significant community of piscivorous (fish-eating) bird species, including one of

the largest great blue heron (*Ardea herodias*) colonies within the mid-Atlantic region, a dense breeding population of bald eagles, and both a summer and winter concentration area for migrant bald eagles. The rich hardwood forests are strategically important for local breeding populations of neotropical migrants, as well as, stopover areas for northern populations moving through the region in the fall. The waterways support significant populations of waterfowl during migration and winter. This IBA also includes one of only two known breeding locations for the Bachman's warbler (*Vermivora bachmanii*) in Virginia.

To learn more visit the Northern Virginia Audubon Society website at <http://www.audubonva.org/index.php/important-bird-areas-iba>.



Eagle Point Shelter at Mason Neck NWR

Individual Species Plans

We also referred to the following species specific plans while developing management goals, objectives, and strategies for both refuges.

Sensitive Joint-Vetch Recovery Plan; available at http://ecos.fws.gov/docs/recovery_plans/1995/950929b.pdf

American Shad and River Herring Fisheries Management Plan (spawning/nurseries); available at <http://www.asmfc.org/speciesDocuments/shad/fmps/1985FMP.pdf>

Final Recovery Plan for the Shortnose Sturgeon; available at http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf

Interstate Fishery Management Plan for Atlantic Sturgeon and its amendments and addendums; available at <http://www.asmfc.org/speciesDocuments/sturgeon/fmps/fmps/sturgeonFMP.pdf>

American Eel Fisheries Management Plan and addendum; available at <http://www.asmfc.org/speciesDocuments/eel/fmps/eelFMP.pdf>

Small-Whorled Pogonia Recovery Plan; available at http://ecos.fws.gov/docs/recovery_plans/1992/921113b.pdf

Refuge Management Profiles

Establishing Authority and Purpose

Elizabeth Hartwell Mason Neck Refuge (Mason Neck Refuge) was established in 1969 as the Nation's first refuge specifically established to protect a Federal-listed endangered or threatened species—the bald eagle, which was Federal-listed as threatened until 2007. From the initial acquisition of 845 acres in 1969, Mason Neck Refuge has grown to 2,277 acres. This includes 789 acres leased in 1982 for 60 years from the Northern Virginia Regional Park Authority. Map 1.2 depicts the refuge and its current features.

Featherstone National Wildlife Refuge (Featherstone Refuge) was established under Public Law 91-499, approved October 22, 1970 (84 Stat 1095). This law authorized the Secretary of the Interior to acquire, by purchase or exchange, portions of a tract of land in Prince William County, Virginia (then being disposed of by the District of Columbia). As a prerequisite of the transaction, both the Secretary and the District of Columbia had to mutually agree that the lands were formally classified wetlands, or included adjacent lands necessary to protect the natural features of the wetlands, and were worthy of permanent protection. The purchase of the first 164 acres did not occur until 1979. This was followed by a 161 acre gift from Prince William County in 1992 resulting in the present 325-acre refuge. Map 1.3 depicts the refuge and its current features.

Refuge Administration

Mason Neck and Featherstone Refuges are administered as part of the Potomac River National Wildlife Refuge Complex, sharing staff based at Refuge Complex headquarters in Woodbridge, Virginia. Mason Neck Refuge has its own maintenance compound on site. Featherstone Refuge has no onsite facilities and is maintained with equipment located at Occoquan Bay Refuge. The Refuge Complex has six full-time permanent staff members: the refuge manager, assistant refuge manager, outdoor recreation planner, law enforcement officer, administrative assistant, and maintenance worker. These positions have responsibilities throughout the Refuge Complex. The Refuge Complex also may employ seasonal, part-time, or term appointments.

Refuge Operational Plans ("Step-down" Plans)

Refuge planning policy (602 FW 3) lists more than 25 step-down management plans that are generally required for refuges. Those plans outline specific strategies and implementation schedules for achieving refuge goals and objectives. Some plans require annual revisions; others require revision every 5 to 10 years. Some also require additional NEPA analysis, public involvement, and compatibility determinations before we can implement them.

The status of step-down plans on the refuges follows. This draft CCP/EA document incorporates, by reference, those plans that are up-to-date.

Step-down plans and annual updates completed for the Refuge Complex:

- Chronic Wasting Disease (2006)
- Avian Influenza (2006)
- Safety (annually updated)
- Emergency Action (annually updated)
- Continuity of Operations (annually updated)
- Hazard Communications (annually updated)
- Hurricane (annually updated)

The following plan is completed for both Mason Neck and Featherstone Refuges:

- Fire Management (2004; anticipate 2011 update)

The following plans will be completed:

- Law Enforcement (in preparation for the Refuge Complex; will be completed in 2011)

- Habitat Management (HMP; will be done for each refuge)
- Visitor Services (VSP; will be done for each refuge)
- Integrated Pest Management (IPM; will be done for each refuge)
- Inventory and Monitoring (IMP; will be done for each refuge)
- Sign (will be done for each refuge)

In Chapter 3, “Alternatives Considered, Including the Service-preferred Alternative,” we prioritize the development of the plans not yet completed. Additional plans may be required depending on the alternative selected for the final CCPs.

Vision Statements

Very early in the planning process, our team developed the following vision statements to establish a desired condition for the entire Refuge Complex, as well as to provide a guiding management philosophy and convey Mason Neck and Featherstone Refuges’ unique contribution to that overall vision.

Potomac River National Wildlife Refuge Complex Vision

“The Potomac River National Wildlife Refuge Complex provides exceptional forest, grassland, and wetland habitats for wildlife in a dynamic, highly urbanized region of Northern Virginia. We will maintain and enhance those quality habitats along the middle tidal Potomac River for native wildlife, particularly bald eagles and other species of conservation concern.”

The proximity of the Refuge Complex to our Nation’s capital provides unparalleled opportunities to demonstrate the importance of the natural world in enhancing the quality of human life, and to raising public awareness about the value of the National Wildlife Refuge System. Through outreach, education, and partnerships, we will foster stewardship of the living resources of the Potomac River and relate their significance to the greater Chesapeake Bay watershed. Visitors will have diverse opportunities for quality, compatible, wildlife-dependent recreation.”

Elizabeth Hartwell Mason Neck National Wildlife Refuge Vision

“Elizabeth Hartwell Mason Neck National Wildlife Refuge is dedicated to the protection of the bald eagle and exemplifies the significant efforts, contributions and successes of conservationists. The refuge will continue to protect and enhance regionally important habitat for the bald eagle, migratory birds, and native wildlife and plant species. We will provide quality wildlife-dependent recreational and educational opportunities, in particular wildlife viewing and photography. In cooperation with the other public agencies on the Mason Neck Peninsula, we will work to resolve resource issues in the area.”

Featherstone National Wildlife Refuge Vision

“Featherstone National Wildlife Refuge provides valuable acres of ‘wild woods and wetland’ which are rapidly disappearing within this region of Northern Virginia. The refuge will continue to protect wetlands, bottomland hardwoods, and associated native wildlife and plants in an otherwise highly urbanized setting. Assuming access issues are resolved, the refuge will provide quality wildlife-dependent recreational opportunities, in particular wildlife viewing, photography, and fishing.”

Refuge Goals

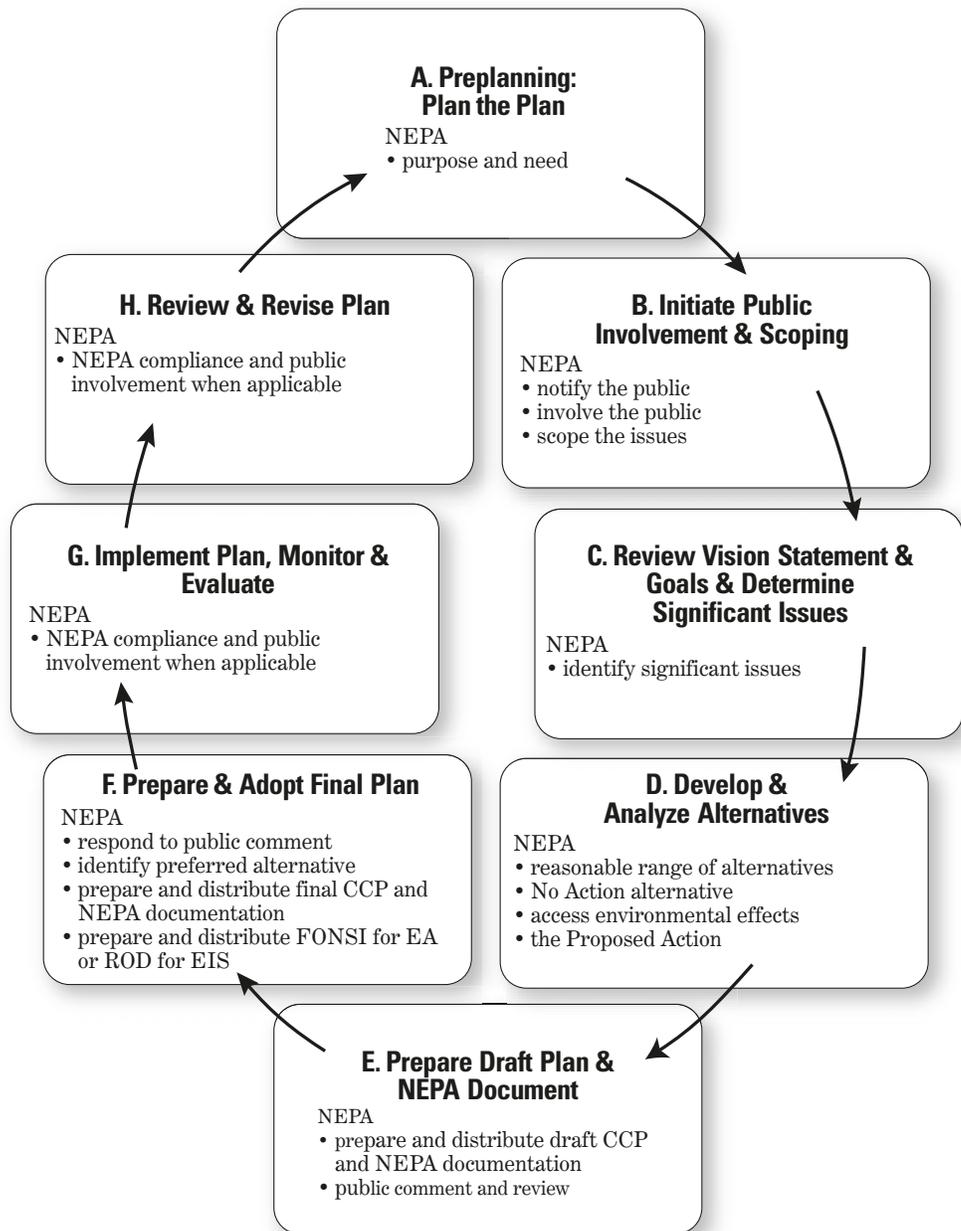
In our discussion on the “purpose of and need for the proposed action” earlier in this chapter, we presented the goals we developed for each refuge. Those goals are based on our vision for each refuge, their respective establishment purposes, the missions of the Service and the Refuge System, and the mandates, plans, and conservation initiatives above. The goals are intentionally broad, descriptive statements of purpose. They highlight elements of our vision for the refuge we will emphasize in its future management. The biological goals take precedence; but otherwise, we do not present them in any particular order. In chapter 3,

The Comprehensive Conservation Planning Process

“Alternatives Considered, Including the Service-preferred Alternative,” we evaluate different ways of achieving the goals.

Service planning policy (602 FW 3) establishes an eight-step planning process that also facilitates our compliance with NEPA (figure 1.1). Our planning policy and CCP training course materials describe those steps in detail. We followed this process in developing this draft CCP/EA document. Although the steps are sequential, CCP planning and NEPA documentation are iterative processes. It is normal to cycle through some steps more than once or to have several steps occurring simultaneously. Also, actions within each of the eight steps may not occur sequentially. For more information visit the website <http://policy.fws.gov/602fw3.html>.

Figure 1.1. The Comprehensive Conservation Planning Process



In 2006, we began developing CCPs for Mason Neck and Featherstone Refuges by collecting information on refuge resources. We also began planning agency and public scoping efforts. We undertook the following actions to complete planning steps A-D.

- Held first CCP core team meeting in September 2006; drafted a vision statement and identified preliminary issues.
- Distributed separate planning newsletters on Mason Neck Refuge and Featherstone Refuge in March 2007 to announce CCP project kick-off, notify the public about the public scoping open house meetings, and share draft vision and goals statements.
- Held open house March 27, 2007 with primary focus on Featherstone Refuge at the Potomac Community Library in Woodbridge, Virginia.
- Held open house March 28, 2007 with a primary focus on Mason Neck Refuge at Gunston Elementary School in Lorton, Virginia. We were prepared to discuss both refuges at either open house date.
- Held a CCP core team meeting March 29, 2007 to discuss the comments made at the scoping meetings, to further define key issues, and to develop a draft CCP schedule.
- Published a Federal Register Notice of Intent (NOI) in May 2007.
- Hosted an inter-agency Visitor Services Program Review that included Service experts and representatives from Mason Neck State Park, Virginia State Parks, and VDGIF on May 15, 2007.
- Hosted an inter-agency Biological Program Station Evaluation that included Service experts and representatives from Mason Neck State Park, Virginia State Parks, and VDGIF on May 16, 2007.
- Distributed a planning newsletter in November 2007 summarizing public scoping comments and describing the visitor services and biological field reviews.
- Held a series of CCP team meetings to develop alternatives from March–October 2007.
- Worked as a team to analyze alternatives and write a draft document from October 2007–September 2010.

As part of the planning process, we also evaluated Service fee-owned lands on the refuges for their possible inclusion into the National Wilderness Preservation System. We completed that evaluation in 2008 with the recommendation that no lands qualified and that we not proceed with a wilderness study. Appendix D shows the results of our assessment.

We also considered whether any waters on the refuges have potential for Federal Wild and Scenic River status. Although Mason Neck Refuge has one border along the Potomac River, the river is not included within its boundaries. The refuge otherwise borders Belmont and Occoquan Bays whose waters are under the jurisdiction of the Commonwealth of Virginia. Featherstone Refuge has one border along Occoquan Bay, and its southern border is along Neabsco Creek. No other river or river segments lie within the refuges.

Eligibility criteria for use by Federal agencies to evaluate wild and scenic rivers potential are recommended by the National Park Service and include consideration of outstanding remarkable values for scenery, recreation, geology or history. We consulted the national rivers inventory database maintained by the National Park Service which documents rivers and river segments that have been evaluated (<http://www.nps.gov/ncrc/programs/rtca/nri/>). Several segments of the Potomac River are identified as potentially eligible. The closest is the 24-mile segment from Nice Memorial Bridge in Charles County, Maryland to Sandy Point in Prince Georges County, Maryland. None of this segment occurs on refuge lands. While we would consider being a part of a more detailed evaluation of the Potomac River in proximity to the Refuge Complex, undertaking its full evaluation is outside the scope of this document and we have determined there is no need to initiate further analysis at this time.

We will complete “Step E: Prepare Draft Plan and NEPA Document,” by publishing our Notice of Availability (NOA) in the Federal Register announcing the release of this draft CCP/EA document and by distributing this document for public review. During a 45-day period of public review, we will hold public meetings to obtain comments. We also expect to receive comments by regular mail and electronic mail. After the comment period expires, we will review and summarize all of the comments we have received and develop our responses. We will present them in an appendix to the final CCPs.

Once we have prepared the final CCPs, we will submit them to our Regional Director for review and approval. He will determine whether they warrant a Finding of No Significant Impact (FONSI), and may find the analysis sufficient to simultaneously issue a decision adopting a CCP for each refuge. If he has concerns, he may require us to revise the EA or complete an environmental impact statement. We will announce his final decision by publishing a Notice of Availability in the Federal Register, where we will also notify people of the availability of the final CCPs. That will complete “Step F: Prepare and Adopt a Final Plan.”

We can then begin “Step G: Implement Plan, Monitor and Evaluate.” We will modify the final CCPs 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. As the Refuge Improvement Act and Service policy stipulate, we will review and revise CCPs every 15 years.

Issues, Concerns, and Opportunities

We define issues and concerns as “any unsettled matter requiring a management decision.” An issue can be an “initiative, opportunity, resource management problem, threat to a resource, conflict in use, or a public concern” (602 FWS 1.6). Note the inclusion of “opportunity” in the definition to convey that the context is not always negative. Issues, concerns, and opportunities arise from many sources, including our staff, other Service programs, State agencies, other Federal agencies, our partners, neighbors, user groups, or Congress. One of the distinctions among the proposed management alternatives is how each addresses those issues, concerns, and opportunities. The following summary provides a context for the issues that arose during the scoping process.

Mason Neck Refuge Issues, Concerns, and Opportunities

Based on core team discussions, Federal and State agency scoping, and public scoping, we compiled the following set of issues, concerns, and opportunities to address under our various management objectives.

Maintaining a Biological Program

Establishing a quality biological program is core to the mission of the Refuge System. The 1997 Refuge Improvement Act emphasizes that “wildlife come first” on refuges. Unfortunately, due to budget and staffing changes, the Refuge Complex has been without a wildlife biologist for several years. This has hampered the current staff’s ability to develop a strategic plan for its biological program.

- Staff Biologist—If we are to have a viable biological program in the long term, should hiring a wildlife biologist be a high priority for the Refuge Complex?
- Management Assistance—How can we best cooperate with VDGIF, other state agencies, conservation partners, and volunteers for assistance with biological inventory, monitoring, and management, and/or other aspects of the biological program?

Bald Eagle Management

With a reduction in pollution, greater awareness and better national and regional protection for populations and their habitat, the bald eagle has made a recovery. In 2007, the bald eagle was officially de-listed under the Federal Endangered Species Act. However, the bald eagle remains one of our priority management concerns because the refuge was originally established for bald eagle conservation and the species remains listed as threatened by the Commonwealth of Virginia.

- Eagle Nest Tree Protection—Although the bald eagle nest trees currently benefit from the breakwater project (see shoreline erosion below), how can we ensure continued long-term protection?
- Preventing Disturbance to Nesting Eagles—Trail restrictions should continue to be posted to protect active nest trees each year. Should those restrictions change in any way?
- Future Roost and Nest Trees—What, if any, site improvements can we make for eagles to ensure there is a sustainable and adequate stock of trees suitable for nesting and roosting? Should this be a major focus of our forest management?

Forest Management

Forest habitat accounts for most of the acres on the refuge. Protecting the diversity, integrity, and health of those forests is fundamental to our mission. We are concerned about many existing and potential threats to this habitat including deer over browsing, pests and pathogens, invasive plants, and climate change. In 2009, the Virginia Department of Forestry (VDF) conducted a Forest Health and Condition Inventory and Assessment for Mason Neck. Overall, they found that the forest as a whole was not healthy (VDF, 2009). The forest was determined to be overstocked, lacking significant regeneration, and missing a shrub and herbaceous layer. The major concerns with these conditions are: stressed trees are less able to fend off disease and pests; the lack of regeneration would mean the forest can not replace itself once trees die; and the lack of shrub and herbaceous understory means degraded habitat conditions for many forest dwelling species.

- Forest Health—How can we effectively implement the VDF’s recommendations, as presented in their Forest Health and Condition Inventory and Assessment, to help meet our forest health objectives? Which ones should be a priority?

- Deer Impacts on Forest—The forest habitat on the refuge appears to be recovering from its previously overbrowsed condition due to reductions in the deer herd from managed hunts. How can we ensure overbrowsing does not occur again?
- Deer Management Coordination—White-tailed deer (*Odocoileus virginianus*) are a problem across the Mason Neck Peninsula and it will take a coordinated effort among agencies to make any more significant improvement in habitats. How can we best continue to play a principal role in that collaborative effort?
- Deer Exclosures—Currently there are about 20 deer exclosures on the refuge, each showing differences in vegetation growth and forest floor diversity. These exclosures have not been monitored in the last several years, but many are in disrepair. What should be done with the deer exclosures?
 - Is the Bureau Land Management (BLM) still interested in using some at the Meadowood Recreation Area?
 - Is there an interpretation message about deer overbrowsing that could be facilitated at one of the exclosures visible location alongside a trail? The exclosure beside the Great Marsh Trail is in good condition and a possibility. Is this a good use of refuge staff and resources?
- Vernal Pools—What can we do to further protect and promote vernal pools on the refuge?

Heron Rookery

This great blue heron (*Ardea herodias*) rookery was once one of the largest in the Mid-Atlantic region with over 1,600 nests at its peak. It now supports approximately 800 nests. The reasons for this reduction are not entirely clear.

- What are the threats to the rookery on Mason Neck Refuge? What steps could we take to address the threats?
- Can it be maintained on the refuge, or on other protected lands in the area?

Wetlands—Little Marsh Impoundment

Little Marsh Impoundment (50 acres) is a heavily used foraging area for bald eagles and heron. It is partially drained in June and July so that fledgling heron and eagles have better access to food. We need to determine how best to address a number of management issues here.

- The Little Marsh wetland is shallow and becoming increasingly silted in, allowing emergent woody vegetation to encroach. How can we create a greater diversity of emergent marsh vegetation to better support wetland wildlife species?
- In the past, large storms have overtopped the dike threatening to damage or wash it out. How can we address the integrity of the dike?
- The water control structure continues to be damaged and disrupted by beavers. How can we address the integrity of the water control structure?

Wetlands—Great Marsh

Great Marsh (207 acres) is a significant natural resource for the refuge and its protection should be a priority. Great Marsh is one of the largest freshwater marshes in northern Virginia. The marsh contains extensive stands of wild rice and provides habitat for a variety of species including waterfowl and waterbirds (<http://www.fws.gov/refuges/profiles/index.cfm?id=51610>).

- How do we best determine what steps are needed to maintain its integrity and be proactive about certain issues, such as
 - Is water quality adversely affecting the marsh?
 - How do we continue to deal with tide and storm-deposited trash?
 - How do we best prevent invasive plants from taking hold in the marsh?

Other Wetlands

- What management practices are best for waters currently impounded on refuge streams, such as the Little Marsh Road impoundment (approximately 4 acres)?
- Can waterfowl or waterbirds benefit from these smaller impoundments?

Climate Change

Climate change is an issue of increasing concern because of its potential effects on land, water, and biological resources. In addition to warming temperatures, other predicted climate-related changes 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, and increasing frequency and intensity of severe weather events (TWS, 2004). Each of these changes would affect wildlife and habitats, but the level of impact would vary depending on the species.

Virginia's WAP identifies more than 900 species that are being impacted by the loss or degradation of their habitats. Many of these species could become extinct or extirpated from the Commonwealth if steps are not taken to reverse these trends. In coming decades, climate change would exacerbate and intensify many of the existing threats and would likely result in new sets of impacts and stressors. In 2009, VDGIF and the Virginia Conservation Network (VCN) produced Virginia's "Strategy for Safeguarding Species of Greatest Conservation Need from the Effects of Climate Change" to provide initial guidance on actions Virginia's conservation community can implement immediately to enhance the conservation of wildlife and habitats in the face of climate change while more comprehensive adaptation strategies are developed (VDGIF et al., 2009).

Conservation strategies include specific actions for conserving species and habitats, developing new data and climate modeling resources, and implementing new outreach efforts related to climate change (VDGIF et al., 2009; <http://bewildvirginia.org/climate-change/>).

- How can we manage adaptively on the refuge to address the predicted climate change impacts? Are there specific actions we can undertake to reduce environmental stressors on wildlife and habitats? Are there particular species or ecological communities that should be a priority to address?
- Is there additional research, impacts modeling, monitoring and inventories we should initiate to serve as a baseline for measuring change and/or predicting impacts?

Shoreline Protection

Shoreline erosion is an existing problem that would be exacerbated with predicted climate change impacts. Erosion is occurring along the entire refuge shoreline, but is most visible along the bluffs. Maintaining a stable shoreline is critical to sustaining the integrity of the refuge and its resources. However, shoreline stabilization can be very complex and expensive and would include coordination with several partners.

- How can we best accomplish additional shoreline protection? Breakwaters have been successful in stopping and reversing erosion trends along the southwest bluffs near the heron rookery. Should this technique be used in other locations?
- Is using fill another feasible and practicable way to stabilize the shoreline? Could we use dredge spoil as a source of material for fill?
- Are there other shoreline stabilization measures we should explore, such as “living shoreline” options?
- Are there partners with expertise willing to assist us in the design, implementation and monitoring of stabilization projects?
- What are funding sources for these projects?

Invasive Plants

Japanese stiltgrass (*Microstegium vimineum*) is the most problematic invasive plant on Mason Neck Refuge; however, there are several other invasive plants that may pose problems in the future. Other invasive species present on the refuge include mile-a-minute (*Polygonum perfoliatum*), tree of heaven (*Ailanthus altissima*), Japanese honeysuckle (*Lonicera japonica*), Japanese barberry (*Berberis thunbergii*) and beefsteak plant (*Perilla frutescens*).

- How can we best control an increasing invasive species problem?
- How do we prioritize treatment?

Invasive Animals/Insects

Emerald ash borer (*Agrilus planipennis*) and gypsy moth (*Lymantria dispar*) are pests recorded on the refuge, and while not currently a problem, they could become one without vigilant monitoring and control, where warranted.

- How can we ensure we are prepared to deal with animal and insect pests in the future?

National Historic Preservation Sites and their Protection

Recent studies identified archeological sites along the shoreline that are jeopardized by erosion.

We need to verify whether or not these sites are eligible for the National Register of Historic Places. We are also concerned about the protection of historical sites. Although we are uncertain of the presence of any important sites, the Mason family was settled on the peninsula for several generations.

- How can we protect the integrity of any sites known or eligible for the National Historic Register?
- Are there issues with public access to these sites? Can we expand refuge uses and still effectively protect these resources?

Public Use and Demands

Mason Neck Refuge is located within driving distance of approximately 10 million residents of Virginia, Maryland, and Washington, DC. The current estimate of 19,100 refuge visitors annually is likely to increase over the next 15 years. Such an increase is especially likely if refuge facilities are expanded or improved, and/or promoting recreational opportunities across Mason Neck Peninsula increases. On the Mason Neck Peninsula alone, public agencies include the refuge, the BLM, Mason Neck State Park, Gunston Hall Plantation, and Pohick Bay Regional Park.

Together, in an informal association referred to as “Mason Neck Managers Group,” representatives of these Federal, State, and regional government agencies share resources and attempt to minimize duplication of effort by coordinating recreational activities. This allows each agency to focus on its strengths such as: general recreation, outdoor or wildlife dependent recreation, resource protection, or historical interpretation. Collectively, the Management Area coordination ensures that the public has the opportunity to enjoy a variety of activities without diminishing the purposes for which they were all created. One priority of the association is to collaboratively and jointly manage in anticipation of a predicted increase in area visitation.

The refuge presently accommodates five out of the six priority public uses. Wildlife observation, nature photography, environmental education, interpretation, and hunting, all occur at some level on the refuge, although demand may not always be met. The only priority public use not allowed anywhere on the refuge is recreational fishing. This is an issue that has been raised by the public. It is not allowed primarily because no opportunities are present in areas open to public access. For example, virtually all of the refuge shoreline (and thus, potential fishing sites) are closed to public access due to concerns with wildlife disturbance or impacts to sensitive habitat areas. Under all alternatives, the fishing closure would remain and we would continue to direct people to the adjacent State Park for fishing.

The major issues we need to address concerning public uses at Mason Neck Refuge are:

- How can we accommodate increased public demand for additional access on the refuge, primarily more walking trails, while not jeopardizing sensitive wildlife and habitat areas?
- How do we effectively explain the decision to allow certain activities on the multi-use High Point trail, where it runs through the refuge, while not allowing some of those same activities on refuge trails?
- How can we best coordinate with Mason Neck State Park, which has well established set of trails that should factor into decisions about an overall trail system?
- How can we best provide trail connections, taking into account distances and parking areas?
- How do we accommodate the public desire for more and better access, yet not complicate law enforcement? We have had several instances where vehicles are locked-in behind the gate after hours. Is there a better system? Should we change the gate type to one which opens from the inside after hours, so no one can get locked in? Is the best location on State Park lands? What is the level of coordination that will be required with State Park enforcement of trailheads and parking lots.
- Is there a potential to develop a new trail along a current refuge road (e.g. Sycamore Road), which leads to a viewpoint on the Potomac River? How do we avoid impacting the private residences along that road?
- Could we link the trail to the road and avoid the residential backyards issue by using the first loop of the Woodmarsh Trail as a connector to a Sycamore Road trail?

- Would this impact any archeological/historical sites?
- The bottom two loops of Woodmarsh Trail are closed December to July to protect nesting eagles so we do not want to open up those areas to public use. How do we integrate that closure into an expanded trails plan?
- Could we create a trail to provide access to Little Marsh? A new Little Marsh trail would access a different habitat type than current refuge and State Park trails because Little Marsh is non-tidal freshwater; the water control structure does not allow tidal influence. Access must be through a controlled road.
- Other issues on trails and trail creation:
 - Can we use existing road surfacing for road-to-trail conversions?
 - The State Park is conceptualizing (no final plans yet) a trail from the primitive campground, out towards Sandy Point, up to High Point Road. How can we best integrate any new or expanded refuge trails with the newly planned trails in the State Park?

Environmental Education

A limited environmental education program occurs on the refuge. Although the refuge has a small established environmental education site, it has not been used in recent years. There is high public demand to increase environmental education opportunities on this refuge, but we have been unable to, given our current level of funding and staffing. Instead we have concentrated our environmental education efforts on Occoquan Bay Refuge.

- Can we improve the quality of our environmental education program given our limited resources?
- Could we effectively expand those educational opportunities through partnerships with other educators?
- Would allowing public access to the environmental education site via the proposed Sycamore Road trail affect the quality of our educational programs?

Northern Virginia Regional Park Authority Lands

A large portion of the refuge, including the Little Marsh area, is land leased from the Northern Virginia Regional Park Authority (NVRPA).

- Should the Service pursue full fee-title ownership of the land?
- Are there opportunities for a land exchange?

Volunteers and Friends

There were a number of individuals, groups, and the Friends of Potomac River Refuges interested in projects to support all three refuges.

- How do we best coordinate efforts among individuals and organizations?
- How do we prioritize our staff and funding resources to develop and support meaningful projects that meet expectations, and are consistent with refuge purpose, goals and objectives?

Featherstone Refuge Issues, Concerns, and Opportunities

Based on core team discussions, agency scoping and public scoping, we developed the following set of issues, concerns, and opportunities which we address under our various management objectives:

Refuge Administration and Management

Management emphasis on this refuge has been limited due to higher priorities for refuge staff and available funding and other resources on Occoquan Bay and Mason Neck Refuges.

- Is the level of management attention on this refuge commensurate with its resource and public use values?
- Are there alternative ways (e.g. partnerships) to increase the effectiveness of management on this refuge?

Maintaining or Restoring Biological Resources

- How can we ensure Featherstone Refuge continues its supporting role in a significant eagle conservation area in the Chesapeake Bay Watershed? Eagles have nested on the refuge in the past. What steps can we take to attract eagles to nest here again?
- Featherstone Refuge has low migratory and resident waterfowl counts in comparison to other areas along the Potomac River.
 - How can we most effectively determine why these numbers are low?
 - Do we need to collect baseline data?
 - How can we most effectively partner with state, local, and conservation groups on this type of project?
- How can we best manage the refuge as a neo-tropical migratory bird breeding and migrating location?
- We know very little about the resources on this refuge. Are there other Federal trust or State species of conservation concern we should be managing for on the refuge?

Protecting Wetlands and Water Quality

Featherstone Refuge was established, in part, to protect its wetlands. The refuge's wetlands are at risk from spills from the adjacent commercial industrial park and from shore water runoff from upland drainages. There is a need to establish soil and water baseline conditions onsite and offsite, and monitor effects from pollutants, to address the following concerns:

- Is the refuge receiving contaminants from the industrial park adjacent to the refuge?
- Are there impacts from former landfill activities?
- Are there impacts from storm water runoff, for example, Farm Creek discoloration, fish kills, other hazards to wildlife from runoff and other pollutants?
- How can we most effectively establish baseline conditions?
- Is storm water runoff and siltation onto the refuge a serious problem?

- Can we establish partnerships with other organizations to conduct monitoring (e.g. Ecological Services Division)?
- Based on baseline results, can we establish partners to help in correcting and mitigating negative results?
- How can we best work with Prince William County to address runoff and drainage issues?

Climate Change and Shoreline Protection

Similar to our discussion for Mason Neck Refuge, Featherstone Refuge is at risk from predicted impacts related to climate change and shoreline erosion. Featherstone Refuge, due to its comparatively lower elevation, is more likely to be affected by rising water levels in the tidal Potomac River. The issues questions identified for climate change on Featherstone Refuge are similar to those for Mason Neck Refuge.

Shoreline erosion is an existing problem that will be exacerbated with predicted climate change impacts. However, unlike the bluffs and steep banks on Mason Neck Refuge, the shoreline of Featherstone Refuge has a more gradual slope and is backed by wetlands rather than upland forest. Rising waters would inundate lower areas and create a mix of new wetland habitats while losing some current shoreline areas. While maintaining a stable shoreline is important to sustaining the integrity of the refuge, protecting the existing shoreline would be daunting challenge. The issues identified for climate change include:

- Is protection of the current shoreline necessary to protect refuge resources?
- At what level of climate change impact/sea level rise would protection of the shoreline become critical?
- What, if any, areas of the shoreline should/would be protected?

Public Access

Public access is the overarching issue at Featherstone Refuge. Currently, there is no public access for several reasons. In order to access the refuge, visitors would have to park on private lands and walk across privately-owned land including an active railroad right-of-way, a gas pipeline right-of-way, and/or a subdivision. Public safety is a major concern with access. We need to address that problem before allowing any public uses in the future.

- Should we look into weekend use of parking facilities near the VRE station as part of a plan to allow access?
- Can we establish partnerships with adjacent landowners for the public to gain access to the refuge?
- The southwest corner of the refuge presents different opportunities for access; can we find a way to work with neighbors in nearby townhouses for the public to gain refuge access?
- Should we consider the possibility of access by water trails for canoeists, kayakers, and power boaters?

Trails and Trail System Integration

Featherstone Refuge is considered a great location in the local area for bird watching and other wildlife viewing, and many residents encourage resolution for

finding safe, public access. Continued public involvement in resolving the access issue, and helping to determine trail needs, could bring increased awareness about these and other issues which impact the refuge.

- Would it be a good area to build a birding trail—using natural materials, observation blinds, and boardwalks over wet areas?
- Can we make use of the old railroad grade that runs through the refuge as a location for a walking trail?
- Could Featherstone Refuge be managed to include a segment of the Potomac Heritage National Scenic Trail? Could we make the portions of the Trail through the refuge accessible for pedestrians only or for pedestrians and bicyclists? Can we partner with the Prince William County to establish a trailhead and to identify a suitable location for trail facilities on the refuge that contributes to a continuous Trail network?
- Can the refuge be integrated with the Virginia Birding and Wildlife Trail?
- Should we consider the possibility of a trail at the southern end of the refuge (under railroad trestle)?

Trespass, Vandalism, Law Enforcement

Trespass and vandalism have been recurring problems on the refuge, although incidents have dramatically decreased with the presence of law enforcement personnel on the Refuge Complex. Trespass by anglers looking for fishing access to the Potomac River, and shelters being built by homeless and displaced people are examples of trespass problems in the recent past. Dumping of household and commercial debris and waste are examples of vandalism that has been a problem.

- Can allowing public access and building trails help with this situation? Will a greater public presence on the refuge reduce incidences of trespass and vandalism?
- Are we distributing our law enforcement effort among the three refuges in the Refuge Complex most effectively to deal with the level of violations and resource impacts?



Bill Wallen

Marsh mallow at Mason Neck Refuge

Chapter 2



USFWS

Mason Neck Refuge wetlands

Affected Environment

- Introduction
- Regional Setting
- Socioeconomic Setting
- Special Regional Conservation Areas and Activities
- Potomac River Refuge Complex Administration
- Mason Neck Refuge Environment
- Featherstone Refuge Environment

Introduction

This chapter describes the physical, biological, and social environments of Mason Neck and Featherstone Refuges. The environment of the third refuge in the Potomac River Refuge Complex—Ocoquan Bay Refuge—is described in a separate CCP for that refuge (USFWS, 1997). Included in this chapter are descriptions of the physical landscape, regional and refuge settings, current administration, and specific refuge resources and programs. Appendix F provides an overview of the cultural resources on both refuges. Describing the biological diversity, integrity, and environmental health of these refuges is crucial in planning for their future management under the provisions of the Refuge System Administration Act (16 U.S.C. 668dd-668ee) and other laws.

Regional Setting

Tidal Potomac River Basin

The Potomac River begins in West Virginia and is fed by tributaries from Pennsylvania, Maryland, and Virginia. It flows over 380 miles from its headwaters, expanding to more than 11 miles wide as it flows into the Chesapeake Bay. The Potomac River Basin (see map 1.4) includes 14,670 square miles in four states including Virginia (5,723 square miles), Maryland (3,818 square miles), West Virginia (3,490 square miles), Pennsylvania (1,570 square miles), and the District of Columbia (69 square miles) (Interstate Commission on the Potomac River Basin ICPRB, 2006).

The tidal Potomac River includes that portion the river influenced by tides and extends for 117 miles from its head-of-tide located approximately half a mile upstream of Chain Bridge in the District of Columbia to its mouth at Point Lookout in Maryland and Smith Point in Virginia. The surface area of all tidal waters, including Potomac River embayments and tidally-influenced tributary rivers, streams, and creeks, is about 434 square miles. The land area of the tidal river is 2,537 square miles, or approximately 1/6 of the entire Potomac River Basin area (Lippson et al., 1979).

Many people rely on and enjoy the abundant resources of the tidal Potomac River. It supplies almost 4 million area residents with clean drinking water, provides a wide variety of natural resources such as critical wildlife habitat, and supports historical and cultural resources of national significance (DWSPP, 2007). The tidal river is recognized as regionally significant habitat for numerous species of fish and birds. More than two hundred species of birds, including the bald eagle, breed there. The river also provides important habitat for 70 species of fish (TPL, 2006).

Potomac River Refuge Complex units

The Refuge Complex is located in northern Virginia, approximately 25 miles south of Washington, D.C. It is situated on a roughly 8-mile section of the Potomac River's Virginia shoreline between Pohick Bay and Neabsco Creek (see map 1.1). This portion of Virginia is in the Mid-Atlantic Coastal Plain Physiographic Area of broad rolling hills and moderate slopes (BLM, 2004).

Climate

The climate of the Refuge Complex area is variable. The area is influenced by the Chesapeake Bay, as well as the Atlantic Ocean to the east and the Appalachian Mountains to the west. The weather in the refuge area is characterized by cold, dry, continental-polar winds from the west (“westerlies”) and northwest during the winter, and warm, humid, maritime-tropical winds from the south and southwest during the spring and summer. During the summer, there are occasional air pollution episodes when high-pressure systems stagnate over the area. Precipitation averages 39 inches per year, and is evenly distributed throughout the year. January, February, and April are the driest months, with less than three inches of precipitation. Snowfall averages less than 10 inches per year. The maximum recorded snowfall of 25 inches fell in February 2010. The

annual mean daily temperature for the area is 57°F. The growing season, based on average first and last killing frosts, is from April 15 to October 15. The mean number of cloudy days per month ranges from 11 in June to 16 days in December and January (USFWS, 2005a).

Regional Air Quality

The air quality in the Washington D.C. metropolitan and surrounding area is experiencing gradual improvement, although excessive ozone and some particulates remain a problem. Ozone and particle pollution have been linked to short-term health concerns, particularly among children, asthmatics, people with heart or lung disease, and older adults. The Virginia Department of Environmental Quality (VDEQ) monitors levels of ozone and particle pollution from several stations in Virginia. For more information, visit www.deq.state.va.us/air/homepage.html.

Ozone may affect the recreational potential of this stretch of river, as sensitive groups may be advised to limit their outdoor activities due to high ozone levels (MWCG, 2006). Ozone levels over the past ten years have exceeded healthy levels between zero and 21 days per year (VDEQ, 2006). There is not a discernable trend, increasing or decreasing, in unhealthy ozone days over time. The primary factors contributing to unhealthy ozone levels are emissions and the warm and sunny regional climate (AIR Now, 2006). A significant improvement in air quality is unlikely to occur in the near future, as the metropolitan Washington, D.C. area continues to grow and the climate will remain relatively warm and sunny.

Particles found in soot, dust, smoke, and fumes create air pollution in the area. The burning of coal, oil, diesel, and other fuels produces these particles. Vehicles in northern Virginia are a major source of particulate matter (particles and liquid droplets suspended in the air). Motor vehicles emit direct particulate matter from their tailpipes, as well as from normal brake and tire wear. In addition, vehicles cause dust from paved and unpaved roads to be re-entrained, or re-suspended, in the atmosphere. Also, highway and transit construction projects may cause dust. The particles are small enough to enter deep into the lungs and cause health problems.

Air Quality Index

The Air Quality Index (AQI) is an index for reporting daily air quality. It describes the cleanliness of the air in a particular location and the associated health concerns with increasing pollutant levels (table 2.1). The AQI focuses on health effects a person may experience within a few hours or days after breathing polluted air. The Environmental Protection Agency (EPA) calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone (O₃), particle pollution (also known as particulate matter; PM_{2.5} or PM₁₀), carbon monoxide (CO), sulfur dioxide (SO₂), and nitrogen dioxide (NO₂). For each of these pollutants, EPA has established national air quality standards to protect public health.

An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level EPA has set to protect public health. AQI values below 100 are generally thought of as satisfactory. When AQI values are above 100, air quality is considered to be unhealthy for certain sensitive groups of people. As AQI values increase above 150, everyone in the affected area may experience health effects. The AQI is divided into six categories as shown in table 2.1.



Les Brooks

Scarlet tanager

Table 2.1. Air Quality Index (AQI) Values and Related Health Concerns

AQI Range	Air quality condition: (Level of Health Concern)
0 to 50	<u>Good</u> : (air pollution poses little to no risk)
51 to 100	<u>Moderate</u> : (acceptable; some moderate health concerns for a few people)
101 to 150	<u>Unhealthy for Sensitive Groups</u> : (may cause a health effect for certain groups)
151 to 200	<u>Unhealthy</u> : (may pose health effect for everyone)
201 to 300	<u>Very Unhealthy</u> : (poses a health alert; everyone may experience health effect)
301 to 500	<u>Hazardous</u> : (triggers health warnings of emergency conditions)

County AQI Statistics

In 2007, Fairfax County had 27 of 365 index days when the AQI was unhealthy for sensitive subgroups (table 2.2), with ozone and PM_{2.5} being the problem pollutants. That same year, Prince William County had 5 of 212 days when the AQI was unhealthy, with ozone being the problem pollutant.

Table 2.2. Air Quality Index Statistics for Prince William and Fairfax Counties for 2007

2007		Number of Days when Air Quality was...				Number of Days when AQI pollutant was...					
County	# Days with AQI	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	CO*	NO ₂ *	O ₃ *	SO ₂ *	PM _{2.5}	PM ₁₀
Prince William	212	151	56	5	0		0	212			
Fairfax	365	232	106	27	0	1	0	211	1	151	1

*Note: CO—Carbon monoxide; NO₂—Nitrogen dioxide; O₃—Ozone; SO₂—Sulfur dioxide; PM_{2.5}—Particulate matter smaller than 2.5 micrometers; PM₁₀—Particulate matter smaller than 10 micrometers

Regional Water Quality

Virginia's Water Quality Standards

The goals of Virginia's water quality assessment program are to determine whether water quality standards are met and to design and implement a plan to restore waters with impaired quality.

The VDEQ released the Final 2008 305(b)/ 303(d) Water Quality Assessment Integrated Report (Integrated Report) on December 18, 2006. The Report is a summary of the water quality conditions in Virginia from January 1, 2001, to December 31, 2006. The VDEQ develops and submits this report to the EPA every even-numbered year. The report satisfies the requirements of the U.S. Clean Water Act sections 305(b) and 303(d) and the Virginia Water Quality Monitoring, Information and Restoration Act.

Water quality standards designate uses for waters. There are six designated uses for surface waters: 1) aquatic life, 2) fish consumption, 3) shellfish consumption, 4) swimming, 5) public water supplies (where applicable), and 6) wildlife.

Additionally, several new subcategories of aquatic life use have been adopted for estuarine waters of the Chesapeake Bay and its tidal tributaries. The standards define the water quality needed to support each of these uses. If a water body contains more contamination than allowed by water quality standards, it will not support one or more of its designated uses. Such waters have "impaired" water

quality. In most cases, a cleanup plan (called a “Total Maximum Daily Load”) must be developed and implemented to restore impaired waters.

Impairments in Waters Affecting the Potomac River Refuges

Table 2.3 lists the impairments in tidal waters adjacent to Mason Neck and Featherstone Refuges for which TMDL studies are required to reduce pollutant levels to allow the designated uses. Of particular note are the impairments to aquatic life that may affect aquatic species on both refuges, and the fish consumption advisories that may affect users of Featherstone Refuge if public access is allowed in the future.

Table 2.3. Virginia 2006 303(d) Impaired Waters (Category 5) Needing TMDL Study

TMDL Watershed Name						
TMDL Group ID	Uses Affected	Type of Impairment	River (Miles)	Estuary (Square Miles)	Initial List Date	TMDL Dev. Date
Belmont Bay (Occoquan River)						
60067	Aquatic Life	Estuarine Bioassessments		0.39	2006	2018
Neabsco Bay						
00308	Aquatic Life	pH		0.80	2002	2010
00800	Recreation	Fecal Coliform		0.80	2004	2016
Occoquan Bay						
00309	Aquatic Life	pH		0.59	2002	2010
Potomac River, Tidal (Neabsco Creek)						
20007	Fish Consumption	PCB in Fish Tissue		1.03	2002	2014
Potomac River, Tidal (Occoquan River)						
20006	Fish Consumption	PCB in Fish Tissue	3.20	2.42	2002	2014

Maryland’s Water Quality Standards

The purpose of Maryland’s water quality standards is to protect, maintain, and improve the quality of the State’s surface waters. Maryland’s water quality standards have three main components: designated uses, water quality criteria to protect designated uses, and an anti-degradation policy (MDE 2007).

Designated uses are goals for water quality; usually an appropriate intended use by humans and/or aquatic life. Each waterbody (stream segment, lake, bay, etc.) is assigned one or more designated use, such as human recreation, shell-fishing, human water supply, or aquatic life habitat. Although these designated use goals may not be currently meet, each must be attainable for that waterbody (MDE 2007). For more information on Maryland’s designated uses, visit http://www.mde.state.md.us/Programs/WaterPrograms/TMDL/wqstandards/WQS_Designated_Uses.asp/.

Water quality criteria are generally numeric criteria that set the minimum water quality necessary to meet the designed uses. Maryland publishes criteria for protection of human health, protection of aquatic life and habitat, toxins such as lead, dissolved oxygen levels, turbidity, bacteria, and temperature (MDE 2007). Maryland’s water quality criteria are updated every three years and published in

the Code of Maryland Regulations (COMAR). They are available online at <http://www.dsd.state.md.us/comar/comarhtml/26/26.08.02.03-3.htm>.

The antidegradation policy is the last component of the Maryland water quality standards (MDE 2007). This policy assures that water quality continues to support designated uses. There are three tiers of protection:

- **Tier 1** specifies the minimum standard that must be met—support of balanced indigenous populations and support of contact recreation—this is often referred to as “fishable-swimmable.”
- **Tier 2** protects water that is better than the minimum specified for that designated use.
- **Tier 3** is currently being developed and will afford the highest level of protection to waterbodies designated as Outstanding National Resource Waters.

Impairments in Waters Affecting the Potomac River Refuges

Table 2.4 lists the impairments for the portions of the Potomac River that occur in Maryland for which TMDL studies are required to reduce pollutant levels to allow the designated uses. Of particular note are the impairments to aquatic life that may affect aquatic species on both refuges.

Table 2.4. Maryland 2008 303(d) Impaired Waters (Category 5) Needing TMDL Study

Designated Use(s)	Cause of Listing	Source of Pollutant	Priority
Potomac River Lower Tidal			
Aquatic Life and Wildlife	Combination Benthic/Fishes Bioassessments	Unknown	Low
Lower Potomac River Mesohaline			
Open Water–Fish and Shellfish	Nitrogen (total)	Agriculture	High
Season Deep–Channel Refuge Use	Nitrogen (total)	Agriculture	High
Season Deep–Channel Refuge Use	Phosphorus (total)	Agriculture	High
Open Water–Fish and Shellfish	Phosphorus (total)	Agriculture	High
Seasonal Deep Water–Fish and Shellfish	Nitrogen (total)	Agriculture	High
Aquatic Life and Wildlife	Estuarine Bioassessments	Unknown	Low
Lower Potomac River Oligohaline			
Open Water–Fish and Shellfish	Nitrogen (total)	Agriculture	High
Open Water–Fish and Shellfish	Phosphorous (total)	Agriculture	High
Seasonal Shallow Water–Submerged Aquatic Vegetation	Total Suspended Solids	Unknown	Low
Upper Potomac River Tidal Fresh			
Seasonal Shallow Water–Submerged Aquatic Vegetation	Total Suspended Solids	Unknown	Low
Open Water–Fish and Shellfish	Nitrogen (total)	Unknown	High
Open Water–Fish and Shellfish	Phosphorus	Unknown	High

Source: MDE 2008

Socioeconomic Setting

Regional Overview

The population of the Washington, D.C. metropolitan region is approximately 5.35 million residents (2000 Census), and has increased by almost nine percent over the past decade. Northern Virginia is a sub-area of both the State of Virginia, and the Washington, D.C. metropolitan area (map 1.6). Northern Virginia is home to over 2 million residents. Local governments comprising northern Virginia include four counties: Arlington, Fairfax, Loudoun and Prince William; five independent cities: Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park; and 14 incorporated towns: Clifton, Dumfries, Hamilton, Haymarket, Herndon, Hillsboro, Leesburg, Lovettsville Middleburg, Occoquan, Purcellville, Quantico, Round Hill, and Vienna (NVRG, 2002). Because Mason Neck and Featherstone Refuges are located in the adjacent counties of Fairfax and Prince William respectively, those counties are the most relevant contexts for our discussion within the larger Washington, D.C. metropolitan area.

Fairfax County

Fairfax County, which includes the Mason Neck Peninsula and Mason Neck Refuge, is the largest county in the Washington, D.C. metropolitan area and has the highest population of any county or city in the state. It accounts for about 13 percent of the State's population (USCB American Factfinder, 2007). Fairfax County's population is projected to be 1,077,000 persons as of January 2007, an increase of 31.6 percent over the 1990 census count.

In terms of both population size and density, Fairfax County ranks among the top 2 percent of all counties in the nation (FC, 2006a). The County consists of approximately 252,828 acres of land spread across an area of 395 square miles. Residents are primarily employed by private businesses and the Federal government (FC, 2006b). As of the census of 2000, the population density was 2,455 people per square mile. There were 359,411 housing units at an average density of 910 per square mile. The racial makeup of the county is depicted in table 2.7. The average household size was 2.74 and the average family size was 3.20 (U.S. Census Bureau (USCB) American Factfinder, 2007).

Based on U.S. Census Bureau figures for 2006 for household median income, Fairfax County was the richest county in the country. The median income in the county was \$100,318 in 2006. This overtook the previous richest county, neighboring Loudoun County, which ranked second with a median income of \$99,371 in 2006. Incomes in Fairfax and Loudoun counties are both more than double national median income of \$48,451. In addition, poverty levels in each of the area's four counties were well below the national average of 12.3 percent (Francis & Levitz, 2007).

Prince William County

Prince William County, in which Featherstone Refuge is located, is one of the fastest growing counties in Virginia, and includes Manassas, Manassas Park, and Manassas City (USCB, 2006). It consists of 222,305 acres of land and 5,120 acres of water, and comprises single-family residential, multi-family residential, agriculture, parks and open space, and government, commercial, and industrial facilities. Employment is high, predominantly in government and government associated services or activities (USCB, 2006).

Prince William County has the third highest population of all Virginia's counties and cities but still has only about a third the population of neighboring Fairfax County—an estimated 360, 411 persons in July 2007 (USCB American Factfinder, 2007).

As of the census of 2000, there were 280,813 people, 94,570 households, and 72,724 families residing in the county. The population density was 831 people per square mile. There were 98,052 housing units at an average density of 290 per square mile. The racial makeup of the county is depicted in table 2.7. The fastest growing population since 2005 is of Hispanic and Latino origin.

Of the 94,570 households, 44.20 percent had children under the age of 18 living with them, 61.30 percent were married couples living together, 11.20 percent had a female householder with no husband present, and 23.10 percent were non-families. Of all households, 17.10 percent were made up of individuals, and 3.00 percent had someone living alone who was 65 years of age or older. The average household size was 2.94, and the average family size was 3.32.

In the county, the population distribution included 30.40 percent under the age of 18, 8.80 percent from 18 to 24, 35.20 percent from 25 to 44, 20.80 percent from 45 to 64, and 4.80 percent 65 or older. The median age was 32 years. For every 100 females there were 99.50 males. For every 100 females age 18 and over, there were 97.40 males.

The median income for a household in the county was \$65,960, and the median income for a family was \$71,622. Males had a median income of \$45,595, compared to \$34,286 for females. The per capita income for the county was \$25,641. About 3.30 percent of families and 4.40 percent of the population were below the poverty line, including 5.60 percent of those under age 18 and 4.70 percent of those aged 65 or over (USCB American Factfinder, 2007).

Expected Regional Population Growth

Northern Virginia's population is expected to increase by about one-third during the next 22 years, with an estimate of more than 3 million by the year 2030 (table 2.5).

Table 2.5. Regional Population Forecasts

Jurisdiction	2010	2015	2020	2025	2030
Fairfax County	1,132,500	1,211,500	1,276,000	1,303,700	1,330,900
Prince William County	416,000	463,400	489,900	524,900	556,300
Northern Virginia	2,434,700	2,658,500	2,823,800	2,957,700	3,082,200

Source: (Metropolitan Washington Council of Governments, 2006)

Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority and Low Income Populations," requires Federal agencies to identify and address potential disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations (EO 12898). The Presidential memorandum accompanying this Executive Order further directs Federal agencies to improve opportunities for community input and the accessibility of meetings, documents, and notices (CEQ 1997).

In creating the table below, we used the following definitions:

- **Minority population** includes persons who are members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

- **Low-income population** includes persons living below the poverty line.

Table 2.6. Regional Environmental Justice summary characteristics

	Fairfax County, Virginia	Prince William County, Virginia
Minority Population (as percent of total population)	38.0%	64.3%
Low-income Population (as percent of total population)	5.6%	5.3%

Source: United States Census Bureau, 2010

Table 2.7. Regional Environmental Justice detailed characteristics

	Fairfax County, Virginia	Prince William County, Virginia
Race and Ethnicity (2009)		
White persons	73.8%	68.3%
Black Persons	7.1%	20.8%
American Indian and Alaska Native persons	0.4%	0.5%
Asian persons	16.2%	7.4%
Native Hawaiian and Other Pacific Islander	0.1%	0.2%
Persons reporting two or more races	2.4%	2.8%
Persons of Hispanic and Latino origin	14.2%	18.7%
White persons not Hispanic	61.0%	51.6%
Income and Poverty (2000)		
Median household income	\$67,642	\$87,973
Per capita income	\$31,427	\$25,641
Persons below poverty level (2008)	5.6 %	5.3%

Source: United States Census Bureau, 2010

Local Socioeconomic Setting of Mason Neck and Featherstone Refuges

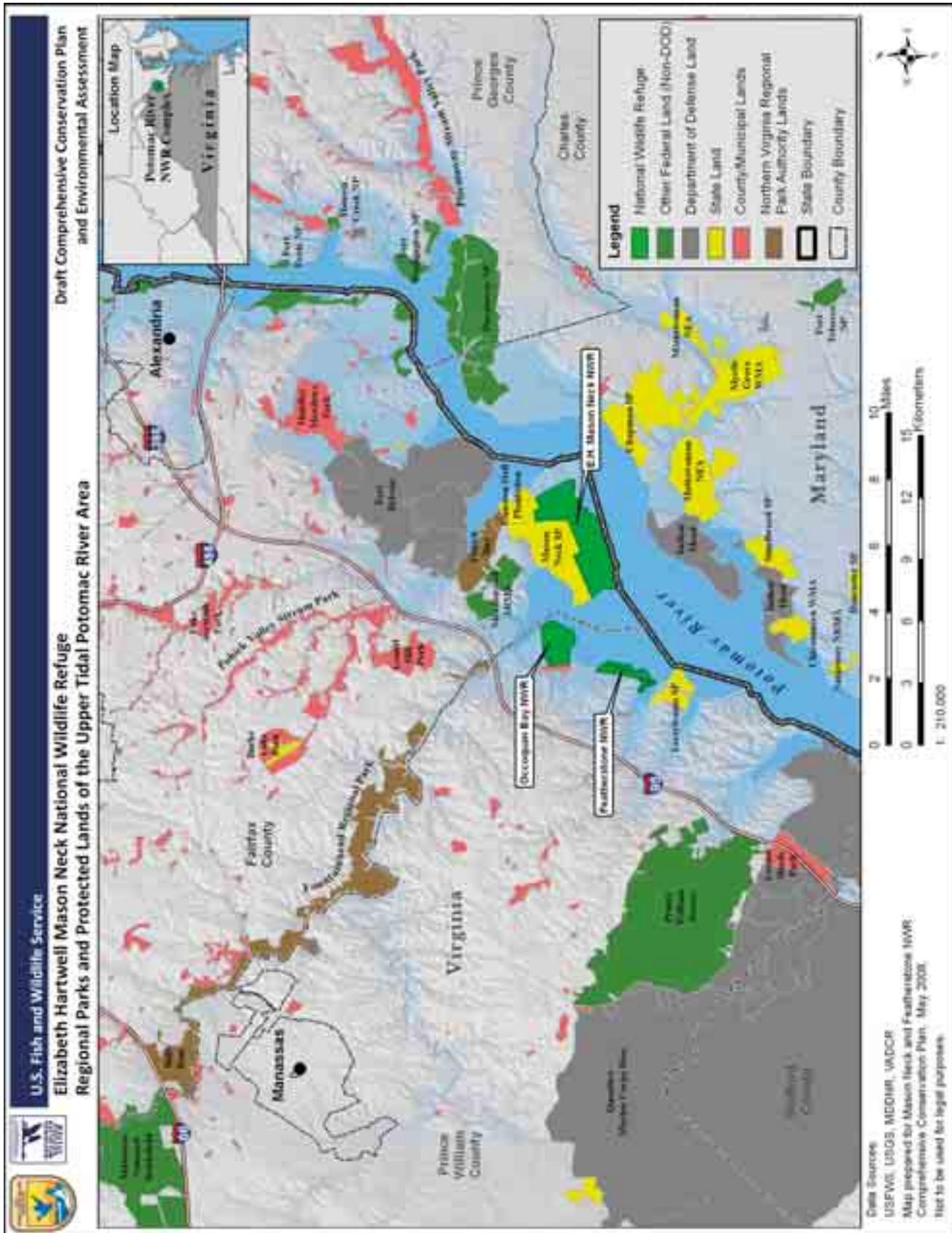
The same factors of burgeoning population and development, and resulting recreation and “green space” demand, influence decision-making across the Potomac River Refuge Complex. However, the local socioeconomic settings of Mason Neck Refuge on the Mason Neck peninsula, and Featherstone Refuge in the Woodbridge section of Prince William County, differ sufficiently to be treated separately in the refuge profiles of Parts 2 and 3 of this chapter.

Regional Parks and Protected Lands

Regional parks and protected lands of the Refuge Complex region are shown on map 2.1. The total land area of the map is approximately 576,000 acres. About one-quarter of the area falls under parks and protected lands, comprised as follows:

- Federal Agencies, not including Department of Defense—approximately 27,000 acres
- Department of Defense—approximately 73,500 acres

Map 2.1. Regional Parks and Protected Lands of the Upper Tidal Potomac River Area



- State Agencies—approximately 13,500 acres
- Northern Virginia Regional Park Authority Land—6,400 acres
- County/Local Park Land—approximately 21,000 acres

The data are from the Virginia Department of Conservation and Recreation (VADCR) at: http://www.dcr.virginia.gov/natural_heritage/conslands.htm and the Maryland Department of Natural Resources (MDDNR) at: <http://dnrweb.dnr.state.md.us/gis/data/>

VADCR is the lead agency in developing the State-wide Conservation Lands Database to include State, Federal, private, and locally managed lands and conservation easements. VADCR is also responsible for tracking Virginia's progress towards the Chesapeake Bay 2000 Agreement land conservation goal of protecting 20 percent of the Chesapeake Bay Watershed by 2010.



Lelaina Marin/USFWS

Breakwater structures off Mason Neck refuge's shoreline

Special Regional Conservation Areas and Activities

Atlantic Coast Joint Venture—Potomac River Focus Area

The Refuge Complex is located in the Atlantic Flyway along a major tributary of the Chesapeake Bay in the Atlantic Coast Joint Venture's Lower Potomac River Focus Area (map 1.5). The Potomac River Focus Area is located in Northern Virginia encompassing 416,551 acres. The area as a whole is considerably developed, as would be expected in Northern Virginia. The brackish and freshwater tidal wetlands are relatively undeveloped, and provide a wide diversity of habitat for many waterfowl species. The Potomac River proper is under the jurisdiction of the State of Maryland, and is not included in the Focus Area. The adjacent marshes are located in Virginia and are included. These marshes are composed of highly brackish *Spartina spp.* marshes near the mouth of the Potomac River to freshwater *Peltandra spp.*, *Lotus spp.*, and wild rice marshes inland. Historically, hardwood forests dominated areas beyond the river. These forests have given way to row crop agriculture, truck farms, horse/hobby farms, loblolly pine plantations, and residential and industrial development. In recent historical times, the shallow water areas of the Potomac River have a history of high-density submerged aquatic vegetation (SAV) beds which are important habitat for waterfowl, fish and other aquatic species.

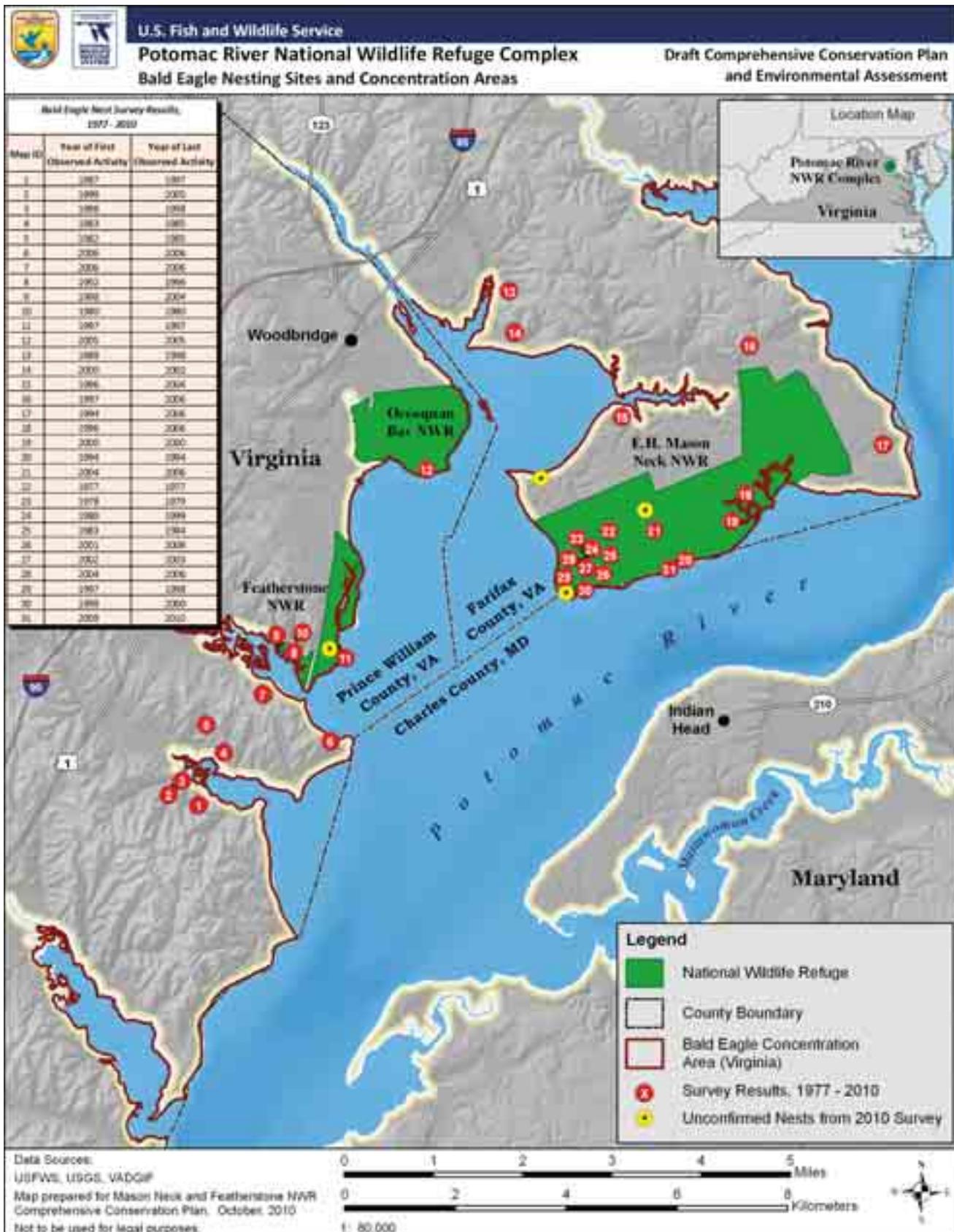
Priority Waterfowl

Fourteen priority waterfowl species use the refuge for wintering and migration habitat: American black duck (*Anas rubripes*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), greater and lesser scaup (*Aythya spp.*), wood duck (*Aix sponsa*), American wigeon (*Anas americana*), canvasback (*Aythya valisineria*), common goldeneye (*Bucephala clangula*), redhead (*Aythya americana*), bufflehead (*Bucephala albeola*), gadwall (*Anas strepera*), ring-necked duck (*Aythya collaris*), and ruddy duck (*Oxyura jamaicensis*). The dabbling duck species use flooded marshes and the adjacent rivers and lakes for food in the form of invertebrates, plant material and seeds. Scaup use the adjacent open-water marshes to feed on submerged aquatic vegetation, and other invertebrates. Several other priority species heavily utilize these same areas for foraging and loafing. Wood ducks abound in the emergent wetlands for brood rearing and staging in the early fall. Table 2.8 outlines waterfowl usage of the Potomac River focus area.

Other Priority Bird Species

This Focus Area supports nearly 25 percent of the coastal population of bald eagle in Virginia (map 2.2). Waterfront development and increased urbanization is the most important limiting factor on the distribution and future population trends of bald eagle and many other species in this area. Small, narrow fragments of bottomland and swamp forest border Potomac River tributaries but represent a relatively minor component of this area compared to other focus areas in coastal Virginia. However, these forested wetlands provide habitat for Acadian flycatcher (*Empidonax virescens*), yellow-throated vireo (*Vireo flavifrons*), northern parula (*Parula americana*), and prothonotary warbler (*Protonotaria citrea*). Small, isolated populations of Swainson's warbler (*Limnithlypis swainsonii*) and worm-eating warbler (*Helminthos vermivorum*) may be found in forested wetlands with dense understory vegetation. Tidal marshes are irregularly distributed along the shores of the Potomac River but are extensive along some of the associated creeks and tributaries. These habitats are important for Virginia rail (*Rallus limicola*), sora (*Porzana carolina*), American bittern (*Botaurus lentiginosus*), and least bittern (*Ixobrychus exilis*). Marshes in the lower salinity zones and upper reaches of the Potomac River also support king rail. Historical records indicate that the coastal plain swamp

Map 2.2. Bald Eagle Nesting Sites and Concentration Areas



sparrow (*Melospiza georgiana*) inhabited these areas as well. However, their complete distribution among the marshes in this focus area is unknown.

Table 2.8. Waterfowl species using the Potomac River Focus Area

Species	Breeding	Migration	Wintering
Mallard	X	X	X
Black Duck	X	X	X
Wood Duck	X	X	
Hooded Merganser	X	X	
Greater Scaup		X	X
Lesser Scaup		X	X
Redhead		X	X
Canvasback		X	X
American Wigeon		X	X
Green-winged Teal		X	X
Blue-winged Teal		X	
Ring-necked Duck		X	X
Tundra Swan		X	X
AP Canada Goose		X	X
Gadwall		X	X
Ruddy Duck		X	X
Bufflehead		X	X
Red-breasted Merganser		X	X

Threats to Migratory Bird Management

Additional development of riparian and forested areas remains a large threat. Increasing stormwater runoff, with increased siltation and chemicals associated with urbanization degrade water quality. Increasing boat traffic may affect habitat quality for waterfowl and may push them into less favorable sites (e.g. create disturbances in resting, foraging and nesting areas).

Migratory Bird Conservation Needs

Continued acquisition and protection of land in a series of conservation corridors will help this area retain its importance for migratory birds. Previously converted crop fields and farmed wetland pasture that are restored to wetland habitat provide excellent waterfowl habitat and receive high use in these areas. Continued restoration of these sites will help wintering and staging waterfowl populations. The preservation of bottomland hardwood forest for nesting wood duck and other cavity nesting migratory birds is also important.

Regional Bald Eagle Monitoring

The Service formed the Chesapeake Bay Bald Eagle Recovery Team in 1977 (Abbott, 1977). This team was tasked with developing a plan for the recovery of the Bay population. As part of this process, State wildlife agencies assumed the responsibility for population monitoring. As the State agency responsible for wildlife management, VDGIF is responsible for bald eagle monitoring and management in Virginia.

The primary focus area for the Virginia bald eagle breeding survey includes the tidal reaches of Chesapeake Bay tributaries and the lower Delmarva Peninsula (map 2.2). All Chesapeake Bay tributaries in Virginia are systematically surveyed to determine the extent of tidal influence on each of them. These drainages encompass nearly all historic records of breeding eagles in Virginia and continue to support the vast majority of the population. Map 2.2 also depicts nest survey results through 2010. Several nests from the 2010 survey are still unconfirmed, but will be verified between December 2010 and January 2011.

The Virginia bald eagle survey measures breeding activity and productivity via a standard 2-flight approach (Fraser et al., 1983). All bald eagle nests detected are plotted on 7.5 min topographic maps and given a unique alpha-numeric code. Each nest is examined to determine its condition and activity status. A breeding territory is considered to be “occupied” if a pair of birds is observed in association with the nest and there is evidence of recent nest maintenance (e.g. well-formed cup, fresh lining, and structural maintenance). Nests are considered to be “active” if a bird is observed in an incubating posture or if eggs or young are detected in the nest (Postupalsky, 1974). The second survey flight is conducted from late April through mid-May to check active nests for productivity.

Lower Potomac River— Important Bird Area

IBA Description

The Lower Potomac River Important Bird Area (IBA) is located in Fairfax, Stafford, King George, and Prince William Counties (map 1.5). The IBA area covers 281,024 acres, at elevations ranging from 0 to 282 feet above sea level.

The tidal fresh/oligohaline reach of the Potomac River included in the IBA extends from Mathias Point to just above Fort Belvoir. The river is wide along this stretch with several large tributaries. Tributaries contain considerable emergent and forested wetlands. Surrounding uplands support extensive tracts of hardwoods that are increasingly giving way to residential development. The area lies within the extreme inner coastal plain and has a great deal of topographic relief that has led to the development of a diversity of upland habitats. Due to its close proximity to the Nation’s capital, the area includes many historic properties and landmarks.

Protection

Due to its size, history, and proximity to Washington, D.C., the tidal fresh reach of the Potomac River contains many tracts of land dedicated to conservation, education, military training, and recreation. Both the Service and the U.S. Department of Defense hold lands that are strategically important for conservation. The State of Virginia also maintains several tracts of land that are State parks or natural area preserves. The Northern Virginia Regional Park Authority and individual counties own other lands for recreational access.



USFWS

Wood duck

Birds in the IBA

The upper tidal reach of the Potomac River has been the focus of intensive ornithological observation for 200 years. Over this time period, the landscape and bird community have changed dramatically. Currently, the area supports a significant community of piscivorous (fish-eating) bird species, including one of the largest great blue heron (*Ardea herodias*) colonies within the mid-Atlantic region, a dense breeding population of bald eagles, and both a summer and winter concentration area for migrant bald eagles. The rich hardwood forests are strategically important for local breeding populations of neotropical migrants, as well as, stopover areas for northern populations moving through the region in the fall. The waterways support significant populations of waterfowl during migration and winter. This IBA also includes one of only two known breeding locations for the Bachman's warbler (*Vermivora bachmani*) in Virginia.

Conservation and Threats

The dominant threat to the avifauna within this area is the loss of habitat to urban expansion extending down the river from Washington, D.C. Jurisdictions within the area are experiencing some of the fastest human growth rates in the nation. This growth is causing the rapid loss of habitat for many species. All of the upland habitats are in immediate danger from development. The increase in the human population has led to an increase in the demand for access to the waterway for recreational boating. Increase in boating activity and associated disturbance is the greatest threat to the bald eagle concentration area. In recent years, increases in disturbance along important shorelines appear to be limiting bald eagle use of the area during peak times of the year. In the future, rapid development of private lands will elevate the importance of government and conservation lands for the management of sensitive species. Maintaining continuity in the mission of these lands as it pertains to population protection will be important (Audubon VA, 2006).

Virginia Division of Natural Heritage Conservation Sites

The Virginia Department of Conservation and Recreation's Division of Natural Heritage maintains a Biotics Data System of occurrences natural heritage resources throughout Virginia. Areas where important natural heritage resources occur are called "conservation sites." These conservation sites represent areas for possible conservation action due to the presence of natural heritage resources, such as rare plant, animal or natural community. Conservation sites are also ranked by biodiversity significance based on the rarity, quality, and amount of natural heritage

Mason Neck Refuge Conservation Sites

Mason Neck Refuge is located in the Mason Neck—Sycamore Point Conservation Site (moderate biodiversity significance ranking). This site supports two important natural heritage resources: bald eagles and tidal freshwater marsh. Two other conservation sites are in the vicinity of the refuge. The Mason Neck State Park—Kane Creek Headquarters Conservation site (moderate biodiversity significance ranking) and the High Point NE Conservation Site (general biodiversity significance ranking) both support the following natural heritage resources: bald eagles and colonial wading bird colonies.

Featherstone Refuge Conservation Sites

Featherstone Refuge is located within the Neabsco Creek Conservation Site (general biodiversity significance ranking) that supports bald eagles. The refuge is also in the vicinity of the Powell Creek Conservation site (high biodiversity significance ranking) which supports both bald eagles and tidal freshwater marsh.

**Potomac River
Refuge Complex
Administration**

Refuge Complex Staff

The Refuge Complex staff manages and carries out duties related to Mason Neck, Featherstone, and Occoquan Bay Refuges. The full-time staff currently consists of a refuge manager, an assistant refuge manager, an administrative assistant, a visitor services specialist, a maintenance worker, and a law enforcement officer.

Refuge Complex Budget

Neither Mason Neck or Featherstone Refuges receives specific funding—all funding is at the Refuge Complex level to support staff and projects on all three refuges. Federal budgets are complex, with funding sources which often have restrictions on where and how the funding can be used. The basic budget consists of funding for operations and maintenance which are defined in more detail below. A station may also receive a variety of additional funds for specific purposes. This funding can be for replacement of equipment, construction projects, major repairs to facilities, support of a specific activity such as burning, or to fund or support a specific project. While this type of funding can represent a significant portion of a station’s overall budget, it is a one-time, project-specific allocation. As such, a station budget appears to have huge differences from year to year, which can be difficult to interpret without explanation. Table 2.9 shows the annual operations and maintenance budget of the Potomac River Refuge Complex from 2002 to 2008. Some of the additional project funds are also listed for reference.

Operations: This funding covers all operational costs including salaries, utilities, fuel, supplies, rent, training, travel, etc. The amount of funding left after all of the above operational costs are covered is the amount of money a station has to spend at its discretion. This “discretionary” money is used to accomplish projects, cover unanticipated expenses such as fuel increases, major repairs to equipment, clean up and repairs after major storms, employee overtime, etc. If a station does not have enough funding to cover the unanticipated cost or complete a project it must be deferred until the next fiscal year. Over the past three years the “discretionary” funds in the budget has averaged \$18,500. Only basic operations funds are included in table 2.9.

Maintenance: This is funding that is provided to a station to cover annual maintenance of buildings and equipment and cover minor repairs. In addition to annual maintenance funds, a station may receive funds targeted for replacement of equipment, major repairs to a facility or for the rental of specialized equipment that the refuge would need to complete a project such as a forklift. These funds can be a significant part of the maintenance budget but are one time funding that varies from year to year. Only annual maintenance funds are included in table 2.9.

Table 2.9. Potomac River Refuge Complex Annual Budget from 2002-2009

Year	Operations	Maintenance	Additional Targeted Funds
2002	\$415,100	\$16,900	\$97,000 Great Marsh Trail improvements
2003	\$409,900	\$16,900	\$147,000 Visitor enhancement projects
2004	\$466,500	\$15,500	\$93,000 Radio system replacement
2005	\$483,500	\$15,200	\$15,000 Equipment rental funds
2006	\$560,800	\$15,500	\$16,000 Equipment rental funds
2007	\$556,614	\$15,500	\$61,655 Roof replacement, equipment
2008	\$689,525	\$15,500	\$211,982 Dump truck, equipment rental
2009	\$715,348	\$15,500	\$11,673 Equipment rental, challenge cost share, environmental compliance

Administrative Facilities**Headquarters Office**

The office for the Refuge Complex is located in Woodbridge, Virginia, about nine miles from Mason Neck Refuge, and one mile from Occoquan Bay and Featherstone Refuges. The office is in a small rental space in a strip mall (USFWS, 2005a). The Service is planning to build a new visitor contact station/headquarters facility at a site on Occoquan Bay Refuge. That project was addressed in separate NEPA documentation and approved in 2009. Contact refuge headquarters for additional information.

Maintenance Facility

The primary maintenance facility for the Refuge Complex is located on Mason Neck Refuge. This facility consists of several small buildings and storage sheds within a fenced compound. The compound is also used for vehicle and equipment storage.

Friends of Potomac River Refuges

The Friends of Potomac River Refuges (Friends Group) is an incredibly valuable organization which supports the Refuge Complex goals. The purpose of this non-profit group is to promote conservation, awareness, and appreciation of the wildlife and habitats of the Refuge Complex and to provide assistance to refuge programs. The group hosts special events and programs related to the Refuge Complex. For more information regarding the Friends Group, you can visit their website at <http://www.fopr.org/>.

Activities of the Friends Group include:

- designing and constructing interpretive signs for self-guided nature trails.
- developing a draft interpretive plan for Occoquan Bay Refuge, including the key message of “a diverse natural history and cultural heritage have created Occoquan Bay Refuge...a remarkable haven for wildlife that enriches our lives now and into the future.”
- funding, designing, and erecting eight interpretive panels through a grant from Gateways
- purchasing nets and storage shed for bird banding station, which has banded more than 3,000 birds.
- advocating for Federal funds for facilities, staff and programs.
- demolishing and removing 60 feet of unsafe bridge at Mason Neck Refuge.
- conducting dozens of interpretive programs highlighting the flora and fauna of the refuges.
- surveying plants, insects, birds and mammals on the refuges.
- co-sponsoring a forum on the Virginia Wildlife Action Plan.
- partnering with Virginia Dominion Power with the construction of public use facilities at Occoquan Bay Refuge.
- participating in local and international events such as
 - Elizabeth Hartwell Environmental Education Eagle Festival at Mason Neck State Park with USFWS
 - Exxon Mobil shoreline cleanup
 - Youth fishing event
 - Photo contest
 - International Migratory Bird Day
- partnering with refuge staff to present an annual Fall Wildlife Festival.

Mason Neck Refuge Environment

Refuge Establishment and History

Refuge Size and Location

The 2,277-acre Mason Neck Refuge is located on the Mason Neck Peninsula in Lorton, Virginia. It is on the western shore of the Potomac River and approximately 18 miles south of Washington, D.C. The refuge is bounded by the Potomac River to the south and west, Mason Neck State Park and Gunston Hall Plantation (a State-owned historic site) to the north, and private housing developments to the east (Friends, 2009).

The Mason Neck Peninsula is surrounded by Gunston and Pohick Coves on the north, the Potomac River on the east and Occoquan and Belmont Bays on the south. Mason Neck forms the southernmost section of Fairfax County, in Northern Virginia, and comprises an area of approximately 9,000 acres, two-thirds of which is preserved as parkland by regional, State, and national authorities (MNCA, 2004). Mason Neck is named for colonial patriot and founding father George Mason, whose estate, *Gunston Hall*, is preserved near the base of the peninsula (WAMU, 2008).

Establishing Authority and Purpose

When a major development was proposed for the Mason Neck Peninsula in the 1960s, local residents, working with The Nature Conservancy to protect the area and the bald eagles that frequented there, brought their concerns to the attention of local, State, and Federal agencies. In response to these concerns, the Service purchased 845 acres of land from The Nature Conservancy and officially established Mason Neck Refuge on February 1, 1969 (MNCA, 2004). Additional lands were subsequently acquired by the Service and another 789 acres were incorporated into the refuge in 1982 under a 60-year lease from the Northern Virginia Regional Park Authority (map 2.3).

Establishing Authorities

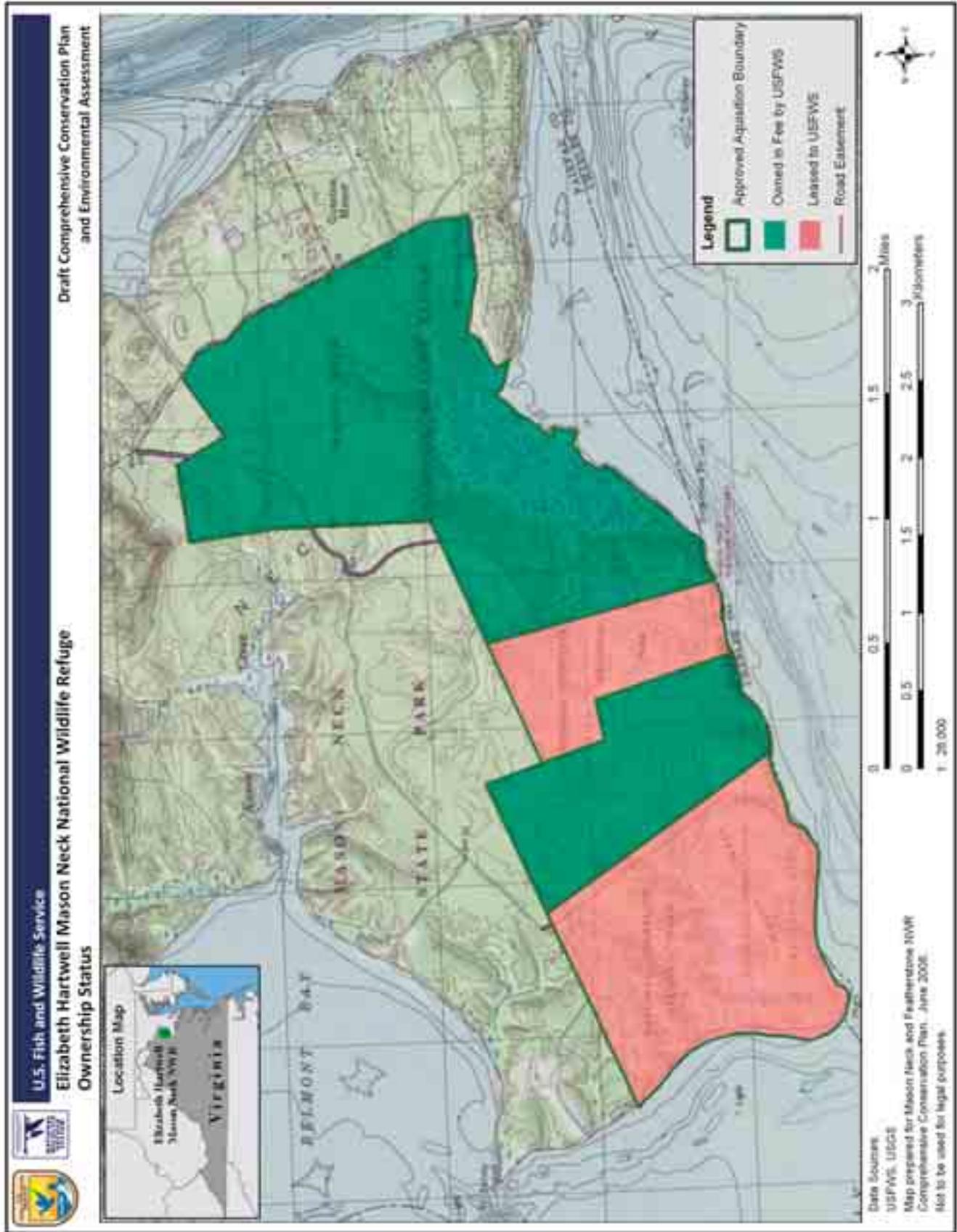
The Service acquired land for the refuge under the following authorities: Endangered Species Act (16 U.S.C. 1534); the Refuge Recreation Act (16 U.S.C. 460[k]-460[k][4]); an Act Authorizing the Transfer of Certain Property for Wildlife; or other purposes (16 U.S.C. 667b); and, the Migratory Bird Conservation Act (16 U.S.C. 715d).

Establishing Purposes

Mason Neck Refuge has several official purposes:

- Lands acquired under the Endangered Species Act were "... to conserve (A) fish or wildlife which are listed as endangered species or threatened species Or (B) plants ..." (16 U.S.C. § 1534);
- Lands acquired under the Refuge Recreation Act were found to be "... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1 "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." (16 U.S.C. 460[k]-460[k][4]);
- Lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes were established for their "... particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b); and,

Map 2.3. Mason Neck Refuge Ownership Status



- Lands acquired under the Migratory Bird Conservation Act were “... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” (16 U.S.C. § 715d).

Administrative Changes since Refuge Establishment

Creating a Refuge Complex

Until 1974, Mason Neck Refuge was a subunit of Blackwater Refuge, located in Cambridge, Maryland. In 1974 it became an independent unit with a manager and two nearby subunits of its own—Marumsc National Wildlife Refuge (Marumsc National Wildlife Refuge) (which later became Occoquan Bay Refuge) and Featherstone Refuge (USFWS, 2005a). With the establishment of Occoquan Bay Refuge in 1998, which combined land previously acquired as Marumsc National Wildlife Refuge with newly acquired military surplus lands, Mason Neck, Featherstone, and Occoquan Bay refuges were administratively reorganized into the Potomac River Refuge Complex. Their proximity to each other, and their growing management complexity, warranted this new administrative status.

Refuge Name Change to “Elizabeth Hartwell Mason Neck” Refuge

In 2005, the name of the refuge was officially changed to Elizabeth Hartwell Mason Neck National Wildlife Refuge in honor of Elizabeth Hartwell, a long-time conservationist with significant contributions to protecting the natural landscape on the Mason Neck Peninsula. Ms. Hartwell, a resident of Mason Neck, spearheaded the movement to protect habitat on the peninsula. Through her efforts, The Nature Conservancy ultimately purchased much of the land on the peninsula for later resale to local, State, and Federal governments. Ms. Hartwell also petitioned Congress for the initial \$3 million appropriation to purchase land for the refuge. While part of the broader preservation movement, she is often referred to as the single most important person responsible for creation of the refuge and the Mason Neck State Park.

Public Access

Access to Mason Neck Refuge for five out of the six priority public uses (wildlife observation and photography, environmental education, interpretation, and hunting) currently occurs via foot access. Two trails, the Joseph V. Gartland, Jr Great Marsh Trail (Great Marsh Trail) and the Woodmarsh Trail, provide access to forest habitat and viewpoints along Great Marsh. The High Point Trail is used solely to provide safe access for pedestrians through the Refuge to Mason Neck State Park. The High Point Trail is the only trail on the refuge that allows bicycles, rollerblades, and other modes of recreational pedestrian travel. High Point Trail and Great Marsh Trail are accessible and allow mobility-impaired visitors access to the natural beauty of the refuge. Parking to access the refuge can be found at the trailheads of Great Marsh and Woodmarsh trails. See the section on “Visitor Services” for more details on the refuge’s priority public use programs.

Some areas of the refuge are closed to public access, or to certain activities, because of concerns with disturbing wildlife or impacting sensitive habitat. For example, a significant area of the refuge is closed to migratory bird hunting by Director’s Order. In 1969, the Director of the Bureau of Sport Fisheries and Wildlife, which was what the Service was called at that time, closed Great Marsh to migratory bird hunting to protect bald eagles (34 FR 15627; Oct 9, 1969). The most current information on refuge closures can be obtained at refuge complex headquarters.

Community Demographics and Planning

Mason Neck Peninsula Demographics

Because of its location, recent history of land management decision-making, and aggressive opposition to development, the Mason Neck Peninsula contrasts

sharply with Fairfax County overall. While the county population density is 2,455 per square mile, Mason Neck population density is 93 per square mile. The peninsula also has a median household income \$8,600 higher than the county median and housing values \$60,000 higher than the county average based on 2000 census figures (USCB, 2007).

Other Public Lands of the Mason Neck Peninsula

Since 1949, the Virginia Division of Historic Resources has protected the Gunston Hall Plantation site. Around the time of refuge establishment, the Virginia Division of Parks and Recreation purchased the land to establish Mason Neck State Park adjacent to the refuge and the Northern Virginia Regional Park Authority (NVRPA) bought the Pohick Bay Regional Park. NVRPA also purchased the Potomac Shoreline regional parks, which they subsequently leased to the Service. Together the Service, the Bureau of Land Management, and these agencies have acquired more than 6,400 acres on the Peninsula (USFWS, 2004).

A series of events threatened Mason Neck in the late 1960s and early 1970s. After plans for a proposed beltway through the area were dropped in 1967, an airport, a natural gas pipeline, a landfill and a sewer line were proposed for the area. These proposals met strong opposition from groups such as the Mason Neck Conservation Committee. Plans for the projects were dropped because of the potential negative impact each had on Mason Neck Refuge and Mason Neck State Park. Mason Neck State Park opened to the public in April 1985 (VADCR, 2006a).

The refuge, along with Mason Neck State Park, the Pohick Bay Regional Park, the Gunston Hall Plantation, and the Bureau of Land Management (BLM), cooperate in the management of their combined lands on the Mason Neck Peninsula with each agency focusing on their strengths of natural resource management, recreation, interpretation, and preservation. This cooperation provides a wide variety of recreational activities while protecting natural resources and avoiding duplication of facilities and programs (USFWS, 2004).

Mason Neck State Park

Mason Neck State Park (1,804 acres) is directly adjacent to Mason Neck Refuge along the refuge's northern boundary. The park attracts migrating and non-migrating species of birds, including tundra swans (*Cygnus columbianus*) and a variety of waterfowl. Like Mason Neck Refuge, bald eagles also inhabit the park. The park also features several hundred acres of hardwood forests consisting of oaks, holly, hickory and other species. Several wetland areas important to area wildlife are also found within the park.

Hiking, biking and self-guided trails wind through the park. Elevated walkways allow visitors to explore some of the marsh areas in the park. Fresh and brackish water fishing are available from car-top boat launch facilities. The Park rents kayaks and canoes to explore Belmont Bay or Kane's Creek. Deer hunting is conducted in coordination with Mason Neck Refuge. The Park's Elizabeth Hartwell Environmental Education Center features exhibits on the plant and animal life of the area, area history and the agencies of the Mason Neck Cooperative Management Area, hands-on activities, a resource library, volunteer exhibit and roving interpretive displays. This center provides an opportunity for teachers to conduct environmental studies in natural settings. The facility has a variety of research materials, a mobile wet lab and a variety of sampling equipment.

The Park supports many activities: pond study, birdwatching, canoe trips, fishing clinics, an active volunteer program, night hikes, teacher workshops, hands-on

experiential educational opportunities, evening programs, and butterfly gardens. (VADCR, 2006a).

Gunston Hall Plantation

Gunston Hall Plantation is a 550-acre National Historic Landmark located about a mile northeast of Mason Neck Refuge. Gunston Hall is the plantation estate of George Mason, who was the first author of the Virginia Declaration of Rights and instrumental in the framing of the United States government. The site includes the main house (completed in 1759), gardens, a variety of outbuildings, as well as a graveyard. The outbuildings include a kitchen, dairy, smokehouse, and laundry. Guided tours of the main house, as well as self-guided tours of the outbuildings and grounds, give a glimpse into how the Mason family, their servants and slaves lived during the mid to late 18th century. Several archaeological studies are currently ongoing, with a strong focus on the historical gardens.

The onsite Gunston Hall Library and Archives serves as a resource to scholars interested in George Mason and the plantation. Gunston Hall occasionally hosts lectures, festivals and other special events. Additionally, student and teacher programs aim to expose schoolchildren to the history of the plantation. The site also houses farm animals and a gift shop. For more information on the site please visit: <http://www.gunstonhall.org> (Gunston Hall, 2006).

Bureau of Land Management- Meadowood Special Management Area

The 800-acre Meadowood Special Recreation Management Area (SRMA), administered by the BLM, is located along Gunston Road in Lorton, Virginia, northwest of Mason Neck Refuge. Meadowood consists of wooded acreage, open pastures, and support buildings. Support buildings on the property include a stable and indoor riding arena, and blacksmith shed. There are also three former residences on the property which have recently been converted into office space, temporary quarters, and an Environmental Education and Interpretive Center. The farm roads that traverse the property are planned to be used as recreational trails. The Meadowood Farm was privately owned until the BLM acquired it on October 18, 2001 under the authority of the 2001 Washington, D.C. Appropriations Act. Section 165 of this Act authorized a complex set of land transactions facilitated by Fairfax County. These resulted in the acquisition of Meadowood Farm by BLM in exchange for federally-owned land in the former Lorton Correctional Complex (BLM, 2004).

Management of the Meadowood SRMA focuses on three core programs: recreation, environmental education, and wild horses and burros. The goals and objectives of these programs and activities are balanced with the goals and objectives of the natural and cultural resource management programs. Boarding of private horses is allowed, as well as horse-related programs that the BLM determines are appropriate. Wildlife, vegetation and riparian/wetland management focuses on species diversity, quality, protection, and enhancement in balance with visitor-use activities (BLM, 2004).

Pohick Bay Regional Park

Pohick Bay Regional Park is a 1,002-acre scenic shoreline park managed by the Northern Virginia Regional Park Authority (NVRPA). The park, located in the upper area of the Mason Neck Peninsula, features a large campground (160 acres), 18-hole golf course (460 acres), and a recreational facilities area (382 acres) featuring a large swimming pool, miniature and disk golf courses, four miles of equestrian trails, nature trails, and picnic shelters. The park also provides visitors with rental paddle boats, jon boats, sailboats, canoes and kayaks (NVRPA, 1999).

Refuge Administration

Refuge Revenue-Sharing Payments

The Refuge Revenue Sharing Act of 1935 (16 U.S.C 715s), as amended, authorizes revenues and direct appropriations to be deposited into a special fund, the National Wildlife Refuge Fund (NWRF), and used for payments to counties in which lands are acquired in fee (fee land) or reserved from the public domain (reserved land) and managed by the Service. These revenues are derived from the sale or disposition of (1) products (e.g., timber and gravel); (2) other privileges (e.g., right-of-way and grazing permits); and/or (3) leases for public accommodations or facilities (e.g., oil and gas exploration and development) incidental to, and not in conflict with, refuge purposes.

The Act authorizes payments for Service-managed fee lands based on a formula contained in the Act that reflects, among other things, the amount of refuge land and its appraised value. Congress ultimately determines each year whether full payment, or a percentage of that full payment, will be made.

Mason Neck Refuge's revenue-sharing payments to Fairfax County from 2003 to 2008 are listed in table 2.10. Revenue-sharing checks are sent by the Service electronically to Fairfax County on an annual basis.

Table 2.10. Revenue-sharing Payments to Fairfax County, Virginia from 2003-2009

Fiscal Year	Revenue-Sharing Payments
2009	\$51,147
2008	\$65,923
2007	\$68,175
2006	\$73,661
2005	\$65,224
2004	\$73,741
2003	\$61,814

Source: (USFWS, 2007a)

Other Current Refuge Plans

In 1989, we prepared an EA to evaluate strategies to control the overpopulation of white-tailed deer that inhabit the refuge and destroy habitat. High deer densities in the eastern deciduous forest cause heavy browsing that impacts forest communities, particularly the understory, ground cover, and recruitment of seedlings. Sensitive woody species subjected to heavy browsing will disappear as deer density increases and become replaced by less desirable (to deer) species. This process eventually alters the plant diversity and physical structure of the habitat, which in turn affects the populations and diversity of other species of wildlife. White-tailed deer management can not only improve the health of the deer population itself by eliminating overcrowding and competition for scarcer food resources, but will also improve the health and diversity of the plant and animal community as a whole (USFWS, 2005b). The EA resulted in the development of a refuge hunt plan.

A managed deer hunt has been conducted at Mason Neck Refuge since 1989. The Mason Neck State Park joined with the refuge in 1993 to form a single hunting management unit. In the years since the initiation of the hunt, shade tolerant species such as American holly (*Ilex opaca*), American beech (*Fagus grandifolia*), paw-paw (*Asimina spp.*), and rhododendron (*Rhododendron spp.*) have rebounded, and in sunnier areas, eastern red cedar (*Juniperus virginiana*) has also rebounded, forming a noticeable mid- and understory layer throughout some parts of the refuge. However, the impact of white-tailed deer overpopulation

remains, as evidenced by lack of understory and tree regeneration, even though past hunts have removed part of the refuge's population. These conditions call for continued management actions and monitoring (USFWS, 2005b).

Special Use Permits

The refuge issues special use permits for various activities such as research, wildlife surveys and censuses, and environmental education. Each request is considered on a case-by-case basis and decisions are based on the following criteria: type, purpose, and appropriateness of activity; whether the activity supports refuge goals; and, what kind of impact the activity will have on other users. Prior to issuing a special use permit, we evaluate the use's appropriateness and compatibility with the refuge purposes.

Partners

Since the 1960s, the conservation community has learned the importance of building strong partnerships between public agencies and private groups. Mason Neck Refuge is part of the Mason Neck Cooperative Management Area, which includes BLM-Meadowood, Pohick Bay Regional Park, Mason Neck State Park, and Gunston Hall. The refuge coordinates with those agencies to address and resolve common management issues.

Other partnerships encompass a wide array of community organizations and individuals, including but not limited to the following:

- Friends of the Potomac River Refuges
- Audubon Society of Northern Virginia
- Virginia Department of Game and Inland Fisheries
- Boy Scouts of America
- Girl Scouts of America
- Chesapeake Bay Gateways Network
- The Hartwell Foundation

Volunteer Program

Since its establishment in 1969, refuge staff has continuously provided opportunities for volunteers to be involved in research, maintenance, and education. Volunteers contribute hundreds of hours of service each year to provide critical assistance in the maintenance of roads and trails, assistance in the management of white-tailed deer, monitoring of populations of bald eagles and great blue heron. In addition, volunteers have completed a variety of projects such as cleaning and painting kiosks, inventory of museum property, mounting of plants for the herbarium collection, and updating databases. The Refuge Complex's Visitor Services' Specialist is responsible for the oversight of all volunteer activities including training.

Refuge Terrain and Habitats

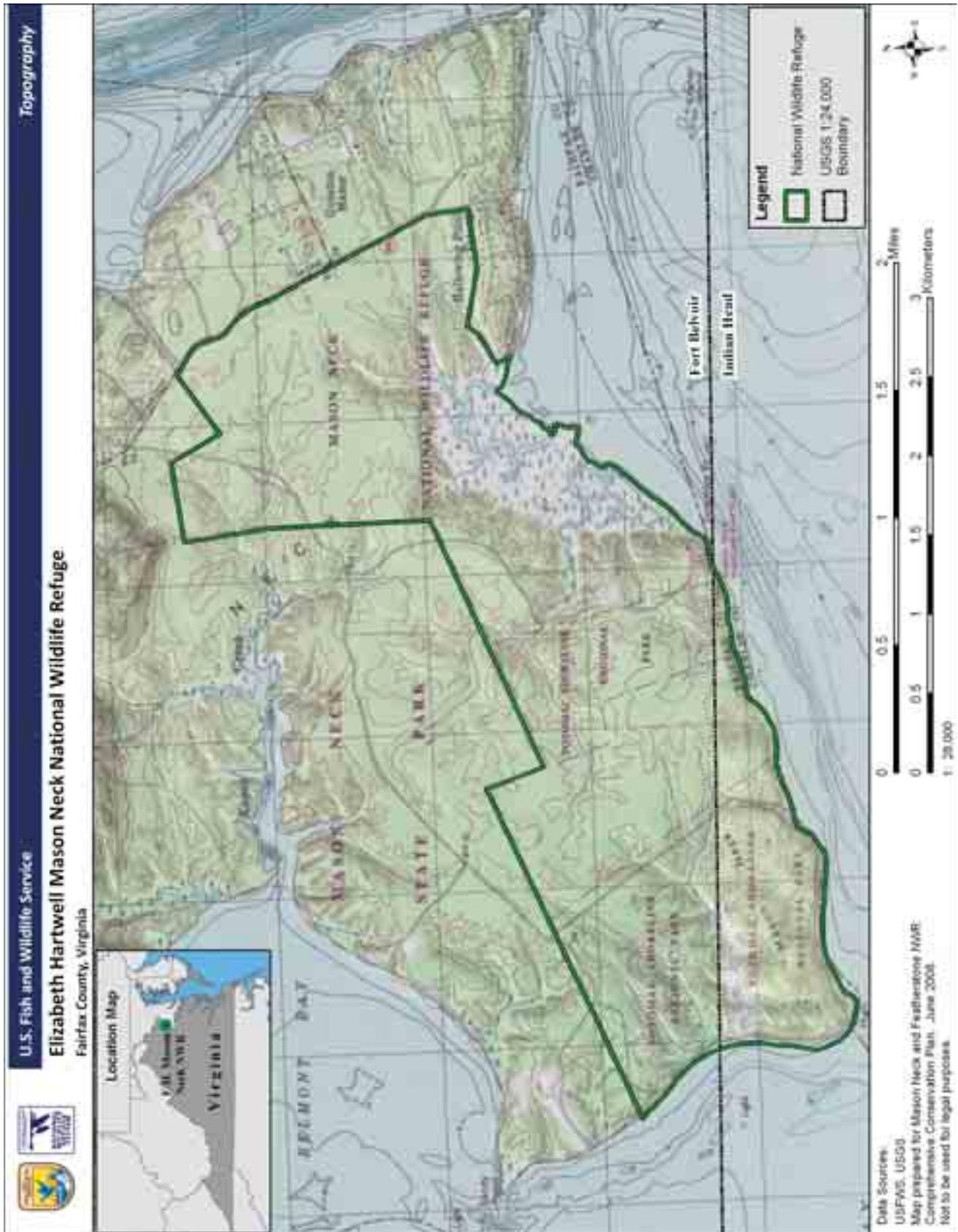
Topography

Inspection of the USGS topographic map (map 2.4) shows that the largest portion of Mason Neck Refuge is upland with relatively gentle relief between 30 and 40 feet above sea level. The shoreline terrain on the banks of the Potomac River consists of narrow beaches just above tidal level. Immediately inland of the beach are 20 to 40 feet high bluffs. At the major drainage outlets of the Great Marsh and Little Marsh, the land shows the dendritic pattern of deeply eroding notches of streams and marsh-vegetated low tidal flats.

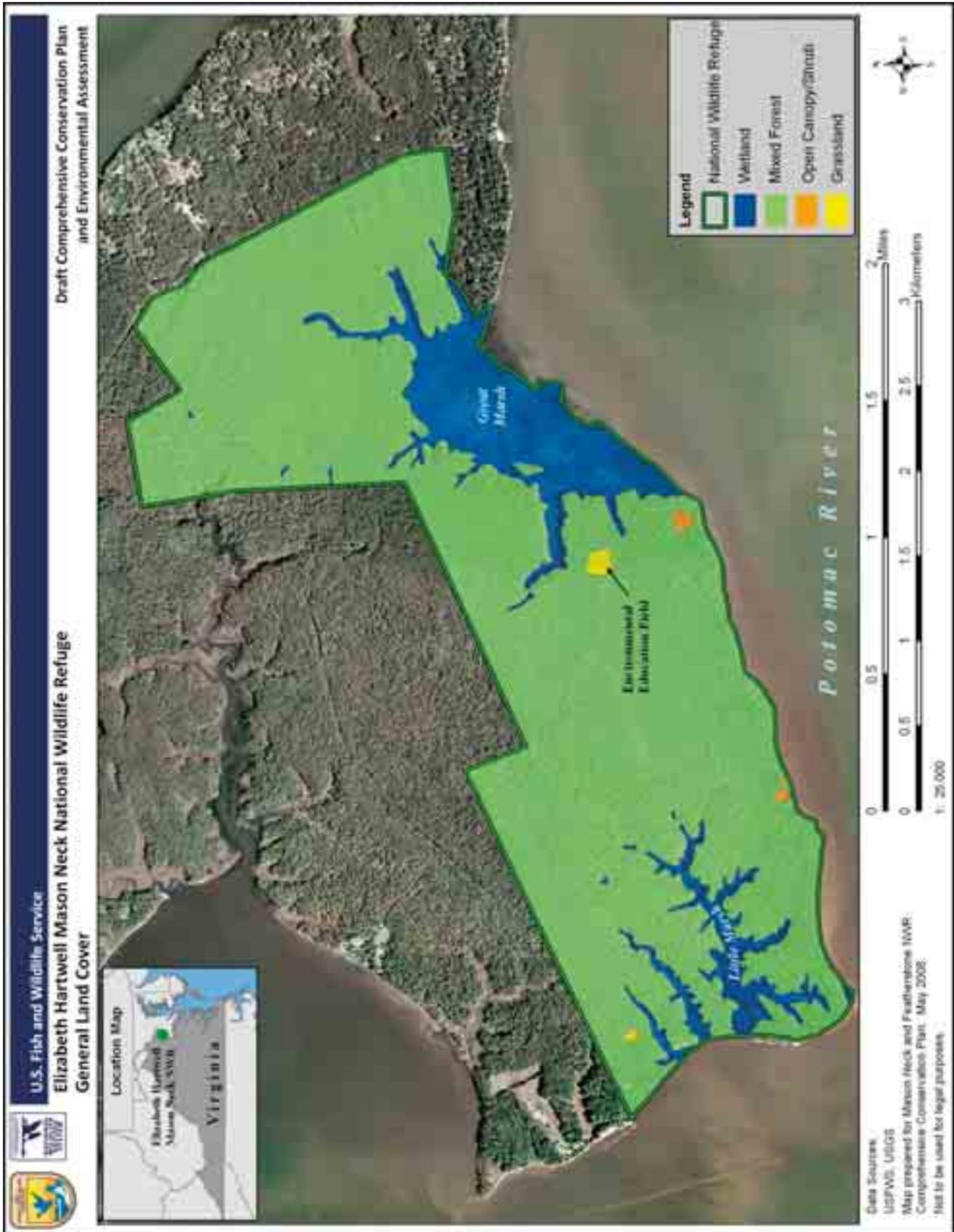
Land Cover

GIS-based land cover information from the Service and the USGS is shown on map 2.5. As illustrated on the map, the predominant land cover types on the refuge are mixed forest and wetlands, with very minor amounts of grasslands and open canopy/shrub cover. The refuge is comprised of 1,883 acres of mixed deciduous upland forest, 364 acres of palustrine and riverine wetlands, 15 acres

Map 2.4. Mason Neck Refuge Topography



Map 2.5. Mason Neck Refuge General Land Cover



of grasslands, 10 acres of brush, and 5 acres of administrative buildings, parking and roads (USFWS, 2005a).

Soils and Shoreline

The predominant soil association on the refuge is the Matapeake-Mattapex-Woodstown. It consists of sandy silt loams with more erodible soils along the cliffs (TPL, 2006). Specific soil series at Mason Neck Refuge are depicted on map 2.6 and their characteristics described in table 2.11 based on profiles from the Fairfax County Soil and Water Conservation District below (FC, 2009; USDA-NRCS, 2008).

Between High Point (the southwest point of refuge land at the junction of the Potomac River and Occoquan Bay) and Sandy Point (where Occoquan and Belmont Bays meet) is a two-mile stretch of west-facing shoreline experiencing erosion. Four minor drainage systems enter Occoquan Bay along this stretch, with Little Marsh the southern-most and Short Marsh the northern-most. Both High and Sandy Points can be seen from the site, as well as Occoquan Bay Refuge across the bay. This exposed stretch of bluffs and creek mouths is what is most subject to heavy erosion. Miller (1983) studied erosion processes, rates, and sedimentation of the Potomac Tidal River. One of his study locations occurred across High Point Creek on the bluff opposite Little Marsh Creek. At this location, Miller found that the mean recession rate was approximately 14 inches per year (Miller, 1983). This translates into over 115 feet of shoreline lost in the last 100 years; with even a greater proportional loss at the Little Marsh Creek site.

In 2001, the Federal Highway Administration (FHWA) and Virginia Department of Transportation (VDOT) requested and received authorization for construction mitigation activities associated with the Woodrow Wilson Bridge Replacement Project, including constructing three, 250-foot breakwaters near Mason Neck Refuge. These are spaced 50 feet apart which filled in to create 22,500 square feet of State jurisdiction bottomland adjacent to the refuge, and another two, 300-foot breakwaters, spaced 50 feet apart which filled in to create 18,000 square feet of State bottomlands adjacent to Mason Neck State Park (VAMRC, 2000).

The breakwaters were completed in October 2002 and have stemmed major erosion along the refuge's western shoreline, to the extent that the substrate is accreting behind the breakwaters and the shoreline is actually expanding there. Erosion by wind and runoff is still occurring along the top of the bluff where numbers of mature trees are undermined and lost. At the time, limited SAV monitoring at these sites occurred. However, a steady increase in abundance of SAV was noticed. The species composition varies but consists of mostly brittle waternymph (*Najas minor*) and *Hydrilla spp.* with a good percentage of *Vallisneria spp.* and *Myriophyllum spp.* mixed in.

*Breakwater off
Mason Neck Refuge*



Bill Wallen

Map 2.6. Mason Neck Refuge Soils

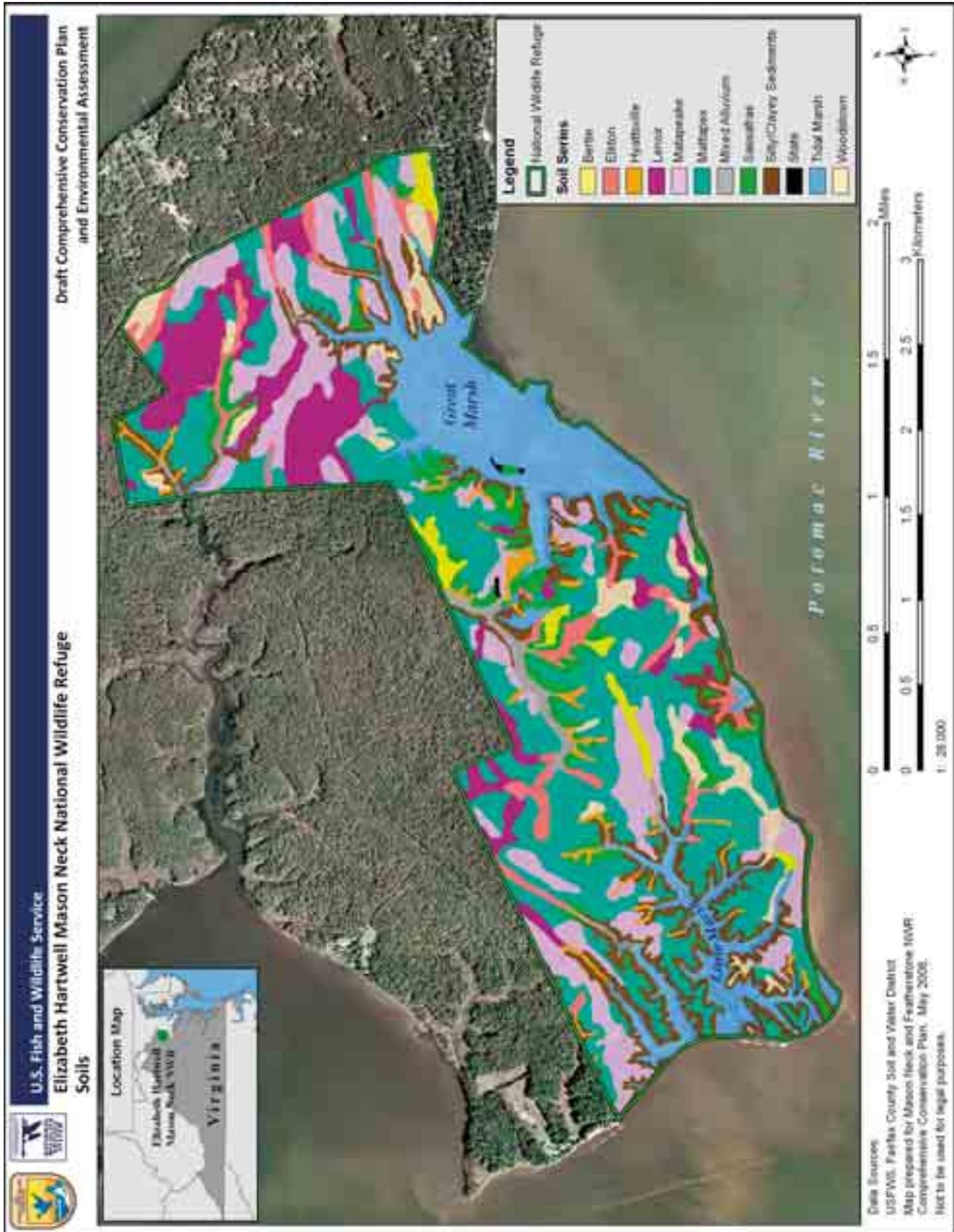


Table 2.11. Characteristics of the Soils of Mason Neck Refuge (Source: FC, 2009; USDA-NRCS, 2008)

Soil Type	Characteristics
Bertie	Predominantly fine, sandy loam sediments on relatively flat landscapes in the Coastal Plain. Very strongly acidic to moderately acidic. The seasonal high water table is 1.5 to 2.5 feet below the surface. Depth to hard bedrock is greater than 50 feet. Somewhat poorly drained with slow surface runoff and moderate permeability. Moderate erosion potential. Mostly used for agriculture, but where wooded supports loblolly pine, sweetgum, yellow poplar, water oak, southern red oak, red maple. Understory plants typically include American holly, flowering dogwood, sassafras, greenbriar, giant cane and inkberry.
Elkton	This wet soil occurs on nearly level landscapes in the lower Coastal Plain. Low areas of this soil, near larger streams, are within the floodplain. Fine-silty surface overlies silty and clayey subsoils. Organic strata may be encountered in some areas. Extremely to strongly acidic. Poorly drained with slow to ponded surface runoff. Erosion potential is low. The seasonal high water table is near to the surface. Depth to bedrock is greater than 200 feet. Mostly wooded with native vegetation including red maple, sweetgum, willow oak, blackgum, and loblolly pine. Understory plants typically include greenbriar, American holly, waxmyrtle, and sweet bay.
Hyattsville	This soil occurs in drainageways and toe slopes, derived from Coastal Plain sediments eroded from upper slopes. Soil materials include clay, silt, sand and gravel. The seasonal high water table is 1 to 2 feet below the surface. Depth to bedrock ranges from 10 to 200 feet or more. Low erosion potential.
Matapeake	This soil occurs on uplands in sand, silt and clay sediments of the lower Coastal Plain. Sandy clay loam, clay loam, and silty clay loam soils are typical. A dense silty clay loam layer may be present two to three feet below the surface in some areas. Extremely to strongly acidic. Well-drained with medium surface runoff and moderate to moderately slow permeability. Erosion potential is moderate. Depth to bedrock is typically greater than 200 feet. Almost exclusively used for agriculture, native vegetation dominated by oaks, some cutover areas have loblolly, Virginia, or shortleaf pine.
Mattapex	This soil occurs on uplands in sand, silt, and clay sediments of the lower Coastal Plain. Sandy clay loam, clay loam, and silty clay loam soils are typical. A dense layer occurs 2.5 to 3 feet below the surface. A "perched" seasonal high water table is found above the dense layer, one to two feet below the surface. Extremely to strongly acidic. Moderately well-drained with moderate to moderately slow permeability. Erosion potential is moderate. Depth to hard bedrock is typically greater than 200 feet. Where wooded dominate vegetation is white oak, scarlet oak, loblolly pine, red maple, yellow poplar, sweet gum with understory of sassafras, dogwood, greenbriar, and American holly.
Mixed Alluvial	This channel-dissected soil complex occurs in floodplains and drainageways, and is susceptible to flooding ¹ . Soil materials range from soft organic silts and clays to dense gravel-sand-silt-clay alluvium. The seasonal high water table varies from 0 to 2.5 feet below the surface. Depth to hard bedrock ranges from 3 to 30 feet. Stream bank erosion within these soils may result in undercutting of embankments. Erosion potential is low.
Sassafras	This soil occurs on hilltops and sideslopes in sandy and clayey Coastal Plain sediments. The upper five feet consists of predominantly sandy and sandy clay loam materials. Well drained with slow to medium surface runoff and moderate to moderately slow permeability. Erosion potential is moderate. Depth to hard bedrock is greater than 200 feet. Mainly used for agriculture, where forested native vegetation is mixed upland hardwoods with some shortleaf and Virginia pine.
Silty/ Clayey Sediments	Occurs primarily along steep hillsides and adjacent to drainageways in the Coastal Plain. It consists predominantly of silty and clayey strata. Soil properties are variable within this unit and low bearing strata and perched seasonal high water tables may be present. This unit may contain deposits of marine clay. Erosion potential is high.
Tidal Marsh	Tidal marsh areas occur along the Potomac River and are periodically inundated by flood waters under tidal influence. The soils consist of organic-rich, highly-stratified sandy, silty and clayey sediments. Underlying soil is usually soft. Floodwaters from tidal inundation are typically shallow. Erosion potential is low.
Woodstown	This soil occurs in sandy sediments on nearly level landscapes in the lower Coastal Plain. Soil materials are primarily sandy loams to sandy clay loams, with a dense subsurface. The seasonal high water table is 1.5 to 2.5 feet below the surface. Extremely to strongly acidic. Moderately well drained with slow to medium surface runoff and moderate permeability. Erosion potential is low. Depth to hard bedrock ranges from 50 to more than 300 feet. Mostly used for agriculture; where wooded native vegetation is oak and hardwoods with some Virginia and loblolly pine.

Soil Type	Characteristics
State	This sandy to silty soil occurs on high stream terraces in the Coastal Plain. Flooding may occur following storm events. The seasonal high water table is four to six feet below the surface. Extremely to strongly acidic. Well drained with negligible to moderate surface runoff and moderate permeability. Shrink-swell potential is low. Erosion potential is high. Depth to hard bedrock is 8 to 20 feet. Mostly used for agriculture, where wooded dominate vegetation is white oak, red oak, American beech, elm, sycamore, American holly, sweetgum, yellow poplar and loblolly, Virginia and shortleaf pine.
Lenoir	This soil occurs in loamy and clayey sediments on nearly level landscapes in the lower Coastal Plain. A silty surface overlies a slowly-permeable clayey subsoil which has a moderate shrink-swell potential. The seasonal high water table is 0.5 to 1.5 feet below the surface. Somewhat poorly drained with slow surface runoff and slow permeability. Erosion potential is moderate. Depth to bedrock is typically greater than 200 feet. Where wooded, dominant vegetation is loblolly pine, longleaf pine, blackgum, and yellow poplar. Understory typically includes inkberry, sourwood, honeysuckle, flowering dogwood, American holly, wax myrtle, blueberry, poison ivy, redbay, and greenbriar.

Wetland Habitats

Tidal Wetlands

Mason Neck Refuge’s freshwater tidal wetlands include the 207-acre Great Marsh, fronting on the Potomac River in the arch of the boot-shaped Mason Neck Peninsula, and the 50-acre Little Marsh, formed by the impoundment of High Point Creek, a drainage system near the toe of the peninsula (map 2.7).

Great Marsh has several meandering creek mouths and is dominated by wild rice, spatterdock, and other open marsh species favored by a constant freshwater tidal exchange (USFWS, 2005a).

High Point Creek is narrow and protected by forested promontories, except at the narrow impounded (large dike) mouth with little exchange of water beyond storm surges and runoff. Little Marsh impoundment is drawn down to the greatest extent possible in early summer to provide better foraging opportunities for young eagles and great blue heron (USFWS, 2005a).

Non-Tidal Waters

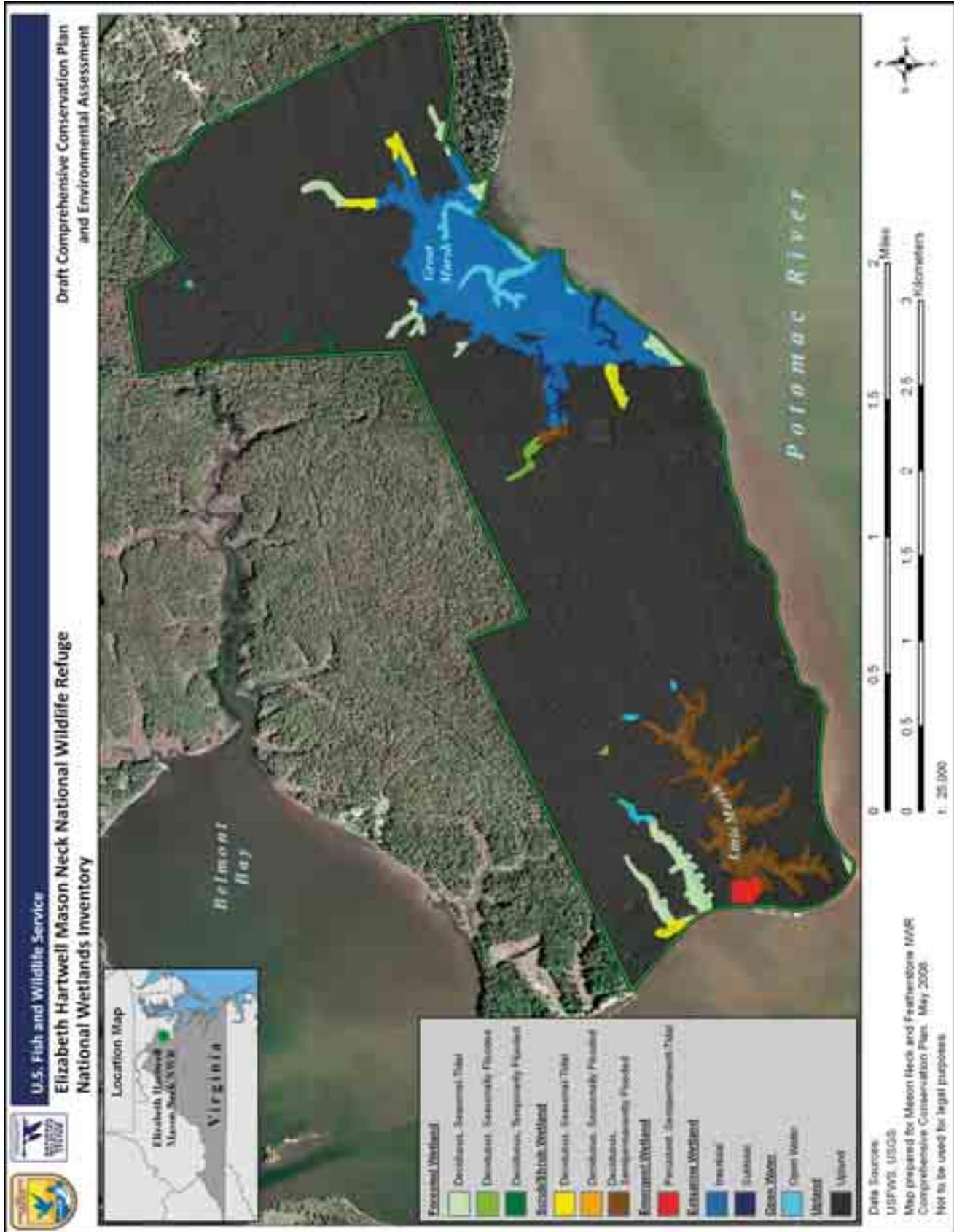
Streams such as Raccoon Creek provide excellent wetland habitat throughout the refuge attracting species such as the painted turtle (*Chrysemys picta*) and red-bellied turtle (*Pseudemys rubriventria*), and many furbearer species like beaver (*Castor canadensis*) and mink (*Mustela vison*) (USFWS, 2004).

Beaver are common on the refuge.



© Gene Stires, Sr.

Map 2.7. Mason Neck Refuge National Wetlands Inventory



Upland Habitats

A survey in 1986 of Mason Neck Refuge identified a wide variety of plants throughout the diverse habitats of the refuge. Table A.5 in appendix A lists the plant species found during the survey.

Forest

Upland hardwood forest (1,883 acres) is the predominant vegetation type on the refuge and peninsula. Thirty-six species of trees have been recorded on the refuge. The dominant deciduous species in the upland forest are oak (*Quercus spp.*)—primarily chestnut oak (*Quercus prinus*), white oak (*Quercus alba*) and red oak (*Quercus rubra*) (USFWS 2004). Other overstory species include mockernut hickory (*Carya alba*), shagbark hickory (*Carya ovata*), yellow poplar (*Liriodendron tulipifera*), sycamore (*Platanus occidentalis*), American beech and red maple (*Acer rubrum*). The dominant understory species include holly (*Ilex opaca*), flowering dogwood (*Cornus florida*), and sweetgum (*Liquidambar styraciflua*) (USFWS, 1993).

Virginia pine (*Pinus virginiana*) is the most common coniferous species and is widely scattered throughout the deciduous upland forest, where it sometimes occurs in small patches and is usually found along the wetland edges. Other conifers include loblolly pine (*Pinus taeda*), eastern red cedar, and shortleaf pine (*Pinus echinata*).

In 2009, the Virginia Department of Forestry (VDF) completed a Forest Health and Condition Inventory and Assessment of Mason Neck Refuge. Overall, they determined that the Mason Neck hardwood forest was unhealthy, suffering from a lack of regeneration, missing an understory of shrubs and herbaceous plants, and was considerably “overstocked.” The lack of hardwood regeneration, shrub layer, and herbaceous plants was attributed to overbrowsing from high deer populations. The VDF report included recommendations for improving forest health and habitat quality for bald eagles and forest interior dependent birds. The report is available from refuge headquarters.

Grassland

Only about 15 acres of grasslands or open field remain on the refuge and they are not a priority for management. During colonial times and up to the early 1900s, numerous acres were used for agriculture (crops and dairy) and logging. Natural succession has converted the grasslands into hardwood forests leaving a monotypic habitat of mixed hardwoods with small patches of conifers. Most of the refuge has not been logged in the last 40-50 years and some areas on the refuge have stands of 100-year and older trees (USFWS, 2005a). We mow approximately ten acres of the grassland fields on a rotational basis for wildlife viewing opportunities and to manage invasive plants and weeds. In addition, approximately two acres of the field associated with the environmental education site are mowed annually as part of a three-year rotational strip mowing program designed for educational interpretation and habitat diversity (USFWS, 2005a).

Threatened or Endangered Plants

The small whorled pogonia (*Isotria medeoloides*), a Federal-listed threatened plant species, has been found south and north of the refuge, but not on the refuge itself. Habitat for this plant may be present on the refuge, but the deer population is likely having an impact on any suitable areas (USFWS, 1993). To date, the recovery team has not recommended special efforts to locate this plant on the refuge.

Sensitive joint-vetch (*Aeschynomene virginica*), a Federal- and State-listed threatened plant, has the potential to occur in freshwater tidal marshes on or in the vicinity of the refuge. Although it has not been identified on the refuge,

sensitive joint-vetch can occur in freshwater to brackish wetlands, primarily marshes in the intertidal zone of large rivers (VADCR letter, 10/20/2010).

Two other State rare plant species may occur in the vicinity of the refuge, although they have not been identified on the Refuge. Parker's pipewort (*Eriocaulon pakeri*) occurs in intertidal zones and river bulrush (*Schoenoplectus fluviatilis*) inhabits fresh tidal marshes (VADCR letter, 10/20/2010).

Invasive Plants

Executive Order 13122—Invasive Species (issued February 3, 1999) authorizes and directs the Service to protect native wildlife and their habitats on national wildlife refuges from damage from invasive and injurious species. In 2004, the refuge surveyed for invasive plants along 24 transects across the refuge. Table A.5 in appendix A lists the species found. The refuge currently has two invasive plants of primary concern: Japanese stiltgrass (*Microstegium vimineum*) and mile-a-minute (*Polygonum perfoliatum* L.). Their descriptions are below. Other invasive plants of concern on the refuge are tree-of-heaven (*Ailanthus altissima*), Japanese honeysuckle (*Lonicera japonica*), Japanese barberry (*Berberis thunbergii*), and beefsteak plant (*Perilla frutescens*).

Japanese stiltgrass

Japanese stiltgrass is an annual plant that has a sprawling habit and grows slowly through the summer months, ultimately reaching heights of 2 to 3½ ft. It threatens native plants and natural habitats in open to shady, and moist to dry locations. Stiltgrass spreads to form extensive patches, displacing native species that are not able to compete with it. Where white-tail deer are abundant, as they are on Mason Neck Refuge, they may facilitate stiltgrass invasion by feeding on native plant species and avoiding stiltgrass (NPS, 2008). Japanese stiltgrass can spread rapidly following a disturbance such as flooding or mowing. Within three to five years it can form dense monotypic stands which crowd out native herbaceous vegetation. Although Japanese stiltgrass does not produce prolific amounts of seed, a single plant typically giving rise to 100 to 1000 seeds, the seeds remain viable in the soil for three to five years. It is also well adapted to low light levels and is able to grow and produce seed in 5 percent of full sunlight

Mile-a-minute

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 percent) 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. Its rapid growth and vine-like nature allow mile-a-minute to overtake the native vegetation of an area, smothering seedlings and out-competing adult plants for space, nutrients and sunlight. This competition is a particular concern in wet meadows which may support rare wetland plants (VADCR, 2003).

Refuge Wildlife

Threatened or Endangered Animals

There are no known occurrences of any Federal-listed animal species on the refuge. However, should one become known, we would make it a priority to protect and aid in its recovery. Two State threatened birds, the peregrine falcon (*Falco peregrinus*) and loggerhead shrike (*Lanius ludovicianus*), are known on the refuge but are rare sightings. The tables in appendix A highlight sensitive species including State rare and endangered species, as well as other species of concern.

Birds

The mature upland hardwoods, freshwater marshes, and small grassland areas which comprise the refuge habitat host over 211 species of birds, 31 species of mammals, and 39 species of reptiles and amphibians (USFWS, 2005a). One of the State's largest colonies of great blue heron in the mid-Atlantic region is located in the Little Marsh impoundment area (USFWS, 2004). Lists of the wildlife species on the refuge are provided in appendix A. This section discusses species of greatest conservation need found at the refuge that we consider as focal species for refuge management.

Of the 211 species of birds that occur on Mason Neck Refuge (USFWS, 1995; also see appendix A), more than half (114 species) are listed as species of conservation concern by one or more of the following authorities:

- USFWS Birds of Conservation Concern, Region 5 (17 species)
- Atlantic Coast Joint Venture, BCR 30 (70 species)
- PIF priority species for Area 44 (50 species)
- Virginia Wildlife Action Plan (70 species)

About half of those species of conservation concern (56 species) are known to breed on the refuge.

Bald Eagle

The refuge was established for the primary objective of protecting essential nesting, feeding, and roosting habitat for bald eagles (USFWS, 2005a). Records of bald eagle use date back to the 1700's showing multiple nest sites and summer roosts hosting concentrations of 50 or more birds. During the 1960s, populations dwindled locally, as they did nationally, due to increased pesticide use and habitat destruction (USFWS, 2009). With greater awareness, better protection nationally and regionally of the birds and their habitat, and reduction in pollution, the eagle population has made a recovery (USFWS, 2005a).

Three active eagle nest sites exist on the refuge. Other areas frequented by eagles in the vicinity of the refuge are the roost and a nest site on Kanawha Creek in the neighboring State park, a nest and roost on the north border of the refuge and Gunston Hall, a nest site between Gunston Manor and Hallowing Point communities, and a nest site on undeveloped land on the north portion of the peninsula. Historically, eagles abandoned the nest near the heron rookery and moved out along the shore between Anchorage and High Point. Though active for three years, the bald eagle nest in the heron rookery seemed in conflict with the heron and the High Point Creek Nest. In 2002, the occupied breeding site was abandoned and has not been occupied since (USFWS, 2005a). The inset table in map 2.2 highlights the nesting territories and productivity of bald eagles on Mason Neck Refuge from 1990 to 2010.

The year 2005 marked the completion of six years of bald eagle surveys along the shoreline of the Potomac River between Fort Washington, Maryland and Aquia Creek, Virginia. The field study was designed to examine the distribution and abundance of the bald eagles and to assess potential human impacts or the effects that activities might have on their distribution and relative abundance. In general, there was a three-fold increase in the overall number of eagles observed along the shoreline, with an average of 20 birds observed in 2000 to an average of 64 birds observed in 2005. The relationship between their distribution and the availability of perching and foraging habitat along the river suggests that the eagles are avoiding developed areas along the river (USFWS, 2005a).

Waterfowl

Waterfowl that breed at the refuge include the American black duck, a highest priority species in BCR 30. Also known on the refuge are the hooded merganser (*Lophodytes cucullatus*) and the wood duck which are both considered of moderate priority by BCR 30. Although Mason Neck Refuge is out of the mainstream of the Atlantic Flyway, the refuge, as part of a series of small marshes along the Potomac River, provides migrating and wintering habitat for over 20 different waterfowl species. The Atlantic Population Canada goose (BCR 30 highest priority) and the tundra swan (BCR 30 high priority) are common migrants at the refuge.

Each year at Mason Neck Refuge, approximately 75 ducks are banded at Great Marsh by the VDGIF. The majority of banded ducks are wood ducks; approximately, five to ten are teal; and three to five are mallards. Aerial surveys around the refuge area have not been conducted in the past seven years because of flight area restrictions.

Raptors

Fifteen species of raptors (table A.1, appendix A) have been known to breed on or visit the refuge. In addition to bald eagles, nesting has been documented for BCR 30 ranked high priority broad-winged hawk (*Buteo platypterus*), the VDGIF ranked American kestrel (*Falco sparverius*; Tier II), and VDGIF ranked red-shouldered hawk (*Buteo lineatus*; Tier V). VDGIF ranked owls of conservation need found nesting on the refuge include the barred owl (*Strix varia*; Tier II) and barn owl (*Tyto alba*; Tier V). Definitions of tier levels are explained in appendix A.

Shorebirds, Gulls, Terns, and Allied Species

The Great Marsh and Potomac River provide only marginal habitat for shorebirds due to tidal influence and steep banks. The refuge is also located out of the main migration pattern. A total of 19 species of shorebirds, gulls, and terns have been reported at Mason Neck Refuge. In the winter, ring-billed (*Larus delawarensis*), herring (*Larus argentatus*), and great black-backed gulls (*Larus marinus*), and the PIF 44 (Tier V) and State-listed (Tier IV) Forster's tern (*Sterna forsteri*) comprise the bulk of this community with small populations of migrating shorebirds, including the wintering greater yellowlegs (*Tringa melanoleuca*) (BCR 30 high-priority listed), and common snipe (*Gallinago gallinago*) (BCR 30 moderate-priority listed).

Marsh and Water Birds

The refuge hosts 14 species of marsh and water birds during the spring and summer. Most abundant are the great blue heron, green-backed heron (*Butorides virescens*) and great egret (*Ardea alba*) that use the small marshes and Potomac River shoreline for feeding, nesting and roosting. Extensive marsh bird surveys were last conducted at Mason Neck and Occoquan Bay Refuges in June and July of 1999.

Two species of colonial waterbirds—the great blue heron and great egret—breed on the refuge. The number of great blue heron, in particular, contributes to this being one of the largest rookeries in the mid-Atlantic region. Both are PIF 44 listed as Tier V birds of conservation concern. The population size of the heron rookery in the southwest corner of the refuge grew from 30 nests in 1979 to over 1,679 nests at its peak in 2003, during which time the reproductive potential for the heron has varied considerably and may be related to weather-related factors. The estimated mean size of the rookery at Mason Neck Refuge during the period 1992 to 2004 was 1,386 nests, with a range of 1,026 to 1,679 nests, based on a total census of nests during the fall or winter. The rookery has been comprised primarily of great blue heron with some great egret nests. The number of great egret nests has typically ranged from only 15 to 25 and they have been

consistently located in the southwest corner of the rookery site (Witt, 2006). More recently, the entire rookery has decreased markedly in size to fewer than 800 nests (Witt, personal communication, 2008). The portion of the refuge on which the heron and egret rookery is located is closed to the public.

Migratory Songbirds

The refuge supports a wide diversity of songbirds. A complete list can be viewed at <http://www.fws.gov/masonneck/wildlife.html>. Several of these are birds are listed of “Highest” conservation concern in the BCR 30 plan, including blue-winged warbler (*Vermivora cyanoptera*), prairie warbler (*Dendroica discolor*), and wood thrush (*Hylocichla mustelina*). There are also 14 songbird species of “High” concern in BCR 30 that breed on the refuge. Those are listed in appendix A. Several others known to breed on the refuge are listed as FIDS of conservation concern in the Chesapeake Bay area, including, red-eyed vireo (*Vireo olivaceus*), Louisiana waterthrush (*Seiurus motacilla*), hooded warbler (*Wilsonia citrine*), and ovenbird (*Seiurus aurocapilla*).

The Institute for Bird Populations (IBP) from Port Reyes Station, California has continued operating two Monitoring Avian Productivity and Survivorship (MAPS) stations on Mason Neck Refuge, which were started in 1995. The refuge was included in a partnership with nearby Fort Belvoir to monitor nesting bird activity as part of the “Monitoring Avian Productivity and Survivorship (MAPS) Program. The refuge’s stations are Mason Neck-1 located on Sycamore Road near Old Barn Road and Mason Neck-2 on Little Marsh Road northwest of the High Point eagle nest. Volunteers, trained by IBP, operate the stations and conduct an average of 8 banding sessions between May and August each summer. At the site the birds were captured with mist-nets, identified, sexed, and measured. The 2005 field season resulted in 38 birds being newly banded with 11 recaptured from previous years at Mason Neck-1 site; and 54 birds being newly banded with 6 recaptured from previous years at Mason Neck-2 site.

Game Birds

In addition to waterfowl, the VDGIF lists the wild turkey (*Meleagris gallopavo*), mourning dove (*Zenaidura macroura*), northern bobwhite quail (*Colinus virginianus*), ruffed grouse (*Bonasa umbellus*) and woodcock (*Scolopax minor*) as game birds. Quail and grouse are rarely seen on the refuge. Woodcock are common in the spring and doves are abundant year round. Wild turkey populations have increased in recent years.

Mammals

General Survey

There are 28 confirmed mammal species on the refuge, and an additional 17 species that likely occur based on the presence of suitable habitat (Jones and Klimkiewicz, 1975). Currently, 31 species of mammals are known to inhabit the refuge (USFWS, 2005a). The black bear (*Ursus americanus*) and bobcat (*Lynx rufus*) were present at one time, but their recent occurrence on Mason Neck peninsula is doubtful. The mammals that have been observed or collected on Mason Neck Refuge are listed in appendix A, table A.7 (Jones and Klimkiewicz, 1975). White-tailed deer, eastern cottontail rabbit (*Sylvilagus floridanus*), and gray squirrel (*Sciurus carolinensis*) are State game mammals according to hunting regulations; however, the only species hunted on the refuge is deer.

White-tailed Deer

White-tailed deer are one of the most visible species on Mason Neck Refuge. The refuge’s large deer population reflects overall high population levels throughout northern Virginia. Extensive development in the area has reduced the amount of habitat available for wildlife which taxes remaining habitats more heavily. White-tailed deer populations at high levels may negatively impact habitat quality

and other wildlife species. Deer are particularly prone to habitat alteration due to their high reproductive potential (Rooney and Waller, 2003). Through their foraging habits and preferences, they can change plant composition and structure with subsequent impacts on other wildlife such as songbirds (McShea and Rappole, 2000). These impacts are magnified when other factors, such as mild weather, availability of alternative food sources, and reduced annual mortality allow populations to quickly increase in numbers (USFWS, 2007b). In addition to a general decrease in habitat quality, high deer densities can also decrease overall deer population health as evidenced by decreased body weights, increased occurrence of deformities, increased levels of internal and external parasitism, decreased body fat deposits, and disease transmission (USFWS, 2007b).

Mason Neck's deer population appears to be having these types of impacts on the refuge's forests. In 2009, the Virginia Department of Forestry (VDF) determined that the Mason Neck hardwood forest was unhealthy, suffering from a lack of regeneration, missing an understory of shrubs and herbaceous plants, and was considerably "overstocked." The lack of hardwood regeneration, shrub layer, and herbaceous plants is likely due to overbrowsing from high deer populations (VDF, 2009). Impacts to the recruitment of canopy trees, which are used by bald eagles, is a particular concern.

The refuge implemented a deer management program in 1989 to control and reduce deer numbers and to improve the quality of the forest habitat which had been severely degraded. This was clearly evidenced by distinct browse lines and lack of understory vegetation. Spotlight counts were used in an attempt to obtain estimates of the deer population and the population trend over time. Between 1988 and 2004 a high count of 43 deer were observed in 1990 and 2000. However, these spotlight counts were found to be inadequate to determine population and trends primarily due to the limited area that deer could be observed while conducting the surveys. The refuge currently uses deer health data such as weight, fat deposits, antler growth, and bone marrow fat content as indicators of herd health. Harvest data indicate that the population is stable and that habitat is improving, however densities are still above desired levels and deer are still stressed nutritionally.

Reptiles and Amphibians

The refuge offers a diverse array of habitats for reptiles and amphibians with its vernal pools, creeks, tidal marshes, and woodlands. Sawdust piles, fallen trees, and brush piles also provide habitat favored by many reptiles (Klimkiewicz, 1972a).

Reptiles

Seven species of turtles and four species of lizards have been observed on the refuge (Klimkiewicz, 1972a). Tables A.2 in appendix A lists the turtles and lizards for the refuge. The eastern box turtle (*Terrapene carolina*) and spotted turtle (*Clemmys guttata*) are listed as Tier III species of greatest conservation need by the State of Virginia (VDGIF, 2005). Two studies on the snake community of Mason Neck Refuge have been completed; a 2001 doctoral thesis by Terry R. Creque of George Mason University (Creque, 2001) and 2001-2003 study of eastern worm snakes (*Carphophis amoenus*) by John Orr of J.E.B. Stuart High School in Fairfax, VA (Orr, 2006). The two studies found 12 species of snakes on the refuge. Of the 12, the common (or eastern) ribbon snake (*Thamnophis sauritus*) and eastern hognose snake (*Heterodon platirhinos*) are listed by VDGIF as Tier IV species of concern (VDGIF, 2005).

Amphibians

Five species of salamanders have been found on the refuge (Klimkiewicz, 1972b). For species information, see appendix A. Anuran call count surveys for Mason

Neck Refuge were conducted each year from 2000 to 2002. These surveys were initiated on the refuge to determine what species of frogs occur on the refuge and which sites are important to breeding populations. The eleven species of frogs and toads heard on the refuge are listed in table A.2 in appendix A.

Interjurisdictional and Other Fish Species

The tidal Potomac River and tributaries support a diversity of interjurisdictional fish species that depend in part on the larger tributaries (including the Occoquan River and Occoquan Bay) and the smaller streams and marshes along the Virginia shoreline for habitat. Interjurisdictional fish of interest to the Service, and listed as species of concern by VDGIF (2005), include the shortnose sturgeon (*Acipenser brevirostrum*) (Tier I), Atlantic sturgeon (Tier II), alewife (Tier IV), American shad (Tier IV) and American eel (Tier IV). Other fish of greatest conservation need in the Coastal Plain-Potomac EDU include the bridle shiner (*Notropis bifrenatus*) (Tier I) and yellow lance (*Elliptio lanceolata*) (Tier III) least brook lamprey (*Lampetra aepyptera*) (IV) ironcolor shiner (*Notropis chalybaeus*) (Tier IV) and logperch (*Percina caprodes*) (Tier IV).

Cultural Resources

Mason Neck Refuge contains an unusually important and diverse archaeological and historical record, which offers evidence of thousands of years of settlement by Native Americans, and of later occupations by Euro-Americans and African-Americans. Twenty-five known Native American sites occur on the refuge and represent occupations that began as early as 9,000 years ago, and continued into the mid-seventeenth century. There are also fifteen known historical archaeological sites, which offer insights into Euro-American settlement that occurred after the seventeenth century. Unfortunately, the refuge's archaeological resources are seriously threatened by shoreline erosion and a recent reconnaissance study assessed the impacts of this erosion (Johnson, 2005). Appendix F presents a detailed discussion of the cultural resources of Mason Neck Refuge.

Visitor Services

Mason Neck Refuge provides opportunities for the public to participate in wildlife-dependent recreational activities. The 1997 Refuge Improvement Act identifies six wildlife dependent public uses that are a priority on refuges and direct us to give them enhanced consideration during CCP development. Any use, including these six priority uses, must be assessed through a compatibility determination process before we will allow them. Non-priority public uses must also initially go through an appropriateness evaluation. Five of the six priority uses have been found compatible on this refuge in designated areas, including: wildlife observation, nature photography, hunting, interpretation and environmental education. Recreational fishing is the only priority public use not allowed anywhere on the refuge primarily because no opportunities are present in areas open to public access. For example, virtually all of the refuge shoreline (and thus, potential fishing sites) are closed to public access due to concerns with wildlife disturbance or impacts to sensitive habitat areas. Our public use program areas of emphasis on this refuge are wildlife observation and photography, and interpretation.

Visitation

In 2009, our total annual visitation was 19,172 visitors. The majority (approximately 75 percent) of our visiting public is engaged in wildlife observation and photography.

Wildlife Observation and Photography

These two activities are facilitated on the three trails discussed below. Many visitors participate in both wildlife observation and photography on their visits to the refuge.



USFWS

*Joseph V. Gartlan, Jr.
Great Marsh Trailhead
on Mason Neck Refuge*

Joseph V. Gartlan, Jr. Great Marsh Trail

The Great Marsh Trail is a paved, three-quarter-mile, accessible trail that follows a forested ridge along a natural peninsula and terminates at an observation platform at Great Marsh (USFWS, 2004). The large observation platform features an accessible Mark-1 telescope to facilitate wildlife observation. Interpretive sites on the Great Marsh Trail are located at a kiosk near the parking lot and a wayside interpretive panel at the observation platform. Information about the refuge, Joseph V. Gartlan, Jr., Great Marsh, plants and wildlife can be found at these sites.

Woodmarsh Trail

The three-mile Woodmarsh Trail loops through a hardwood forest, carpets of ferns, over small streams, and along a marsh (USFWS, 2004). Interpretive sites on Woodmarsh Trail are located at a kiosk at the parking lot, a wayside interpretive panel at the beginning of the trail, and a kiosk at the back end of the trail adjacent to Sycamore Road. These sites provide information about the refuge, white-tailed deer, bald eagles, invasive plants, other refuge wildlife, rules and regulations, and a trail map (USFWS, 2005). Portions of the trail are closed from December through July due to bald eagle nesting activity.

High Point Trail

The High Point Trail was dedicated at the Elizabeth Hartwell Mason Neck Earth Day celebration in April of 2005 (USFWS, 2005a). It is a multi-purpose, Americans with Disabilities Act-compliant trail which parallels High Point Road from Gunston Road through the refuge to the Mason Neck State Park Visitor Center. Only one-half mile of the 3-mile trail occurs on the refuge. The trail was developed to provide a safe alternative to pedestrians that were using High Point Road to access the State Park. This is the only trail on the Refuge that allows bicycling and other pedestrian uses along with foot traffic.

Environmental Education

According to Service policy (605 FW 6) environmental education is a curriculum-based process designed to teach citizens and visitors of all ages about the history and importance of conservation and the significance of natural resources. In general, environmental education programs may incorporate some of the following: on-site, off-site, and distance learning materials, activities, programs, and products based on a course of study designed for specific audiences.

Unfortunately, over the past few years, participation of refuge staff in environmental educational activities has diminished from an active role to one of a facilitator. In addition, diminishing school budgets has resulted in a decrease in the number of schools utilizing the refuge. However, we continue to encourage educators to use the refuge with their primary and secondary students to participate in hands on activities in which they learn basic biological principles and are taught about the Chesapeake Bay Watershed. High school and college level teachers and faculty have also led students on more advanced studies.

Environmental education facilities on the refuge include an education pavilion and loop trail located off Sycamore Road which is maintained when staff and funding allows. This area is not open to the general public and is managed via a special use permit. Other educational programs also occur elsewhere on the refuge. For example, Thomas Jefferson High School has used the refuge to conduct advanced science projects. Four times a year, students survey specific vernal pool sites for salamanders as well as to test new computer monitoring devices. Another study by students relates to collecting and analyzing deer pellets. The coordinator of the project has been very excited about the advanced science work completed

by the students and the opportunity to use the refuge. A new program led by Virginia Tech was initiated in 2007 involving students from Freedom High School collecting dendrochronology information.

Interpretation

The Service defines interpretation as “[a] communication process that forges emotional and intellectual connections between the audience and resource” (603 FW 7). From the perspective of refuge management, interpretation is the means by which the refuge presents historical and cultural information and explains concepts of ecology and methods of resource management to the public. The Service’s guiding principles for its interpretive programs include: developing a sense of resource stewardship, minimizing conflicts between visitors engaged in wildlife-dependent recreation, and promoting an understanding and appreciation for the individual refuge, the National Wildlife Refuge System and America’s natural and cultural resources.

Woodmarsh Trailhead structure on Mason Neck Refuge



Bill Wallen

Interpretation facilities on the refuge include 3 kiosks with interpretive panels. Two are located at the trail heads of Great Marsh and Woodmarsh trails. An additional kiosk is located further down Woodmarsh Trail, close to Sycamore Road. Each kiosk contains a map panel to physically orient the visitor with additional panels covering topics such as viewable wildlife, bald eagles, invasive and exotic plant and animal species and the white-tailed deer.

All interpretive panels on the Great Marsh Trail were updated in 2001. One panel provides information on Joseph V. Gartlan, Jr., what visitors are likely to see along the trail, and refuge regulations. Another provides information on the Great Marsh with photographs of typical plants and wildlife. New panels at the Woodmarsh parking lot include a trail map and an aluminum trailhead map

and information panel. Six panels at the Sycamore Road kiosk include panels on white-tailed deer, bald eagles, invasive plants, and the wildlife in the area, as well as a trail map.

Interpretive tours are given by staff on special occasions such as the annual Elizabeth Hartwell Eagle Festival. Refuge brochures on a variety of topics are also available to facilitate self-guided interpretation.

Hunting

A white-tailed deer management program was initiated in 1989 (USFWS, 2005b) to reduce the population of deer on the refuge and thereby protect and restore understory vegetation on both the refuge and adjacent State park. A large, unmanaged population of deer had created a noticeable browse line due to the lack of available food. In partnership with the State park and VDGIF, the refuge holds an annual hunt in November and December as part of its deer management program. Hunters selected through an application and lottery process are required to attend an orientation session to learn the rules, restrictions and management goals of the hunt.

From a recreational perspective, these hunts serve to continue the legacy and heritage of hunting in the region. From a biological perspective white-tailed deer hunting is a viable management tool needed to reduce the deer population on the refuge and the State park. The quick and continual repopulation of this area by deer implies that these hunts will be facilitated each year.

Table 2.12. Annual Mason Neck Refuge Deer Harvest Results (1998-2009)

Year	Does	Bucks	(antlered/button)	Totals
1998	44	53	(38/15)	95
1999	34	60	(34/26)	93
2000	53	56	(33/22)	109
2001	48	44	(27/17)	92
2002	41	31	(23/8)	72
2003	48	67	(46/21)	115
2004	39	60	(54/6)	99
2005	39	50	(37/13)	89
2006	60	61	(47/14)	121
2007	44	67	(40/27)	111
2008	55	53	(37/16)	108
2009	30	40	(30/10)	70

Featherstone Refuge Environment

Refuge Establishment and History

Refuge Size and Location

Featherstone Refuge is an unstaffed station consisting of 325 acres of woodland and freshwater tidal marsh. It lies along the northern shore and mouth of Neabsco Creek and north around Featherstone Point along Occoquan Bay, approximately 4 miles southwest of Mason Neck Refuge, and 22 miles from Washington, D.C., in Prince William County, Virginia.

Establishment Authority and Purpose

Public Law 91-499, approved October 22, 1970 (84 Stat 1095), authorized the Secretary of Interior to acquire by purchase or exchange portions of a tract of land in Prince William County, Virginia (then being disposed of by the District of Columbia) that the Secretary and the District mutually agreed were wetlands, and areas necessary to protect surrounding natural features of such wetlands (<http://www.fws.gov/laws/lawsdigest/nwracts.html#Featherstone>). In summary, it was established with the purpose to protect the features of a contiguous wetlands area.

History of Refuge Land Acquisition

It was not until 1979 that the Service acquired land to establish Featherstone Refuge from the District of Columbia. The refuge then consisted of 164 acres of land along Farm Creek in eastern Prince William County. It was acquired as part of an original proposal to create a 17-unit "Potomac Estuary National Wildlife Refuge Complex." An additional 161 acres of land was acquired for the refuge with a donation from Prince William County in 1992.

Public Access

There is no authorized public access to Featherstone Refuge. Official administrative access is by two rights-of-way, neither of which is accessible to vehicles, and which only provide access to the refuge boundary, not its interior. Refuge staff utilize the Virginia Railway Express (VRE) commuter rail station landing built next to the refuge as one way to gain quick access across the tracks to the refuge.

Illegal trespass is a common problem on the refuge but has been dramatically reduced with the addition of a full-time refuge law enforcement officer. Violations recorded include illegal hunting, fishing, camping and dumping of trash.

Community Demographics and Planning

Featherstone Refuge is located on Occoquan Bay in the eastern-most portion of the town of Woodbridge, Virginia which is a U.S. census-designated place (CDP). According to the United States Census Bureau, the Woodbridge CDP has a total area of 10.8 square miles, of which 10.5 square miles is land and 0.3 square miles of it (2.87 percent) is water. Woodbridge is geographically located about 22 miles from Washington, D.C.

Population Statistics

As of the census of 2000, there were 31,941 people, 10,687 households, and 7,769 families residing in the Woodbridge CDP. The population density was 3,047.8 people per square mile. There were 11,026 housing units at an average density of 1,052.1/square mile (406.2/square kilometer). The racial makeup of the CDP was 56.34 percent White, 23.45 percent African American, 0.55 percent Native American, 4.90 percent Asian, 0.17 percent Pacific Islander, 9.62 percent from other races, and 4.96 percent from two or more races. Hispanic or Latino of any race were 19.07 percent of the population. There were 10,687 households out of which 41.5 percent had children under the age of 18 living with them, 52.3 percent were married couples living together, 14.2 percent had a female householder with no husband present, and 27.3 percent were non-families. 20.4 percent of all households were made up of individuals and 3.9 percent had someone living alone who was 65 years of age or older. The average household size was 2.96 and the average family size was 3.40.

The median income for a household in the CDP was \$50,525, and the median income for a family was \$52,362. Males had a median income of \$35,538 versus \$28,587 for females. The per capita income for the CDP was \$19,810. About 4.6 percent of families and 5.5 percent of the population were below the poverty line, including 7.7 percent of those under age 18 and 5.9 percent of those age 65 or over.

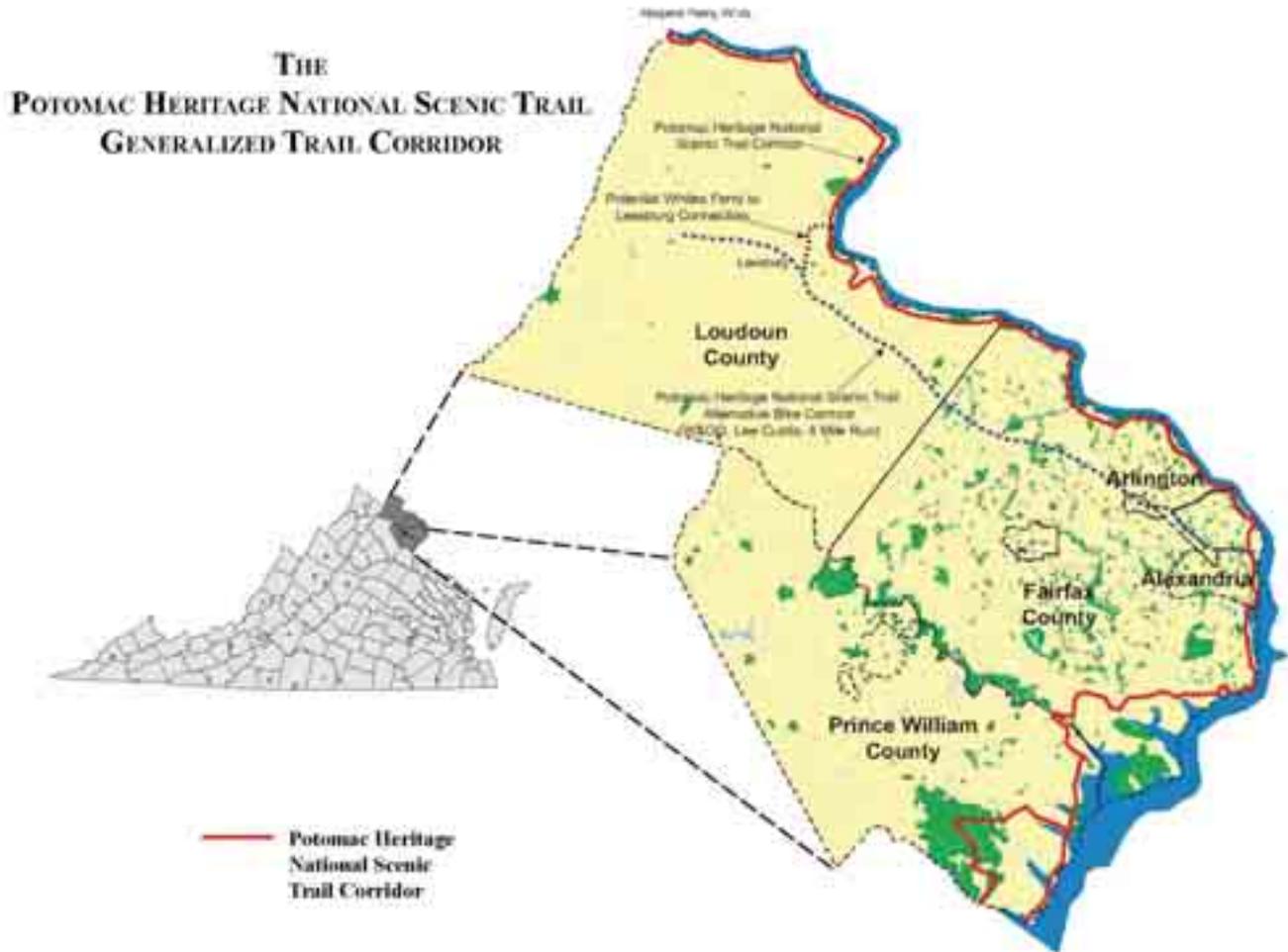
Potomac Heritage National Scenic Trail

The Potomac Heritage National Scenic Trail (PHNST) is a developing network of locally-managed trails and routes between the mouth of the Potomac River and the Allegheny Highlands in the upper Ohio River Basin (NPS, 2009). The PHNST network is one component of the National Trails System that originated with enactment of the National Trails System Act of 1968 to create a national system of trails based on multiple partnerships and substantial roles for citizen's organizations and to designate the Appalachian and the Pacific Crest as the first national scenic trails. Subsequent amendments authorized feasibility studies for various trails, including the PHNST as well as designations for additional components of the National Trails System. DOI completed a feasibility study for the PHNST in 1974 and Congress passed legislation designating the PHNST in March 1983 (Public Law 98-11), establishing an administrative foundation for development of the PHNST network of approximately 704 miles of trails in Virginia, Pennsylvania, Maryland and Washington, D.C.

To date, approximately 830 miles of existing and planned trails have been recognized as segments of the PHNST network (NPS, 2009; see "view map" at www.nps.gov/pohe). Although the goal of a continuous trail network is yet to be realized, many trails and segments have been established; for example, one can hike 375 miles from Washington, D.C. to Seward, Pennsylvania (Lillard & Talone, 2006); such an experience would use the Chesapeake and Ohio Canal Towpath, Great Allegheny Passage and Laurel Highlands Hiking Trail. Existing and planning routes in Northern Virginia total approximately 100 miles, and bicycling routes in southern Maryland and on the Northern Neck of Virginia total over 225 miles. The PHNST is recognized in local and regional plans; in Virginia Outdoors Plan: Connecting Our Commonwealth (2006); and in a report by the Virginia Greenways and Trails Task Force on "trunkline" trails in the Commonwealth (2009).

Existing, planned and proposed alignments for segments of the PHNST in Prince William County parallel the Potomac River shoreline as closely as possible (map 2.8), including a segment within Featherstone Refuge (see map 3.3). From south to north, the proposed route near the refuge would use an existing pedestrian crossover at the VRE station, pass east of the railroad tracks, continue north along an abandoned railroad right-of-way within the refuge, and connect with Featherstone Drive on the north end of the refuge. The alignment for the PHNST within the refuge is contingent upon the availability of parking spaces at the VRE station and use of the pedestrian crossover.

Map 2.8. Potomac Heritage National Scenic Trail proposed generalized corridor



Refuge Administration

Refuge Revenue Sharing Payments

The Refuge Revenue Sharing Act of 1935 (16 U.S.C 715s), as amended, authorizes revenues and direct appropriations to be deposited into a special fund, the National Wildlife Refuge Fund (NWRF), and used for payments to counties in which lands are acquired in fee (fee land) or reserved from the public domain (reserved land) and managed by the Service. These revenues are derived from the sale or disposition of (1) products (e.g., timber and gravel); (2) other privileges (e.g., right-of-way and grazing permits); and/or (3) leases for public accommodations or facilities (e.g., oil and gas exploration and development) incidental to, and not in conflict with, refuge purposes.

The Act authorizes payments for Service-managed fee lands based on a formula contained in the Act that reflects, among other things, the amount of refuge land

and its appraised value. Congress ultimately determines each year whether full payment, or a percentage of that full payment, will be made.

Featherstone Refuge’s revenue-sharing payments to Prince William County from 2003 to 2008 are listed in table 2.13. Revenue-sharing checks are sent by the Service electronically to Prince William County on an annual basis.

Table 2.13. Revenue-sharing Payments for Featherstone Refuge to Prince William County, Virginia from 2003-2009

Fiscal Year	Refuge Revenue-Sharing Payments
2009	\$633
2008	\$816
2007	\$844
2006	\$911
2005	\$807
2004	\$912
2003	\$949

Source: (USFWS, 2007a).

Special Use Permits

The refuge issues special use permits for various activities such as research, surveys and censuses, and environmental education. Each request is considered on a case-by-case basis and decisions are based on the following criteria: type, purpose, and appropriateness of activity; whether the activity supports refuge goals; and, what kind of impact will the activity have on other users. Prior to issuing a special use permit, we evaluate the use’s appropriateness and compatibility with other refuge purposes.

Partners

The refuge coordinates with Prince William County and the Immigration and Naturalization Service for certain law enforcement actions and with VDGIF for fish and wildlife issues.

The Friends group, along with the Prince William Soil and Water Conservation District, provides volunteers for specific maintenance project and clean-ups.

Refuge Terrain and Habitats

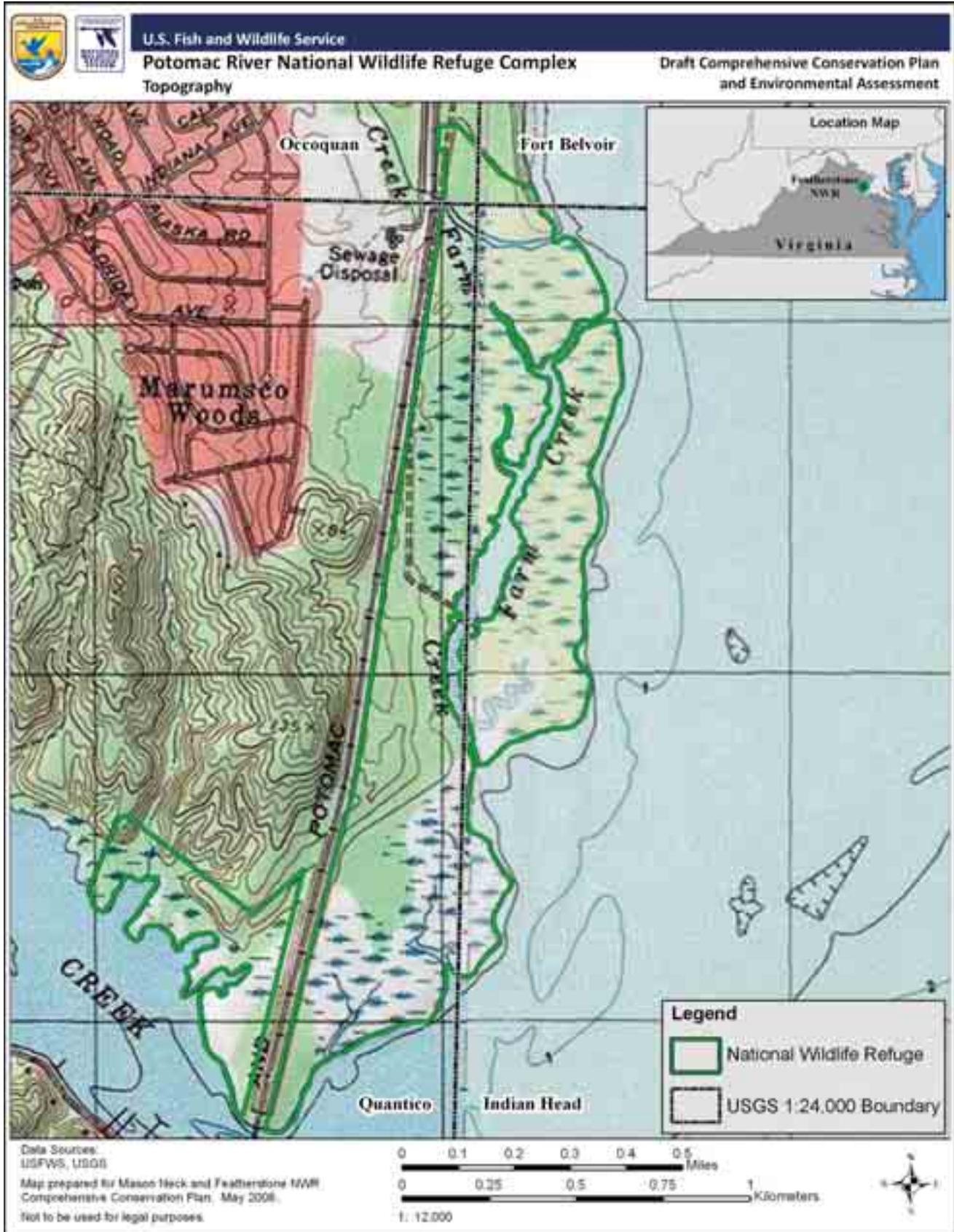
Topography

The refuge’s topography is almost entirely flat with patches of bottomland hardwoods and tidal marsh. Inspection of the USGS topographic map (map 2.9) shows that the largest portion of Featherstone Refuge is wetland with relief lower than 10 feet above sea level.

Land Cover

The refuge currently consists of 325 acres: 80 acres of upland mature mixed-deciduous forest, 220 acres of palustrine wetlands, and 25 acres of open water (map 2.10). The shoreline terrain on the banks of the Potomac River consists of narrow beaches along the river. The Richmond, Fredericksburg and Potomac Railroad parallels the western boundary of the refuge from north to south with built up elevations of 80 feet separating the east from the west. An abandoned railroad grade also traverses the refuge, impacting the refuge with the compacted roadbed, castoff slag and coal from early train use, and channeling some of the drainage into vernal pools and swamps. Farm Creek passes through the northeastern portion of the refuge before draining into Occoquan Bay and the Potomac River.

Map 2.9. Featherstone Refuge Topography



Map 2.10. Featherstone Refuge General Land Cover



Soils

The soils of Featherstone Refuge are shown on map 2.11 and described in table 2.14.

Shoreline Erosion

Shoreline erosion is an issue at Featherstone Refuge, similar to Mason Neck Refuge, although Mason Neck is even more at risk due to its orientation more directly in the path of coastal storms and major tides, where more shoreline is exposed, and where eroding bluffs are already prominent. Nevertheless, shoreline erosion remains a concern at Featherstone Refuge and has been regularly observed by Refuge staff over the years, although no measurements have been taken to document the extent of shoreline loss.

Table 2.14. Characteristics of the Soils of Featherstone Refuge (Source: NRCS 2006)

Soil Type	Characteristics
Codorus soils	Occur on level slopes of floodplains and formed in alluvial materials containing medium to large quantities of mica derived from schist, gneiss, phyllite and other metamorphic rocks. About 20 percent are wooded, mostly mixed hardwoods.
Dumfries soils	Occur on narrow ridges and side slopes in the northern part of the Atlantic Coastal Plain. These soils developed in sandy feldspathic sediments in highly dissected Coastal Plain terraces. Most of this soil is in hardwood and mixed hardwood and pine forest. Few areas are used for pasture, residential and commercial development.
Elsinboro soils	Formed in unconsolidated, old alluvium, derived from crystalline rock that contains high amounts of mica. Permeability is moderate in the solum. The potential for surface runoff is negligible to medium. Native vegetation consists of maple, oaks, poplar, hickory, and beech.
Featherstone soils	Occur on level floodplains in the Coastal Plain. They do not flood daily but are subject to high seasonal tides and storm tides. The water table is at the surface 6-8 months each year and most areas are subject to ponding. They are very poorly drained; very slow to ponded runoff; moderate permeability. It is dominated by woody species with few larger trees of red maple and sweetgum. Cattails, skunk cabbage and reeds make up much of the vegetation. Many areas are partially covered with debris.
Hatboro soils	Occur on nearly level flood plains. They formed in alluvium largely from schist, gneiss and other metamorphic and crystalline rocks. They are poorly drained. Permeability is moderate. Index surface runoff class is high or very high. These soils are subject to periodic stream overflow, which usually occurs during the winter and spring months. Woodland areas are in mixed hardwoods.
Kelly soils	Formed in residuum weathered from gray to brown hornfel and granulite. Somewhat poorly drained. The potential for surface runoff is low to medium. Permeability is slow or very slow. In undisturbed areas, the depth to the top of the seasonal high water table ranges from 10 to 20 inches for some time in most years. About 40 percent of the area is in native forest of oaks, hickory, ash, and Virginia pine.
Lunt soils	Occur on gently sloping to moderately steep Coastal Plain uplands. They formed in fluvio-marine Coastal Plain sediments. Most of the Lunt soils are used for urban development, idle land or woodland. The dominant species in the wooded areas are pines, oaks, hickory, gum and poplar
Marr soils	Formed in a regolith of unconsolidated very fine and fine sandy loams. Most of the present woodlands consist of mixed hardwoods, dominated by oaks. Some areas have moderate to heavy stands of Virginia pine, and in places shortleaf pine.
Marumscos soils	Occur on level to gently sloping low Coastal Plain terraces. These soils developed in stratified marine sediments of sand, silt and clay that contain a relatively high content of feldspar. Most of the acreage is in hardwood and pine forest. Some areas are used for urban development.
Quantico soils	Occur on medium to broad drainage divides of the older coastal plain terraces. These soils developed in stratified fluvio-marine sediments that have a high content of feldspathic sands. Largest acreage is in hardwood and pine forest. Many areas are used for residential and commercial developments. Small acreage is used for crops. Native vegetation consists of northern red oak, Virginia pine, red maple, yellow-poplar and sweet gum.
Sycoline soils	Occur on upland sideslopes. The soils developed from hornfel and granulite. Moderately well to somewhat poorly drained; slow to rapid runoff; moderately slow permeability in upper solum, very slow permeability in lower solum.

Map 2.11. Featherstone Refuge Soils



Wetlands Habitat

Tidal freshwater marshes are a diverse group of herbaceous wetlands occurring along the upper tidal reaches of coastal plain rivers and tributaries which are flooded daily. These marshes tend to occur in the uppermost estuary zones, where a large volume of freshwater from upstream can effectively dilute the inflow of saltwater from tidal influence. Tidal freshwater marshes provide habitat for several rare plant species, including the potential for the Federal-listed sensitive joint-vetch (*Aeschynomene virginica*), and important breeding habitat for many birds species, including the least bittern and Virginia rail. Common plant species occurring in the marshes include wild rice (*Zizania aquatica* var. *aquatica*), arrow-arum (*Peltandra virginica*), dotted smartweed (*Polygonum punctatum* var. *punctatum*), and pickerelweed (*Pontederia cordata*). Sea-level rise is increasing salinity, and along with the introduction of invasive plant species, is threatening native species and shifting the vegetative composition of tidal freshwater marshes (VADCR, 2006b; http://www.dcr.virginia.gov/natural_heritage/ncEIA.shtml).



USFWS

Emergent tidal wetlands of Featherstone Refuge.

A large portion of the Featherstone Refuge is tidally influenced freshwater wetlands. Portions of “Hidden Lake,” the main section of Farm Creek running through the refuge, were at one time diked. This dike was likely used for fisheries management in the late 1800s or early 1900s, but has greatly deteriorated. Currently, only a few pilings are left in the water, as well as a short earthen section that no longer serves as a barrier (USFWS, 2005a).

The forested wetlands on the refuge are comprised of red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), yellow poplar (*Liriodendron tulipifera*) and water willow (*Andrographis* spp.). Emergent marsh is located mainly on the southern section of the property (USFWS, 2005a).

Classification of Featherstone Refuge Wetlands

Table 2.15 below describes in more detail the Featherstone Refuge wetland types illustrated in map 2.12:

Map 2.12. Featherstone Refuge National Wetlands Inventory



Table 2.15. Featherstone Refuge Wetland Types

Wetland Type	Characteristics
Forested	Characterized by woody vegetation that is 6 m tall or taller.
Scrub/Shrub	Includes areas dominated by woody vegetation less than 6 m tall.
Emergent	Characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.
Riverine	The riverine system includes all wetlands and deepwater habitats contained in natural or artificial channels periodically or continuously containing flowing water or which forms a connecting link between the two bodies of standing water.
Deciduous	Woody angiosperms (trees or shrubs) with relatively wide, flat leaves that are shed during the cold or dry season.
Persistent	Dominated by species that normally remain standing at least until the beginning of the next growing season.
Seasonally Flooded	Surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years.

Upland Habitats

The tract of upland forest on the refuge features mature oaks (*Quercus spp.*), tulip poplars (*Liriodendron tulipifera l.*) and red maples at or near climax stage with Virginia and loblolly pine (*Pinus taeda L.*). These large bottomland hardwoods provide habitat for woodland warblers and nest cavities for pileated (*Dryocopus pileatus*) and red bellied woodpeckers (*Melanerpes carolinus*), barred owls and prothonotary warblers (*Protonotaria citrea*). Areas bordering Neabsco Creek consist of steep slopes with an understory of mountain laurel (*Kalmia latifolia*).

Endangered or Threatened Plants

Plants listed by the Service as endangered or threatened in Prince William or an adjacent county include the harperella (*Ptilimnium nodosum*) (endangered, occurs in adjacent county), sensitive joint-vetch (*Aeschynomene virginica*) (threatened, occurs in adjacent county), and the small whorled pogonia (*Isotria medeoloides*) (threatened, occurs in Prince William County). None are known on the refuge.

Two other State rare plant species may occur in the vicinity of the refuge, although they have not been identified on the Refuge. Parker's pipewort (*Eriocaulon pakeri*) occurs in intertidal zones and river bulrush (*Schoenoplectus fluviatilis*) inhabits fresh tidal marshes (VADCR letter, 10/20/2010).

Invasive Plants

Phragmites (*Phragmites australis*), or common reed, is not yet a major invasive plant problem in the wetlands of Featherstone Refuge, but does pose a future threat. Common reed has become a destructive weed in Virginia, quickly displacing desirable plants species such as wild rice, cattails, and native wetland orchids. Invasive stands of common reed eliminate diverse wetland plant communities, and provide little food or shelter for wildlife (VADCR, 2010). Other invasive plants of concern include mile-a-minute and Japanese stiltgrass in the upland forests.

Refuge Wildlife

Endangered or Threatened Animals

There are no known occurrences of any Federal-listed species on Featherstone Refuge.

Although the Service lists the dwarf wedgemussel (*Alasmidonta heterodon*) as an endangered species that may occur in Prince William County, it is not known to occur on, or in the vicinity of, the refuge.

Birds

We present a refuge bird list (table A.6) in appendix A compiled by Jim Waggoner, a local birder, based on his observations and what we suspect may occur based on refuge habitats and sightings in other nearby areas. Other information on refuge birds is presented below.

Bald Eagle

Bald eagles are often observed using the refuge, primarily for foraging. The shoreline provides important feeding and perching habitat. Since the early 1990s, a pair of bald eagles have nested on or near the refuge, although they have not always been productive (USFWS, 2005a).

Waterfowl

Featherstone Refuge provides important wintering and nesting habitat for waterfowl, wading birds, and shorebirds. Wintering and migrating waterfowl of conservation concern include American black duck, mallard, blue-winged teal (*Anas discors*), wood duck, hooded merganser, green-winged teal (*Anas crecca*), gadwall (*Anas strepera*), and lesser scaup (USFWS, 2005a).

Raptors

Osprey (*Pandion haliaetus*), red-tailed hawks (*Buteo jamaicensis*), red-shouldered hawks (*Buteo lineatus*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), and Cooper's hawks (*Accipiter cooperii*) have been recorded on the refuge (USFWS, 2005a).

Shorebirds, Gulls, Terns, and Allied Species

Due to the dense vegetation on the refuge, the most likely places to observe species of shorebirds, gulls, terns, and allied species is just off of the refuge property in the waters of the Occoquan Bay and Potomac River. Mudflats exposed at low tide are high in fine sediments and are anaerobic, producing little vegetation or fauna to attract birds for feeding and unattractive for loafing (USFWS, 2005a).

Marsh and Water Birds

The dense and diverse marsh vegetation attracts many wading birds including great blue heron, great egret (*Ardea alba*), and double-crested cormorants (*Phalacrocorax auritus*) (USFWS, 2005a).

Game birds

There are no known game birds on the refuge and there is no public hunting of any kind allowed on the refuge. None of the birds listed as game birds by the VDGIF are likely to occur on the refuge considering the extensive wetlands and limited upland habitat.

Mammals

Common mammals observed on Featherstone Refuge include white-tailed deer, red fox (*Vulpes vulpes*), gray squirrel, and beaver (USFWS, 2005a). There have been no recent mammal surveys or studies conducted on the refuge; however,

many of the mammals found in Prince William County are likely to occur on the refuge. A list (table A.8) of mammals of Prince William County is in appendix A.

Reptiles and Amphibians

There have been no recent surveys or studies of reptiles or amphibians conducted on Featherstone Refuge. Table A.7 in appendix A lists the amphibians and reptiles of Prince William County.



Bill Wallen

Featherstone refuge shoreline

Interjurisdictional Species

The tidal Potomac River and tributaries support a diversity of interjurisdictional fish species that depend in part on the larger tributaries (including the Occoquan River and Neabsco Creek) the smaller streams that include Farm Creek, and the marshes along the Virginia shoreline for habitat. Interjurisdictional fish of interest to the Service, and listed as species of concern by VDGIF (2005), include the shortnose sturgeon (Tier I), Atlantic sturgeon (Tier II), alewife (Tier IV), American shad (Tier IV) and American eel (Tier IV).

Cultural Resources

Presently, there is one known historical site and two archaeological sites on the refuge, including a Native American site of undetermined age. Although no professional surveys or site testing have been conducted at Featherstone Refuge, there is a high likelihood that other sites are present. Appendix F—“Archeological and Historical Resources Overviews” presents an overview of the archaeological, historical, and cultural resources of Featherstone Refuge.

Chapter 3



John Mosesso Jr./NBI

American widgeon

Alternatives, Including the Service-preferred Alternative

- Introduction
- Formulating Alternatives that Relate Goals, Objectives, and Strategies
- Developing Refuge CCP Alternatives
- Mason Neck Refuge CCP Alternatives
 - Alternative A
 - Alternative B
 - Alternative C
- Featherstone Refuge CCP Alternatives
 - Alternative A
 - Alternative B

Introduction

This chapter begins with a description of the process we used to formulate the alternatives for both Mason Neck and Featherstone Refuges. Next, we present detailed descriptions of the alternatives for each refuge in two parts: Part One covers Mason Neck Refuge; Part Two covers Featherstone Refuge. Parts One and Two both start with a description of actions common to all alternatives for that refuge. We also identify decisions we are not making at this time, and that will require additional NEPA analysis before a decision can be made. Next we present the goals, objectives and strategies for the alternatives we analyzed in detail for each refuge. Finally, each refuge part concludes with a tabulated comparison (table 3.1 for Mason Neck Refuge; table 3.2 for Featherstone Refuge) summarizing how each of the alternatives addresses key issues, supports major programs, and achieves the goals we defined for the refuges.

Formulating Alternatives that Relate Goals, Objectives, and Strategies

Each of the management alternatives we describe in this chapter includes a set of refuge goals, objectives to achieve those goals, and a series of strategies to implement them.

Refuge goals are intentionally broad, descriptive statements of the desired future condition for a refuge's resources. By design, they are less quantitative, and more prescriptive, in defining the targets of our management. They also articulate the principal elements of refuge purposes and our vision statements, and provide a foundation for developing specific management objectives and strategies. Goals do not vary between the alternatives. As noted in chapter 1, developing a strategic plan to achieve the goals is the purpose for developing the CCP. The degree to which the alternatives achieve those goals is the basis for selecting among the alternatives.

Objectives are essentially incremental steps toward achieving a goal; they further define management targets in measurable terms. They typically vary among the alternatives and provide the basis for determining more detailed strategies, monitoring refuge accomplishments, and evaluating our success. The Service guidance in "Writing Refuge Management Goals and Objectives: A Handbook" (USFWS, 2004) recommends that objectives possess five properties to be "SMART": (1) specific; (2) measurable; (3) achievable; (4) results-oriented; and (5) time-fixed. A "rationale" accompanies each objective to explain its context and why we think it is important. We will use the objectives in the alternative selected for the final CCP to write refuge step-down plans, which we describe later in this chapter.

The strategies for each objective are the specific or combined actions, tools, or techniques we may employ to achieve an objective. Strategies may also vary among the alternatives. The list of strategies under each objective identifies the potential suite of actions we may implement. We will evaluate most of them further as to how, when, and where they should be implemented in refuge step-down plans. We will measure our success, in part, by how well our strategies achieve our objectives and goals.

Our Service-preferred alternative B also lists biological monitoring elements which are recommended ways to measure our success with respect to achieving our biological program objectives. The results of this monitoring may also trigger adjustments to our management strategies, or trigger a reevaluation or revision to our objectives.

Developing Refuge CCP Alternatives, including the "No Action" Alternative

After identifying a wide range of possible management objectives and strategies that could achieve our goals, we began the process of designing management alternatives. Simply put, alternatives are packages of complementary objectives and strategies designed to meet refuge purposes, the Refuge System mission, and our refuge vision and goals, while responding to the issues and opportunities identified during the planning process.

In this draft CCP/EA, we fully analyze three alternatives for Mason Neck Refuge and two alternatives for Featherstone Refuge which characterize different ways of managing each refuge over the next 15 years. We believe they represent a reasonable range of alternative proposals for achieving the refuge purpose, vision and goals, and addressing the issues described in chapter 1. Unless otherwise noted, all actions would be implemented by refuge staff.

Mason Neck Refuge Alternatives

Alternative A (Current Management) satisfies the NEPA requirement of a “no action” alternative, which we define as “continuing current management.” It describes our existing management priorities and activities, and serves as a baseline for comparing and contrasting alternatives B and C. We suggest you first read chapter 2, “Description of the Affected Environment,” for detailed descriptions of current refuge resources and programs.

Alternative B (Improved Management for Federal Trust Resources) is the Service-preferred alternative. It combines the actions we believe would best achieve that refuge’s purposes, vision and goals, and best respond to public issues. It would enhance our management of refuge habitats to support Federal trust resources and species of conservation concern. In particular, our priority would be to protect the refuge’s upland forests to benefit bald eagles, great blue heron, and other forest-dependent migratory birds and to protect the refuge’s marsh habitat to benefit eagles, waterfowl, wading and waterbirds, and interjurisdictional fish. Our Mason Neck Refuge visitor service’s program would expand to provide an increased diversity of compatible wildlife-dependent activities, with emphasis on wildlife observation, photography, and interpretation. We would improve our current trails and add new trails, observation platforms, and photography blinds. We would expand our interpretive programs and outreach efforts to inform and involve more people in supporting the values of the refuge.

Alternative C (Enhanced Public Use Management) would manage habitat similar to alternative A, but would expand wildlife-dependent public use programs beyond that which is proposed under either alternatives A or B. We would devote more staff time and resources to improving each of the six priority public uses. For example, we would provide additional opportunities by offering a muzzleloader deer hunting season, constructing photography blinds, and offering more guided and self-guided wildlife observation tours and environmental education programs.

Featherstone Refuge Alternatives

Similar to Mason Neck Refuge, alternative A (Current Management) for Featherstone Refuge, would meet the NEPA requirement of a “no action” alternative. It describes our existing management activities.

Alternative B (Enhanced Management) is the Service-preferred alternative. Habitat and species management would include protecting sensitive nesting areas from human disturbance, and monitoring for invasive plants, pests, and pathogens to avoid catastrophic loss or degradation of habitat. With partner assistance, we would establish baseline monitoring of key resources, including the refuge shoreline where erosion and other threats are a concern.

Under alternative B, we would also continue to work with Prince William County and the NPS to secure public parking and pedestrian access to the refuge, and connect with the PHNS Trail, which has been an issue since refuge establishment. Once that access is secured and we have staff to support visitor programs, we would provide opportunities for wildlife observation and nature photography on designated trails, and fishing at designated sites. Under Alternative B, within five years, we would also evaluate a proposal to provide opportunities for a waterfowl hunt and/or a deer hunt to be managed in cooperation with the VDGIF. Other hunt program alternatives, including no action, would be considered in that evaluation, and there would be public involvement before making a final decision.

Part One—Mason Neck Refuge CCP Alternatives

Actions Common to All Mason Neck Refuge CCP Alternatives

There are some actions we propose to undertake in managing Mason Neck Refuge over the next 15 years, regardless of which CCP alternative we select. Some of those actions are required by law or policy, or represent actions that have undergone previous NEPA analysis, public review, agency review, and approval. Others may be administrative actions that do not necessarily require public review, but we want to highlight in this public document.

It is important here to reemphasize that CCPs provide long-term guidance for management decisions through goals, objectives and strategies. They represent our best estimate of future needs. This CCP details program levels and activities that are substantially above current budget allocations and, as such, should be viewed as strategic in nature. Our budgets are determined annually by Congress, and distributed through our Washington and Regional offices, before arriving at field stations. In summary, the actions proposed herein represent our strategic vision for the future. Final CCPs do not constitute a Service commitment for staffing increases, or funding for operations, maintenance, or future land acquisition. Implementation must be adjusted annually given the reality of budgets, staffing and unforeseen critical priorities.

All of the following actions, which we discuss in more detail below, are current practices or policies that would continue in some form under all alternatives, though they may differ in details under each alternative:

- Using an adaptive management approach, where appropriate
- Consolidating and improving refuge lands and facilities
- Refuge staffing and administration
- Coordinating with refuge partners, Friends of Potomac River Refuges, and the Mason Neck Refuge community
- Protecting Federal-listed species
- Managing invasive plants
- Controlling pest plants and animals
- Monitoring and abating wildlife diseases
- Managing forest health and condition
- Supporting research and investigations
- Developing refuge step-down plans
- Distributing Refuge Revenue Sharing payments
- Protecting cultural resources
- Supporting wildlife-dependent recreational uses
- Continuing a fishing closure at Mason Neck Refuge
- Conducting appropriateness and compatibility reviews of refuge uses

Using an Adaptive Management Approach

All of the alternatives will employ an adaptive management approach for improving resource management by learning from management outcomes. In 2007, 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, our monitoring of management actions, outcomes and key resources will be very important to implementing an adaptive management process. Our invasive species and integrated pest management activities are examples of refuge programs or activities where an adaptive management approach may be implemented to insure we are protecting the health and integrity of our habitats. Responding to climate change impacts will also require an adaptive management approach because of the uncertainty as to how, when, and where habitats and species will respond to those impacts.

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 our final 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 the goals of the refuge.

Consolidating and Improving Refuge Lands and Facilities

Consolidating Refuge Lands

We would continue discussions with the Northern Virginia Regional Park Authority (NVRPA), Fairfax County officials, and elected officials, about options for consolidating Service fee ownership of refuge lands. Presently, 789 of the refuge’s 2,277 acres are under a 60-year lease agreement with NVRPA executed in 1982; 33 years remain on that lease which will expire in 2042. Acquiring this land in fee would provide the Service maximum management flexibility. This would be especially desirable when implementing forest management or wetlands restoration.

Building a New Refuge Headquarters/Visitor Center

We would continue to pursue funding to build a new refuge complex headquarters and visitor center on Occoquan Bay Refuge. Staff, equipment, interpretive

materials, and exhibits at this facility would support the outreach, interpretive, and educational objectives identified for Mason Neck Refuge. We have completed a separate environmental assessment (EA) for locating and developing this facility (USFWS, 2009a). A copy is available from refuge headquarters.

Maintaining Visitor Facilities

We would continue to make incremental progress in maintaining and upgrading existing visitor services facilities such as interpretive and informational signs and parking areas. We would also continue to identify and remove those structures that have no useful purpose or that pose safety hazards. Our objective would be to continue to maintain our facilities to Service standards to keep them safe, functional, and attractive.

Refuge Staffing and Administration

Below we describe activities related to staffing, administration, and operations that are shared among the alternatives. Implementing these activities supports all our refuge goals.

Permanent Staffing and Operational Budgets

Our objective would continue to be 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 fiscal year 2006 to support a new base budget approach. The goal was to have a maximum of 75 percent of a refuge complex’s budget cover salaries and fixed costs, while the remaining 25 percent 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.

Under all alternatives, and within the guidelines of the new base budget approach, we would maintain, at a minimum, the six current full-time staff positions for the Refuge Complex, which include a refuge manager, assistant refuge manager, visitor services specialist, law enforcement officer, administrative assistant, and maintenance worker. Staff would continue to be shared within the Refuge Complex and would be assigned tasks at any of the three refuges based on the refuge manager’s determination of how resources should be distributed to accomplish priorities. Alternatives B and C propose an increase in staff based on the national staffing model developed for refuges by the Service in 2008. See our discussion on this under “Actions Common to Alternatives B and C only.”

Refuge Operating Hours

We would continue to open the refuge for public use year-round during refuge hours of operation. These hours of operation are typically 7am to 7pm from April 1-September 30 and 7am to 5pm from October 1-March 31. A temporary closure is implemented during scheduled refuge hunt dates. However, the refuge manager does have the authority to issue a special use permit to allow access outside those periods. For example, we may permit access for research personnel or hunters at different times, or allow organized groups to conduct nocturnal activities, such as wildlife observation, and educational and interpretive programs. To insure visitor safety and protect refuge resources, the refuge manager also has the authority to close the refuge at any time.

Coordinating with Partners, Friends of Potomac River Refuges, and the Mason Neck Peninsula Community

Partners

We would continue to maintain active involvement in the Mason Neck Land Managers Group (Managers Group). The Managers Group is a partnership among all public land management agencies on the Mason Neck Peninsula designed to achieve habitat and public use management objectives that benefit public lands beyond the refuge boundary.

As part of the Managers Group, we would continue to

- Communicate and coordinate regularly with the other agencies: Mason Neck State Park, BLM, Gunston Hall Plantation, and Pohick Bay Regional Park to discuss common goals, issues and concerns, share technical information, and identify opportunities for cooperative management
- Rotate responsibility for hosting quarterly managers meetings
- Pursue formal MOU/MOAs with these agencies where warranted to facilitate sharing of resources
- Maintain the existing MOU with BLM to share in law enforcement

In addition to the Managers Group, we would continue to evaluate opportunities for new partnerships with conservation organizations, educators, research and academic institutions, and other State and Federal agencies who share similar missions and goals. We will develop formal MOU/MOAs, or cooperative agreements, as warranted to facilitate the sharing of resources and implementation of programs.

With existing and future partners, we will make a greater effort to highlight our programs, opportunities and successes through use of media links (e.g., website), development of quality outreach materials with clear and consistent messages.

Friends of Potomac River Refuges

We would continue to look for opportunities to enhance our relationship with the Friends of Potomac River Refuges. We will also encourage them to work with other local citizens groups as an extension of our community outreach program. We will work closely with the Friends Group to

- Implement their strategic plan.
- Conduct monthly information and strategy meetings.
- Contribute information to their newsletter and website.
- Support their efforts at sponsoring community events and programs.

Protecting Federal-listed and Recently De-listed Species

The bald eagle was removed from the Federal list of threatened and endangered species in 2007. However, we would continue to protect nesting bald eagles and their habitat on the refuge under all alternatives because their protection was the primary purpose for establishing the refuge. Furthermore, the bald eagle remains a State-listed threatened species in Virginia and continues to be protected federally under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. There are currently three nesting bald eagle pairs on the refuge, and we will continue to monitor the nests and breeding activities and prohibit the public from disturbing them.

The Service has identified two Federal-listed plants in Fairfax County which have not been documented but may be present on Mason Neck Refuge: sensitive joint-vetch (threatened) and small whorled pogonia (threatened). We would continue to survey for these plants wherever we propose any ground disturbing activities on the refuge. If located, we would work with the respective species' Recovery Team and other experts to develop plans to protect them.

Managing Invasive Plants

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) Conduct Refuge Complex integrated pest management planning to address the abilities and limitations of potential techniques including chemical, biological, mechanical, and cultural techniques;
- 5) Manage invasive species on refuges under the guidance of the National Strategy for Invasive Species Management and within the context of applicable policy;
- 6) Continue treatment of the most problematic species as funding and staffing permit;

- 7) Maintain early-detection/early-response readiness regarding new invasions;
- 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; and,
- 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 would continue to refine our control program to address the most critical problems first. Further, our priorities may be adjusted to reflect changes in Regional Service priorities, and/or based on new information or resource availability. We will identify those priorities and treatment needs in an Integrated Pest Management (IPM) Plan for the Refuge Complex that will specify the tools, procedures, and mitigation measures we will use to address invasive plant problems on all three refuges. Until the plan is finalized, we will track the spread of invasive plants on the refuges and address their control as warranted. Currently, our particular concern on Mason Neck Refuge is the spread of mile-a-minute and Japanese stiltgrass. Other problem plants we are tracking include beefsteak plant, tree-of-heaven, Japanese barberry, Japanese honeysuckle, and Japanese wisteria.

We would continue to treat invasive plants as needed using mechanical (e.g. mowing or trimming) and cultural (e.g. hand-pulling) methods, as well as herbicides. Only herbicides approved by the Regional Contaminant Coordinator will be used, and only in accordance with approved rate and timing of application. Consideration of impacts on target and non-target species is part of the approval process. The extent and frequency of approved herbicide use would depend on funding.

Controlling Pest Animals

At times, native plants and animals interfere with management objectives. The Refuge Manual (7 RM 14.4A) defines a pest as “Any terrestrial or aquatic plant or animal which interferes, or threatens to interfere, at an unacceptable level, with the attainment of refuge objectives or which poses a threat to human health.” That definition could include the invasive species defined above, but in this section, we describe some situations involving native species and under what conditions we would initiate control.

In controlling pests, whether invasive or native species, we would continue to use an integrated approach. The Refuge Manual (7 RM 14.4C) defines integrated pest management as “a dynamic approach to pest management which utilizes a full knowledge of a pest problem through an understanding of the ecology of the pest and ecologically related organisms and through continuous monitoring of their populations. Once an acceptable level of pest damage is determined, control programs are carefully designed using a combination of compatible techniques to limit damage to that level.”

An integrated approach uses various methods, including natural, biological, cultural, mechanical, and chemical controls. Some examples and potential remedies of pest management follow.

Problem: Deer browsing on newly planted tree seedlings, causing unacceptable levels of mortality

Potential solutions: Use tree shelters or plant clover in advance of tree planting to provide alternative food source. This would be a site-specific strategy to protect a specific valued resource at one location. Our general strategy for keeping deer populations in balance with overall refuge habitat conditions is through public hunting, which we support under all alternatives.

Problem: Beaver girdling large trees adjacent to public use facilities, potentially causing injury to visitors or damaging facilities from falling trees and branches

Potential solutions: Wrap trees with hardware cloth to prevent girdling. Temporarily employ local trappers to remove individuals from the population from selected locations. Remove dead trees before they fall. Also, see discussion below about furbearers and the discussion on general strategies.

Problem: Beaver damming and flooding creeks or other drainage areas, killing native trees or flooding roads, preventing access or threatening public safety, and altering tidal flow

Potential solutions: Remove individual problem beavers by trapping and shooting.

Problem: Mute swans are increasing in numbers and using protected wetland areas.

Potential solution: Work with Federal and State partners (VDGIF) on the capture and removal of mute swans. The Service goal is zero productivity for mute swan in the Northeast Region, due to the swan's negative impact on native waterfowl and their habitats.

Problem: Resident Canada geese increasing in number and using protected wetland areas and grazing and depositing manure on Little Marsh dike and other grassy areas and on the adjacent Mason Neck State Park.

Potential solution: Work with Federal and State partners (VDGIF) on the capture and removal of resident Canada geese.

Problem: Furbearers, such as raccoons, cause unacceptable levels of predation on nesting birds.

Potential solutions: If nest boxes are in use, construct predator guards. Employ mechanical removal or herbicides on invasive vines, such as honeysuckle, that facilitate climbing access to nests. Use a State-licensed trapper to remove individuals from the population in selected areas, if necessary.

We do not intend to initiate a public or recreational trapping program at this time. Trapping is considered a commercial activity and must meet a higher standard of compatibility than priority wildlife-dependent public recreational uses or other non-commercial uses. We will reconsider our position if future situations arise in which predation, habitat loss, or disease is severe, and we determine public trapping to be an effective, essential element in managing them. Until that is necessary, we will only use trapping on a case-by-case basis to help alleviate a particular problem. Trapping would only be conducted by refuge staff, their agents or contractors, to achieve a specific management objective. As such, it would be considered a management or administrative activity and not subject to compatibility review.

We would continue to use the following general strategies in pest management:

- 1) Determine the need for site-specific control based on the potential to affect our management objectives for a given area. Although we will employ an adaptive management strategy, we also expect the lethal control or removal of individual animals to be the exception rather than the rule. Unfortunately, to establish general thresholds for that action is difficult. Instead, we will determine our solution by each site. For example, in some areas, beaver activity (e.g., ponding, flooding, tree-girdling, tree-falling, etc.) enhances our management objectives for wildlife and habitats. In other areas, extensive beaver activity (e.g., tree-felling, trees dying from flooding, blockage of water control structures, etc.), could begin to affect habitat significantly for migratory birds and other sensitive species. In summary, we will base our beaver management actions on the extent and impact of damage, and not on the number of beavers present. We will focus on how they affect sensitive resources, neighboring marshes and fields, refuge infrastructure, and accessibility. When non-lethal techniques are not feasible, or they are no longer a viable remedy, we will consider targeted trapping or shooting by refuge staff, their agent or contractor.
- 2) Employ integrated pest management techniques, including those described in the examples above, when a species is having a significant impact on an area resulting in major habitat replacement and loss of valuable canopy trees (such as oaks).
- 3) Monitor results to ensure that pests do not exceed acceptable levels.

Monitoring and Abating 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, significant attention has been given to those diseases that are transmitted through wildlife to humans. Lyme disease, transmitted by ticks, and West Nile virus, transmitted by mosquitoes, are examples.

A serious wildlife disease receiving considerable attention worldwide is avian influenza. 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 the Refuge Complex was approved in July 2006 (USFWS, 2007a). It discusses methods for dealing with this disease should it ever be identified on the refuge.

Another disease of significant concern to both the Service and VDGIF is chronic wasting disease (CWD). It attacks the brain and spinal cord of deer, elk and moose and is typically fatal. 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. 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 VDGIF is conducting active surveillance for (CWD) during deer hunting seasons. To establish whether CWD occurs in Virginia, VDGIF commenced statewide CWD surveillance in 2002. Deer have been sampled from every county in the Commonwealth, and fortunately CWD has not been detected (VDGIF, 2007). We developed a CWD plan for the Refuge Complex in 2006.

Managing Forest Health and Condition

In addition to wildlife diseases, we would continue to be attentive to diseases and insect pests that affect forest health and condition. Since we place high value on 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.

General strategies for pest and disease prevention and control include:

- 1) Continue to conduct pest and disease surveillance in conjunction with other field work;
- 2) 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
- 3) Cooperate with Federal and State agencies, particularly VDGIF and USDA-Forest Service (USDA-FS) in conducting surveillance, providing access for sampling, and following protocols in the event of an outbreak;
- 4) Follow protocols outlined in national, State, and refuge-specific disease prevention and control plans.

In 2009, the Virginia Department of Forestry (VDF) completed a Forest Health and Condition Inventory and Assessment of Mason Neck Refuge. Overall, they determined that the Mason Neck Refuge's hardwood forest was unhealthy, suffering from a lack of regeneration, missing an understory of shrubs and herbaceous plants, and was considerably "overstocked." The lack of hardwood regeneration, shrub layer, and herbaceous plants is likely due to overbrowsing from high deer populations. The VDF report included recommendations for improving forest health and habitat quality for bald eagles and forest interior dependent birds. Specific recommendations we plan to adopt are highlighted as strategies under each of the alternatives.

Supporting Research and Investigations

Guidance on conducting and facilitating 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 before a special use permit is issued to allow the activity. As noted in chapter 2, “Affected 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:

- Seek qualified researchers and funding to help answer refuge-specific management questions;
- Participate in appropriate multi-refuge studies conducted in partnership with the United States Geological Survey;
- Facilitate appropriate and compatible research by providing temporary housing and equipment, if available, for persons conducting field work; and,
- Pursue peer-reviewed publications of research, and/or insure the Service is acknowledged as a contributor in research conducted on the refuge by others.

Generally, we will approve permits for research projects that provide a direct benefit to the refuge or that will strengthen our decisions on managing natural resources for biological or public use programs on the refuge. The refuge manager also may consider requests that do not relate directly to refuge objectives, but instead relate to the protection or enhancement of native species and biological diversity in the region and support the goals of ecoregional conservation teams, such as the Atlantic Coast Joint Venture.

All researchers will be required to submit detailed research proposals following the guidelines established by Service policy and refuge staff. Special use permits will also identify the schedules for progress reports, the criteria for determining when a project should cease, and the requirements for publication or other interim and final reports. All publications will acknowledge the Service and the role of Service staff as key partners in funding and/or operations. We will ask our refuge biologists, other divisions of the Service, USGS, select universities or recognized experts, and the VDGIF to peer review and comment on research proposals and draft publications, and will share research results internally, with these reviewers, and other conservation agencies and organizations. To the extent practicable, and given the publication type, all research deliverables will conform to Service graphic standards.

Some projects, such as depredation and banding studies, will require additional Service permits. The refuge manager will not approve those research projects until all required permits are received and the consultation requirements under the Endangered Species Act have been met.

Developing Refuge Step-down Plans

Service planning policy identifies 25 step-down plans that may be applicable on any given refuge. We have identified those that are most relevant to this planning process, and have prioritized their completion if they are not already developed. Plans will be modified and updated as new information is obtained so we can continue to keep them relevant. All plans completed are incorporated by reference and their implementation assumed in this draft CCP/EA. Completion of step-down plans supports all refuge goals.

Refuge Complex-wide Plans

We would continue with Refuge Complex step-down plans according to the following schedule, with details on specific refuges incorporated therein:

- Chronic Wasting Disease Plan (completed 2006)
- Avian Influenza Plan (completed 2006)
- Law Enforcement Plan (in preparation; high priority)
- Safety Plan (updated annually)
- Emergency Action Plan (updated annually)
- Continuity of Operations Plan (updated annually)
- Hazard Communications Plan (updated annually)
- Hurricane Plan (updated annually)
- Fire Prevention Plan (updated annually)
- Integrated Pest Management Plan (moderate priority)

Refuge-specific Plans

The following are refuge-specific plans developed to address the specific conditions and requirements that pertain to Mason Neck Refuge. The priorities for completing the refuge plans are noted below.

- Fire Management Plan (completed in 2004; planned for 2011 update)
- Habitat Management Plan (HMP) (highest priority; to be completed after CCP approval)
- Visitor Services Plan (VSP) (high priority)
- Inventory and Monitoring Plan (IMP) (moderate priority; dependent on completing HMP)
- Sign Plan (moderate priority)

Distributing Refuge Revenue Sharing Payments

As described in chapter 2, we pay Fairfax County Refuge Revenue Sharing Payments based on the acreage and the appraised value of Service fee-owned refuge lands. These annual payments are calculated by formula determined by, and with funds appropriated by, Congress and authorized by the Refuge Revenue Sharing Act (16 U.S.C. 715s). We would 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 cultural resources, including archaeological sites and historic structures that are eligible for the National Register of Historic Places. This applies not only to resources that are located on refuge lands, but also those

on lands affected by refuge activities, as well as any museum properties. As described in chapter 2, there are numerous recorded archeological sites within the refuge area. Considering the refuge's location on the tidal Potomac River, it is likely that additional sites of various periods will be identified in the future. Appendix F includes an overview of refuge cultural resources.

We would conduct an evaluation of the potential for our projects to impact archeological and historical resources, and would consult with our Regional Archeologist and Virginia SHPO as appropriate. This will be especially important for those projects that include moving or displacing soil, as preservation in place is our preferred treatment for archaeological sites. A pre-project evaluation of activities will ensure we comply with Section 106 of the National Historic Preservation Act, regardless of the alternative implemented. That compliance may require any or all of the following: a State Historic Preservation Records survey, literature review, or field survey. In addition to any surveys and reviews, we will seek to minimize adverse impacts to eligible archaeological sites by limiting public access and through monitoring by law enforcement officials.

We also plan to work with State and local historical societies and preservation offices to interpret cultural resources on the refuge and to explain the importance of protection and preservation of those resources. Additional projects are identified under each alternative.

**Supporting Wildlife-
Dependent Recreational
Uses**

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 (605 FW 1), we will strive to ensure any 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 define and evaluate programs

In 2005, the Northeast Regional Visitor Services Review Team identified priority wildlife-dependent public use programs of emphasis for each refuge. The two programs identified for this refuge are: wildlife observation and interpretation. This determination was based on careful consideration of the refuge's 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 of the priority public uses are important, and all but fishing are offered on this refuge (see discussion below), wildlife observation and interpretation will receive greater emphasis when prioritizing projects and the distribution of refuge resources. As always, we look to our conservation partners, as well as the Friends of Potomac River Refuges and volunteers to develop and assist with all refuge public use programs.

Continuing a Fishing Closure at Mason Neck Refuge

Mason Neck Refuge has never been open to fishing and a closure to this use would be maintained under all alternatives. There are several reasons for this. We are concerned that anglers walking the shoreline have the potential to disturb nesting and wintering bald eagles, waterbirds, and waterfowl. We are also concerned with trampling of sensitive tidal marsh vegetation, and contributing to shoreline erosion. There are also areas on the shoreline with high, eroding banks where safety is a concern. In summary, there are no areas along the refuge shoreline where we could offer a fishing opportunity and not be concerned with resource damage, wildlife disturbance, or safety. We would continue to direct people to the adjacent State Park for fishing.

Conducting Appropriateness and Compatibility Determinations

Chapter 1 describes the requirements for appropriateness and compatibility determinations. Appendix B includes draft appropriateness and compatibility determinations to support the activities in alternative B, the Service-preferred alternative. Our final CCP will include the approved findings of appropriateness and compatibility determinations for the alternative selected. We will 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: taking of native plants, berry picking and mushroom harvesting, jogging, horseback riding, picnicking, biking on other than designated bike routes, swimming and sunbathing, public trails terminating at refuge trailheads, non-wildlife-dependent group gatherings (e.g. weddings, family reunions, other similar parties) and geocaching (a "treasure-hunting" game using GPS locators). 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 five priority recreational and educational uses we allow, we have determined that several other activities are appropriate and compatible on refuge lands under certain circumstances under all alternatives. They include: dog walking on leash only, research, and certain outdoor events (including the Eagle Run and Hartwell Festival). These activities are either discussed earlier in this section or described in detail under individual alternative's discussions, and included in appendix B.

Special Use Permits

Special Use Permits may be issued for specialized or unique activities allowed on the refuges. Each activity will be evaluated for their appropriateness and compatibility on a case by case basis as they are requested. These activities could include groups of 10 or more individuals or self-guided groups who wish to host their own wildlife-dependant activities, or research activities. Groups of 10 or more are required to have permission for wildlife observation and photography, environmental education, and interpretation. Each request must be presented in writing with details of who, what, where, when, why, and how the activity will be conducted. Each request has different logistics, and therefore, would be evaluated for impacts on the Refuge mission. Using professional judgment, as long as there is no significant negative impact to natural resources or visitor services, or violation of Refuge regulations, a Special Use Permit (SUP) will be issued outlining the framework in which this use can be conducted. Refuge staff will ensure compliance with the SUP.

Actions Common to Alternative B and C Only

Providing Refuge Housing

Alternatives B and C have two actions in common which are not included under alternative A.

We would pursue options for providing refuge staff housing on-site (see map 3.1 on page 3-49 for location). Affordable housing in the area is limited and refuge staff must often travel extended distances to find a reasonable place to live. It has been very challenging to find seasonal or temporary staff under these circumstances. Travel time between the refuges within the Refuge Complex during the workday can also be problematic and inefficient. Currently, due to traffic congestion on US Route 1, refuge staff can spend over one hour commuting between refuges less than 20 miles apart. The resulting travel time between home and work, or between refuges, also decreases the Service's ability to respond to incidents or emergencies. Having housing located near the refuge would:

- Significantly increase resource and visitor protection;
- Provide a Service presence in the area, even when the refuge is closed;
- Promote greater awareness of the refuge and its resources by having an employee in the local community conducting outreach, both planned and opportunistic;
- Provide affordable housing for Service employees; and,
- Provide short-term housing for temporary staff, interns, and employees on detail.

Our provisional location for the housing is on refuge lands adjacent to the entrance road (High Point Road; see map 3.1 on page 3-49) on uplands east of Kane's Creek close to the refuge boundary. Archeological and threatened and endangered species surveys and water percolation tests for a septic system would be conducted before a final location is selected. The building would be a two-story duplex set back from the road so as to be less visible to refuge visitors. It would have a garage and an approximately 50 foot length driveway, and be serviced by well-water and a septic field. Building it would involve disturbance to no more than one acre of land.

Also on refuge lands, we would continue to pursue installing a pad and facilities hook-ups for a recreational vehicle (RV) to be used as seasonal temporary quarters for refuge volunteers. It would be located at the Mason Neck Refuge

maintenance facility, or other feasible location on the refuge where infrastructure could be placed without diminishing resource values or public activities.

Implementing the National Staffing Model

In 2008, the Assistant Director of the Refuge System convened a team to develop a national staffing model that would more effectively represent what is needed to operate and manage the diversity of field stations in the Refuge System. The team was directed to develop a model that would take into account the variety of refuge purposes in the Refuge System; contribute to the Refuge System mission; and, comply with the 1997 Refuge Improvement Act and other laws, regulations and policies. The team was also directed to build-off of information and lessons-learned from previous System-wide staffing modeling efforts.

The model developed considers 15 factors which drive refuge workloads, including consideration of acres under management and the level of that management. For example, such things as the amount of: invasive species management, endangered species management and monitoring, active habitat management and biological monitoring, wilderness management, visitation and visitor services programs, volunteer programming, Friends Group coordination, maintenance and facilities management, aircraft or ocean travel needs, subsistence uses, and law enforcement are factors evaluated. The model identifies a total number of full-time equivalents (FTEs) a refuge should have, but it does not dictate what specific disciplines the positions should be, nor does it determine a priority order for filling them. These more detailed decisions are made by the Regional Director, after advisement from the Assistant Regional Director for the Refuge System and recommendations from respective refuge managers.

The national staffing model recommends 16 positions for the Potomac River Refuge Complex. Under alternative B, the Service-preferred alternative, and alternative C, we have proposed which specific positions are recommended to fill out 16 positions. We present the recommended staff by alternative in appendix E—Staffing Charts. We also identify our recommended priority order for acquiring new staff in appendix C—RONS tables.

Actions Considered, but not Fully Developed

A proposed public trail system is in development on the Mason Neck Peninsula. The proposed plans indicate that part of this trail system would terminate at the trailhead parking area for the Mason Neck Refuge’s Joseph V. Gartlan Jr. Great Marsh Trail (Great Marsh Trail). This proposed trail would be multi-use and allow activities prohibited on the Great Marsh Trail such as bike riding and rollerblading. After considering whether to include this action our management alternatives, we are have determined it is not warranted to evaluate this proposal further.

First, some of the uses allowed on the proposed trail are not compatible and would conflict with users on the Great Marsh Trail. Some of the uses on the public trail are not wildlife-dependent uses and are not necessary to support priority public uses on the refuge. User conflicts may also decrease the enjoyment of refuge visitors engaged in wildlife-dependent use of the Great Marsh Trail. We do not feel that terminating a proposed public trail at a refuge trailhead will support any refuge purpose, objective, or goal and will not benefit the natural or cultural resources present on the refuge.

Secondly, it is predicted that some individuals using the public trail system will park in the Great Marsh Trailhead parking lot, thus decreasing the amount of parking available for refuge visitors engaged in priority public uses. This could also result in increased use of other refuge facilities by non-refuge users, such as restrooms and trash receptacles. The refuge would incur the costs of increased maintenance of these facilities. We also expect an increase in instances of

prohibited uses (e.g. bicycling, rollerblading, jogging) on the Great Marsh Trail by visitors that do not differentiate between the refuge trail and the proposed public trail system. These instances would create an increased workload for the Refuge law enforcement officer.

Finally, trail maintenance is a concern. The proposed trail would traverse the border of the refuge and the public would likely assume it is owned and maintained by the refuge. The public would, therefore, expect Refuge staff to deal with trail issues.

Based on these factors, we have decided that the proposal for a trail system to terminate at the Great Marsh Trailhead parking lot does not justify further analysis.

Conducting Additional NEPA Analysis

For all major actions, NEPA requires site-specific analysis and disclosure of their impacts, either in an environmental assessment (EA) or an environmental impact statement (EIS). Most of the major actions proposed in the three alternatives and fully analyzed in this draft CCP/EA are described in enough detail to comply with NEPA, and would not require additional environmental analysis. Although this is not an all-inclusive list, the following project examples fall into this category: biological inventories and monitoring; modifications to our public use programs, including new hunting opportunities, and controlling invasive plants and animal pests. Several actions proposed only under alternatives B and C are additional examples of actions analyzed in enough detail to comply with NEPA in this document: new refuge housing, a recreational vehicle (RV) pad for trailer parking, new trails on existing roadbeds, and a new youth turkey hunt program.

Although we analyze herein the impacts of the management alternatives we have developed, additional NEPA analysis will be necessary for certain types of actions even once the CCP is adopted. Where decisions have not been made in this CCP, but must be made later, we analyze the impacts of the possible range of alternatives herein, but may need to supplement this analysis later. An example of this is our proposal under Alternatives B and C to design and construct new breakwaters or other major construction projects to protect the shoreline at Mason Neck Refuge: we analyze the impacts of such projects at a general level herein, but this analysis will have to be supplemented before a final decision on whether to go forward with a particular design is reached. Similarly, if the VDF forest health and condition inventory and assessment recommend extensive forest management activities unforeseen by Refuge staff, adoption of such recommendations would require additional analysis. In each case these are management actions whose precise details and therefore consequences cannot be known by the FWS at this time.

Green heron



Eugene Hester/USFWS

Mason Neck Refuge Alternative A—Current Management

Introduction

Alternative A provides the baseline for comparing alternatives B and C. It assumes that our management of the refuge would continue its current program activities and emphases. We would continue to focus on protecting Federal trust wildlife species and their habitat and maintain current opportunities for public use, without significant improvements or new programs.

Habitat Management

Alternative A would continue our management to protect key Federal trust wildlife species and their habitat, most notably, bald eagles, great blue heron and other waterbirds, and waterfowl. We would continue to prohibit public access to nesting areas that would disturb bald eagles and great blue heron. We would also continue current efforts to control invasive plants, and injurious or exotic species on the refuge. Biological program inventory and monitoring efforts would continue to be those primarily conducted by VDGIF and other partners. We would permit compatible research projects requested by other entities on refuge lands, but would not directly support them.

Visitor Services and Outreach

We would continue our current wildlife observation, photography and interpretation programs by maintaining the Joseph V. Gartlan, Jr. Great Marsh (Great Marsh) and Woodmarsh Trails, and their respective observation platforms and interpretive signs. We would continue to work cooperatively with Mason Neck State Park to maintain the High Point multiple use trail where it crosses the refuge. The primary outreach activity would continue to be our annual Elizabeth Hartwell Eagle Festival Day event.

Refuge Administration

Mason Neck Refuge would be managed by the current six person permanent Refuge Complex staff. Staff hours spent administering this refuge and working on its projects would continue to be based on project priority within the Refuge Complex. In 2007-2008 approximately 30 percent of staff time was spent this refuge.

Objectives and Strategies to Meet Refuge Goals

GOAL 1:

Protect, enhance, and restore the biological integrity, diversity, and environmental health of mature hardwood-mixed forests to support native wildlife and plant communities including species of conservation concern.

Objective 1.1 Mature Hardwood-mixed Forest—Bald Eagles.

Continue to monitor breeding bald eagle activity on the refuge, and protect nesting pairs from human disturbance.

Rationale

See rationale for alternative B, goal 1, objective 1.1.

Strategies

Continue to

- Protect all known active nest sites from human disturbance by restricting public access during sensitive nesting periods. The size of closed area depends on topography, vegetation, and sight distance
- Post trail closures and/or warning signs at appropriate, visible locations to explain to visitors the restriction

**Objective 1.2 Mature
Hardwood-mixed
Forest—Migrating Forest
Dependent Birds**

- Cooperate with VDGIF and Mason Neck State Park staff in monitoring bald eagle nesting activity
- Utilize refuge law enforcement officer to conduct outreach and enforce restrictions

Protect and manage a healthy contiguous mature hardwood-mixed forest on 1,883 acres benefiting forest dependent migrating birds and other native wildlife.

Rationale

See rationale for alternative B, goal 1, objective 1.2.

Strategies

Continue to

- Work with VDGIF to assess deer populations, deer health, and deer impacts on native vegetation.
- Conduct annual deer hunt as a means of keeping deer population in check and prevent deterioration to the forest understory and herbaceous layer.
- Work with USFS to evaluate threat of gypsy moth outbreak and be vigilant for unusual concentrations of pests, pathogens, and invasive plants and respond with respective treatments accordingly. These may include both chemical and mechanical controls (also see objective 1.5 below)
- Treat invasive plants to the extent funding and staffing are available, with priority given to controlling mile-a-minute, Japanese stiltgrass, and beefsteak plant.
 - Treat approximately 1 acre/year of invasive plants on the refuge, using chemical (e.g. glyphosates) and mechanical controls, and hand-pulling, in an effort to reduce their spread
 - Focus treatments along roads and trails or in sensitive resource areas
 - Cooperate with the adjacent State park in treating invasive plants
 - Utilize volunteers, researchers and/or other conservation partners to collect forest resource information of interest to the Service_
- Work with researchers, educators, and/or volunteers on an opportunistic basis to collect resource information on forest dependent wildlife and plants
- Conduct outreach, education, and interpretation with visitors to explain the refuge's importance to the full complement of forest wildlife and plants
- Minimize the potential for disturbance to these habitat features by restricting public access to designated trails only
- Interpret the importance of vernal pools and the other habitat features as important to a wide variety of wildlife in refuge literature and during refuge purposes

**Objective 1.3 Heron
Rookery**

Continue to protect the 61 acres of mature hardwood-mixed forest that supports one of the largest great blue heron breeding colonies in the mid-Atlantic region.

Rationale

See rationale for alternative B, goal 1, objective 1.3.

Strategies

Continue to

- Prohibit public access to Little Marsh and surrounding bluffs and adjacent forest. Both foot and boat access is prohibited.
- Communicate the unique and regional significance of the heron rookery at outreach opportunities such as refuge programs, events, on the website and in other refuge printed information
- Allow volunteer-led efforts to count nest sites
- Use law enforcement officer to conduct outreach and enforce closure area

GOAL 2:

Protect, enhance, and restore the biological integrity, diversity, and environmental health of wetland habitats and shorelines to support native wildlife and plant communities including species of conservation concern.

Objective 2.1 Great Marsh Management

Continue to protect the 207-acre Great Marsh for waterfowl, wading birds, bald eagles and other native wildlife identified as a conservation concern in the Virginia WAP.

Rationale

See rationale for alternative B, goal 2, objective 2.1.

Strategies

Continue to

- Prohibit public access to Great Marsh. Both foot and boat access is prohibited.
- Communicate the unique and regional significance of the Great Marsh at outreach opportunities such as refuge programs, events, on the website and in other refuge printed information
- Partner with VDGIF to conduct winter waterfowl banding and avian influenza monitoring in this area
- Use law enforcement officer in the field to conduct outreach and enforce closure area

Objective 2.2 Little Marsh Management

Continue to protect the 50-acre Little Marsh impoundment and maintain the 1.5 acre Little Marsh Road impoundment to support wading birds and waterfowl during the breeding season, and fall and spring migrating seasons, while also providing habitats for other species of conservation concern identified in the BCR 30 plan and Virginia WAP.

Rationale

See rationale for alternative B, goal 2, objective 2.2.

Strategies

Continue to

- Prohibit public access to Little Marsh; both foot and boat access is prohibited
- Maintain signs alerting boaters it is prohibited to land on the dike
- Use law enforcement officer to conduct outreach and enforce restrictions
- Adjust water levels to provide great blue heron and other wading birds with better foraging conditions and to control woody vegetation encroachment

- Maintain water control structure in good working condition
- Conduct a slow drawdown of water lasting about 4 weeks in summer to improve foraging habitat for wading birds, particularly great blue heron
- Exclude public from Little Marsh Road to protect sensitive wildlife areas

Objective 2.3 Shoreline Protection

Continue to protect the refuge's 4.4 miles of shoreline and bluffs to maintain refuge integrity and protect refuge habitats.

Rationale

See rationale for alternative B, goal 2, objective 2.4.

Strategies

Continue to

- Work with partners to monitor and maintain the existing approximately 200 feet of refuge shoreline (e.g. breakwater structures)
- Minimize public access to shoreline

Objective 2.4 Aquatic Habitat and Water Quality

Continue to support local, Federal and State partners' efforts to protect and monitor aquatic habitats and water quality to conserve interjurisdictional and Federal trust fisheries in the tidal Potomac River.

Rationale

See rationale for alternative B, goal 2, objective 2.5.

Strategies

Continue to

- Provide assistance to researchers upon request, typically as logistical support, to facilitate their research on fish and other aquatic species in the tidal Potomac River
- Monitor invasive aquatic species and distribution, and implement control measures when funding and staffing allows

GOAL 3:

Provide quality, compatible wildlife-dependent recreational opportunities with particular emphasis on interpretation and wildlife observation.

Objective 3.1 Deer Hunting

Continue to provide the annual, public, high-quality white-tailed deer hunt program to support deer and forest health and condition objectives.

Rationale

See rationale for alternative B, goal 3, objective 3.1.

Strategies

Continue to

- Cooperate with VDGIF in meeting State deer management plan goals
- Maintain current hunt program;
 - State and local partners involved in hunt administration
 - Incorporate Mason Neck State Park as part of hunt area
 - Target an average of 90-100 deer harvested/year or a number recommended by VDGIF biologists

- Provide technical support for deer hunt programs on other public land management agencies on Mason Neck Peninsula

Objective 3.2 Turkey Hunting

No program

Objective 3.3 Waterfowl Hunting

Continue to work with VDGIF to support a waterfowl hunt in State waters adjacent to the refuge.

Rationale

See rationale for alternative B, goal 3, objective 3.3.

Strategies

Continue to

- Coordinate with VDGIF conservation officer in addressing any waterfowl hunting issues
- Prohibit waterfowl hunting on refuge lands

Objective 3.4 Wildlife Observation and Photography

Continue to maintain current opportunities for wildlife observation and photography at existing trails and parking facilities, observation platforms and photography blinds.

Rationale

See rationale for alternative B, goal 3, objective 3.4.

Strategies

Continue to

- Maintain the two trails entirely on refuge lands: Woodmarsh (2.5 miles) and Joseph V. Gartlan, Jr. Great Marsh (Great Marsh) (0.75 miles) trails
- Cooperate with Mason Neck State Park in maintaining the multi-purpose High Point Trail where it passes through the refuge (3.0 miles total; 0.5 miles on refuge)
- Close portions of the Woodmarsh Trail from December to June to protect nesting bald eagles
- Allow foot travel as the only mode of transportation on Woodmarsh and Great Marsh Trails
- On the High Point multi-purpose trail, continue to allow all forms of pedestrian and bicycling access in coordination with Mason Neck State Park
- Prohibit motorized use and horseback riding on all trails
- Collect monthly visitor use data on the High Point, Great Marsh, and the Woodmarsh Trails

Objective 3.5 Interpretation Program

Continue to maintain current interpretive program to explain to the public the values of refuge wildlife and habitats and cultural resources.

Rationale

See rationale for alternative B, goal 3, objective 3.5.

Strategies

Continue to

- Distribute general refuge brochure and post at kiosks
- Maintain interpretive and other pertinent refuge information at the three kiosks located at the Woodmarsh trailhead, the Woodmarsh trail near Sycamore Road, and the Great Marsh trailhead.
- Install interpretive panels along trails to explain refuge resources and management activities, and to enhance self-guided interpretive opportunities.
- Work with the Mason Neck State Park to support the annual Elizabeth Hartwell Eagle Festival in April, including providing guided refuge tours.
- Coordinate with the National Park Service to identify opportunities to interpret the Captain John Smith Chesapeake National Historic Trail on the refuge, such as placing interpretative panels at strategic locations.
- Work with the Mason Neck agencies to complete the joint agency kiosk on Gunston Road near the entrance to the Mason Neck Peninsula to orient visitors and describe the missions of each agency. This kiosk will:
 - Contain a map of the area including agency lands,
 - Provide information about the purposes and management of each agency, recreational opportunities, and regulations for each area

**Objective 3.6
Environmental Education
Program**

Continue to maintain a limited environmental education program.

Rationale

See rationale for alternative B, goal 3, objective 3.6.

Strategies

Continue to

- Allow Thomas Jefferson High School to conduct environmental educational activities along High Point, Anchorage, and Sycamore Roads, including their successive years of study on
 - Vernal pools
 - Deer pellet counts
- Facilitate other environmental education opportunities and programs upon request

GOAL 4:

Enhance efforts to promote awareness, understanding and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.

Objective 4.1 Volunteers

Maintain an active volunteer program.

Rationale

See rationale for alternative B, goal 4, objective 4.1.

Strategies

Continue to

- Enlist the help of volunteers on an opportunistic basis to support refuge programs

- Develop community service projects to support Fairfax County court system
- Have volunteers from the community assist in refuge cleanup activities, special events, routine maintenance of trails, roads, and other areas; invasive plant control; bald eagle and other bird counts
- Develop projects for the Boy Scouts and the Girl Scouts upon request
- Issue the monthly refuge complex volunteers newsletter to identify current and upcoming events
- Develop and implement annual volunteer recruitment, training, and appreciation/recognition events

Objective 4.2 Community Outreach

Continue to inform visitors and local residents about the refuge and its resources at refuge and community events, via the media, and at refuge-hosted programs and projects in order to create an awareness and understanding of how refuge management activities benefit wildlife, wildlife habitat, and the protection of historic and cultural resources.

Rationale

See rationale for alternative B, goal 4, objective 4.2.

Strategies

Continue to

- 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
- Routinely respond to written, telephone, and in-person inquiries from the public.
- Maintain and regularly update contact information for partners, elected officials, the media, and the general public
- Inform refuge neighbors of refuge management activities via website, press stories, and newsletters
- Promote our successes in the local community via refuge and community events, project demonstrations, and media stories
- Utilize volunteers to participate in community events in Fairfax County where effective outreach of refuge programs can occur
- Continue to maintain the refuge website with links to newsletters, the Friends of the Potomac River Refuges, and other pertinent refuge information

Objective 4.3 Partner Outreach

Continue to foster cooperation and communication with other State and Federal agencies, museums, civic organizations, environmental and conservation groups, and other interest groups, such that the Refuge System mission and refuge goals are better understood by all.

Rationale

See rationale in alternative B, goal 4, objective 4.3.

Strategies

Continue to

- Maintain contact list and ensure regular contact with local groups, environmental groups, and other interested parties active in the Mason Neck Refuge area.

Objective 4.4 Elected Official Outreach

Continue to inform elected officials representing the refuge area about refuge management priorities, special events and other activities, on an annual basis or as significant issues arise.

Rationale

See rationale in alternative B, goal 4, objective 4.4.

Strategies

Continue to

- Invite Federal, State, and local elected officials to attend and participate in outreach events held on the refuge
- Provide written or personal briefings for members of Congress, and their staff, as needed or requested, to inform them about important refuge issues

Objective 4.5 Research

Continue to encourage research to provide data to support refuge management decisions or to support regional projects of Service interest.

Rationale

See rationale in alternative B, goal 4, objective 4.5.

Strategies

Continue to

- Support inventories and research led by others, such as the Monitoring Avian Productivity and Survivorship (MAPS) station, that are a priority for the refuge, and compatible with refuge purposes, goals and objectives; use both refuge staff or volunteers as funding allows.

GOAL 5:

Enhance efforts to protect and interpret refuge cultural resources.

Objective 5.1 Archeological Resources

Continue to protect archaeological resources on the refuge from damage by visitors, from illegal activity, or from environmental factors.

Rationale

See rationale in alternative B, goal 5, objective 5.1.

Strategies

Continue to

- Limit public access to designated trails to keep visitors away from known archeological sites on the refuge
- Coordinate with the Service's Regional Archeologist to determine the level of consultation required in conjunction with refuge projects that have a potential to affect archaeological resources

- Conduct archaeological reviews, surveys, or studies of project areas as needed, or recommended, by the Service's Regional Archeologist
- Monitor known archeological sites for looting and trespass

Objective 5.2 Historical Resources

Continue to protect historical resources on the refuge from damage by visitors, from illegal activity, or from environmental factors.

Rationale

See rationale in alternative B, goal 5, objective 5.2.

Strategies

Continue to

- Limit public access to designated trails to keep visitors away from historic sites on the refuge
- Provide interpretation of historic importance of refuge in refuge brochures and kiosks
- Monitor known historical sites for looting and trespass

Entrance sign at Mason Neck Refuge



Bill Wallen

Mason Neck Refuge Alternative B—Improved Management for Federal Trust Resources (Service-preferred Alternative)

Introduction

Our planning team recommends this alternative to the Regional Director for implementation. We believe it provides the best combination of actions to meet the Refuge System mission and policies, and refuge purposes and goals. It is also the most effective of the alternatives in addressing public issues. We plan to enhance and expand our partnerships to help achieve priority work and obtain the best resource information available. Our management focus would be on those actions that protect and enhance the refuge's tidal marsh and forest habitats, with emphasis on benefiting bald eagles, wading and waterbirds such as great blue heron, forest-dependent migratory songbirds, and waterfowl.

Habitat Management

As noted above, our highest priority is to protect and enhance the diversity, integrity and health of the refuge's Great Marsh and the mature hardwood-mixed forest habitats. We would develop a HMP to outline the detailed, site-specific prescriptions and strategies we intend to employ in those habitats to benefit a broad array of wildlife, including our focal species, amphibians and reptiles, aquatic resources, and other native wildlife of conservation concern. The HMP would also include detailed plans to improve Little Marsh impoundment and other refuge wetlands. We would also improve our program to treat invasive species. Our mapping, inventory and monitoring program of wildlife and habitats would increase to help assist us in measuring our successes.

Visitor Services and Outreach

We would enhance the visitor services provided by improving our infrastructure and the quality of our programs, and offering new opportunities. For example, we would improve our existing parking facilities and trails, and create new trails and observation platforms on Sycamore Road and Treestand Road. These actions would provide additional opportunities for wildlife observation, photography and interpretation. We would also offer a new youth turkey hunt. Our outreach to the local community would improve through increased Service visibility, an improved volunteer program, and enhanced programs and services.

Refuge Administration

We would manage the Refuge Complex from new headquarters on Occoquan Bay Refuge. The approved Refuge Complex staffing chart identifies a total of 16 positions which is an increase of 10 positions from our current staffing levels. We have identified the vacant positions we recommend in this CCP which we believe are key to implementing this plan's goals and objectives. They include wildlife biologists, maintenance, law enforcement and visitor services staff.



Forested habitat on Mason Neck refuge

USFWS

Objectives and Strategies to Meet Refuge Goals

GOAL 1:

Protect, enhance, and restore the biological integrity, diversity, and environmental health of mature hardwood-mixed forests to support native wildlife and plant communities including species of conservation concern.

Objective 1.1 Mature Hardwood-mixed Forest

Bald Eagles. Actively manage 1,200 acres of forest to provide bald eagle nest and roost sites (for a minimum of 3 pairs of eagles). Protect all known sites by preventing disturbance using VDGIF and Service recommendations. Provide for potential new nest trees (higher than the surrounding canopy with large, branching limb structure providing easy access and wide views near marshes and rivers).

Rationale

Bald eagles generally nest near coastlines, rivers, large lakes or streams that support an adequate food supply. In forested areas, bald eagles often nest in mature or old-growth trees, selecting the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nest sites typically include at least one perch with a clear view of the water where the eagles usually forage (USFWS, 2007b). For warmth during the winter, bald eagles sometimes use conifers and floodplains bounded by river bluffs at nighttime or when wind is severe (INHS, 2008).

The Potomac and other major tidal rivers in Virginia also have areas where non-breeding eagles are known to concentrate for roosting and feeding. These areas may be used by non-breeding eagles in both summer and winter. These eagle concentration areas are extremely important because they are used by eagles from throughout the East Coast, as well as resident eagles (USFWS/VDGIF, 2000).

A variety of food sources best satisfies the bald eagles' constant demand (VAFWIS, 2010). The geographic area and season determines the diet. Bald eagles acquire the majority of their food in the shallow waters of low tide. Bald eagles employ a variety of hunting techniques such as striking fish and scavenging carcasses. Infrequently, bald eagles pursue waterfowl in the air, particularly injured birds (INHS, 2008). Brown bullhead (*Ameiurus nebulosus*), chain pickerel (*Esox niger*), white sucker (*Catostomus commersoni*), white perch (*Morone americana*), and smallmouth bass (*Micropterus dolomieu*) are major food sources for inland nesting bald eagles. However, marine mainland bald eagles predominately eat alewife, blueback herring, and American eel. In the winter, food sources include common goldeneye (*Bucephala clangula*), bufflehead (*Bucephala albeola*), and red-breasted merganser (*Mergus serrator*) (VAFWIS, 2010).

In this region, eagle pairs build their nests from October through January, lay eggs from January to April, rear their young from February through June, and fledge their young 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, 2007b)

This refuge was established in 1969 as the Nation's first refuge dedicated to protecting bald eagle using funds provided under the Endangered Species Act. Eagles nested and wintered on the peninsula as far back as colonial times, but in the 1950's and 1960's they succumbed to development and pesticides. With greater awareness, an increase in their protection both nationally and regionally, and a reduction in pollution, the eagle population has made a recovery. The removal of the bald eagle from the Federal list of endangered and threatened species was predicated on the assumption that they would continue to thrive in areas they presently occupy. Mason Neck Refuge is one location where their protection will remain a priority, regardless of the bird's status, since it supports the principal purpose for which the refuge was established. 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).

The Service developed the National Bald Eagle Management Guidelines (2007) to help minimize impacts to bald eagles, particularly where they may constitute disturbance. To avoid disturbing nesting bald eagles, the guidelines 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. These measures are all in place on the refuge.

With enhanced local and regional support for the existing and proposed strategies identified below, we believe the refuge can make an important contribution to sustaining bald eagle nesting and wintering in the Chesapeake Bay region. Hiring a wildlife biologist would be an important component to accomplishing this objective.

Strategies

Continue to

- Protect all known active nest sites from human disturbance by restricting public access during sensitive nesting periods. The size of closed area depends on topography, vegetation, and sight distance
- Post trail closures and/or warning signs at appropriate, visible locations to explain to visitors the restriction
- Cooperate with VDGIF and Mason Neck State Park staff in monitoring bald eagle nesting activity

- Utilize refuge law enforcement officer to conduct outreach and enforce restrictions

Over the 15 years of CCP implementation:

- Hire additional biological staff as identified in the staffing chart (appendix E) to plan, coordinate, and implement activities
- Work with Service and VDGIF bald eagle experts to define potential nest and roost stands, in addition to those currently used by eagles. Identify possible stand treatments to enhance to both potential and currently used areas; consider such actions as thinning, planting, tree release, and fuel reductions to protect areas from potential wildfires and provide optimum growth for potential nest trees
- Ensure management actions meet or exceed the guidelines for protection and management of eagle sites as identified in the Service's National Bald Eagle Guidelines (2007)
- Develop nest and/or roost site management plans as warranted, prioritizing actions and developing an implementation schedule. Incorporate plans into HMP.
- Create and maintain a GIS database with locations of active and potential nest and roost sites, and any management activities. Annotate database with results of annual surveys.
- Work with VDGIF to conduct mid-summer and mid-winter surveys on the refuge. If funding allows, also conduct nest productivity surveys.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, or trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Monitor changing bald eagle roost and nest use and make modifications or repairs as necessary to ensure favorable site conditions. Monitor and control invasive plants, erosion, human disturbance, and other sources of habitat degradation as staff and resources permit to protect the integrity of roost, nest, and concentration areas on refuge property
 - Continue to incorporate this habitat type into ongoing biological surveys, such as habitat-based landbird count surveys, winter and summer bald eagle surveys, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in or near roosts would be updated to track changes in habitat relative to bird habitat use.

Objective 1.2 Mature Hardwood-mixed Forest—Migrating Forest Dependent Birds

Protect and manage a healthy contiguous mature hardwood-mixed forest on 1,883 acres benefiting migrating forest dependent birds and other native wildlife. A healthy mature hardwood mixed forest is characterized by:

- Canopy dominant and co-dominant species consisting of oaks, hickory, poplar, maple, sweet gum, black gum, and beech with patches of coniferous trees such as Virginia and loblolly pine.
- Low edge to interior ratio.

- Basal area of < 100 square feet per acre
- Advanced regeneration of canopy trees (1-4 inches DBH) > 300 stems per acre.
- A diverse, native shrub layer represented by low and high bush blueberry, mountain laurel, pawpaw, arrow wood, *Viburnums*, wintergreen, greenbriar, Virginia creeper, partridge berry, Solomon's seal, and wild yam with stem densities of > 1500 per acre.

Rationale

Coastal forests and woodlands within BCR 30 are crucial stopover sites during migration and overwintering for neotropical migrants (Steinkamp, 2008). Within BCR 30, forested upland communities provide habitat for the second highest number of priority bird species in the region (Steinkamp, 2008). 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. These conditions have become less common due to a lack of forest management and over-browsing by white-tailed deer (Rich et al., 2004).

Of particular concern in forest habitats in the region 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) (Jones et al., 2000). This minimum habitat patch size, in fact, would only be capable of supporting less area-sensitive FIDs species. The larger the contiguous forest patch, the higher the probability of supporting a diversity of productive breeding pairs.

Among a number of management recommendations for forest birds made by the ACJV in the BCR 30 Plan are:

- Increase/improve active management of forests to improve habitat quality within existing and high priority upland forest (e.g., loss of shrub layer).
- Manage upland forest communities to provide post-fledging habitat (e.g., a habitat mosaic, including shrubby areas and openings; targeted species is the wood thrush).
- Develop and implement programs to control invasive plant species.

In 2009, the Virginia Department of Forestry (VDF) completed an assessment of forest health and condition on the refuge's 1,883 forested acres to inform decision-making in respect to managing bald eagles and neotropical migrants. One of the major threats to forest health and condition is deer overabundance. At Mason Neck Refuge, the lack of midstory woody species diversity is likely due to intense browse pressure of white-tailed deer leading to the wide-spread growth of holly and beech, and shrubs and forbs known to be unpalatable to deer (McGlone and Lasher, 2009). Ensuring deer browse pressure does not significantly impact regeneration of woody species regeneration is essential in the success of the development of Mason Neck Refuge's forest understory. Numerous studies have found when white-tail deer browse pressure is high, it can alter the growth, reproduction (Knight, 2003), diversity (Latham et al., 2005) and ultimately survival of plants within a specific population (Alverson and Waller, 1997, Cote et al., 2004). In areas where deer density exceeds 20 deer / square mile, deer

herbivory is related to declines in mid-story bird species (deCalesta, 1994). Other threats include gypsy moth infestations and spread of invasive plant species.

We believe refuge lands make an important contribution to the regional bird populations of FIDs such as wood thrush, Acadian flycatcher, and prothonotary warbler. These species are known to breed on the refuge and are listed as birds of conservation concern by various authorities (appendix A). According to the PIF Area 44 Plan, the BCR 30 plan, and Virginia WAP, other birds species of conservation concern that would benefit from a diverse, mature, mixed-deciduous forest include the eastern wood peewee (*Contopus virens*), Kentucky warbler (*Oporornis formosus*), cerulean warbler (*Dendroica cerulea*—migrant), Louisiana waterthrush, yellow-throated vireo (*Vireo flavifrons*), whip-poor-will (*Caprimulgus vociferus*), northern flicker (*Colaptes auratus*), scarlet tanager (*Piranga olivacea*), and raptors such as red-shouldered hawk (*Buteo lineatus*), northern saw-whet (*Aegolius acadicus*) and barred owl (*Strix varia*) (Rosenberg et al., 1999).

Hiring a refuge biologist and obtaining increased project funding would allow us to increase inventory, protection, and management of forest dependent species and the habitat features on which they depend.

Strategies

Continue to

- Support partner-led Monitoring Avian Productivity and Survivorship (MAPS) station bird survey work
- Support volunteer-led bird survey work on an opportunistic basis
- Work with VDGIF to assess deer populations and deer impacts on native vegetation.
- Conduct annual deer hunt as a means of keeping deer population in check and prevent deterioration to the forest understory and herbaceous layer.
- Work with USDA-FS to evaluate threat of gypsy moth outbreak
- Be vigilant for unusual concentrations of pests, pathogens, and invasive plants and respond with respective treatments accordingly. These may include both chemical and mechanical controls (also see objective 1.5 below)
- Utilize volunteers, researchers and/or other conservation partners to collect forest resource information of interest to the Service.
- Work with researchers, educators, and/or volunteers on an opportunistic basis to collect resource information on forest dependent wildlife and plants
- Conduct outreach, education, and interpretation with visitors to explain the refuge's importance to the full complement of forest wildlife and plants
- Minimize the potential for disturbance to unique habitat features by restricting public access to designated trails only
- Interpret the importance of vernal pools and the other habitat features as important to a wide variety of wildlife in refuge literature and during refuge programs.

Over the 15 years of CCP implementation:

- Hire additional biological staff as identified in the staffing chart (appendix E) to plan, coordinate, and implement activities identified under this and all other objectives under goals 1 and 2. For example, these staff would develop HMP, IMP, and IPM plans, coordinate all field survey work, conduct GIS mapping, and coordinate forest management treatments. The senior biologist would also take a lead role in communicating with conservation partners.
- Enlist forest ecologists to conduct and evaluate results of forest health and condition inventory and assessment identifying the most significant threats to sustaining biodiversity, and stand structure, function, and composition. If possible, work with State and Federal agencies, non-governmental conservation organizations, and/or universities with this expertise and that have worked in this region.
- Develop forest prescriptions with consideration of meeting migration requirements for neotropical landbirds and improving forest health; incorporate prescriptions, stand treatments, and implementation schedule in HMP. The range of possible treatments may include prescribed fire, thinnings, plantings, and patch cuts or regeneration cuts to restore/enhance/maintain desired structural and species composition
- Evaluate, with FMP update planned in 2011, needs to reduce fuel loading given urban interface
- Prioritize and implement those treatments that would protect forest health, reduce wildfire safety concerns, and complement bald eagle and migratory bird objectives.
- Maintain all data collected in GIS database
- Implement a sharp-shooter program to supplement deer herd reductions provided by established public hunt, if further reductions in the deer herd are recommended to protect forest health and condition,
- Continue coordination with the USDA Forest Service for gypsy moth or other pest monitoring and control; but, also coordinate with Mason Neck State Park and other adjacent landowners on Mason Neck Peninsula to make control measures more efficient
- Evaluate all management actions to ensure they do not contribute to further forest fragmentation
- Develop a GIS based habitat map and maintain it to current Regional protocols
- Incorporate survey updates and map occurrences of vernal pools and other unique fine-scale habitat features; as sites are identified, determine if there are opportunities to further protect, restore, create, and/or enhance sites to benefit species of conservation concern. Include any plans for management and their priority and schedule in HMP. Incorporate detailed plans for a given year in AHWP.
- Establish priority needs to inventory and/or monitor for forest wildlife and plants of conservation concern. Incorporate planned activities, their priority and schedule in the IMP. Given available funding and staffing, or under partnerships, implement priority activities.

Monitoring Elements:

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, such as burning and selective removal to achieve structural and species diversity of native forest species. Results may trigger a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Conduct spring and fall landbird surveys for measuring species composition and relative abundance within the Refuge's mature hardwood-mixed forests.
 - To determine the effectiveness of white-tail deer hunting program, evaluate regeneration of native trees, shrubs, and forbs by conducting vegetation surveys to gather information on species composition, abundance, and diversity.
 - To maintain desired quality and characteristics of forests for forest interior migratory birds, annually conduct scouting for invasive plant species. We will afford zero tolerance to species that are highly invasive and stand replacing. Occurrences or stands of more stable patches of invasive plants may be tolerated in the short term as long as their cumulative coverage is not more than 5 percent of refuge upland acreage, and fundamental objectives are not compromised.
 - Monitor presence of coyotes and beaver and work with APHIS or other licensed agent to control these species as necessary to protect public safety and refuge resources.
 - Conduct surveys of anurans, to monitor overall diversity and indications of habitat changes that affect local populations or to evaluate for further vernal pool protection or management.

Objective 1.3 Heron Rookery

Actively protect 61 acres of mature hardwood-mixed forests that support one of the largest great blue heron breeding colonies in the Mid-Atlantic region by maintaining a vegetative buffer zone of at least 1,000 feet surrounding the rookery and managing public access to prevent disturbance to roosting and nesting birds.

Rationale

Great blue heron breed across the United States and southern Canada, and more than half of the Atlantic coast's breeding population nest in Chesapeake Bay—predominantly in wetlands. The Chesapeake Bay, coupled with surrounding wetland and forested areas in its river tributaries, provides both the ideal food and habitat necessary for great blue heron survival. Optimal habitat conditions for nesting great blue herons include: 1) close proximity (~ 1.4 miles) to quality foraging habitat, and 2) protection from disturbance and predators (typically islands, trees in swamps, or high branches). Great blue herons nest mostly in trees, but the selection of tree species is highly variable. Great blue heron are present year round in the refuge area; however, the refuge is best known for its large rookery. The Mason Neck Refuge colony supported an estimated 1,400 nests as recently as 2003, although our monitoring has indicated numbers have declined to approximately 800 nests in recent years. We are not sure of the reasons for their decline, and unfortunately, have not had the opportunity to study it further.

In other areas of the Chesapeake Bay watershed, loss of nesting sites and deterioration of water quality and wetland habitat are issues of concern for their survival. Natural generation of new nesting islands, created when old islands and

headlands erode, has decreased due to artificial hardening of shorelines with bulkheads. Poor water quality reduces the amount of large fish and invertebrate species available in wetland areas. If suitable feeding and nesting areas are not maintained, populations of great blue heron will eventually decline. Toxic chemicals that enter the Bay from runoff and industrial discharges pose yet another threat. Although great blue heron currently appear to tolerate low levels of pollutants, these chemicals can move through the food chain, accumulate in the tissues of prey and may eventually cause reproductive failure in the heron.

Care must be taken to preserve nesting sites, as well as feeding areas. Erosion of island nesting areas due to artificial structural development, as well as sea level rise, needs to be carefully monitored. Human disturbance at nesting sites can be a problem and studies recommend that people remain a distance of at least 660 feet to minimize disruption of the heron colony. If heron are disturbed frequently, they may abandon their nests or neglect their young. To avoid this concern, the refuge does not allow public access during the nesting season. Deterioration of submerged aquatic vegetation limits foraging area potential. Wetland foraging sites within 9 to 12 miles of heron colonies need special protection to ensure prey availability.

Recently, the Maryland DNR and the VDGIF have sponsored surveys to monitor populations and annual nesting success of great blue heron. They also monitor colonies of other species of heron and egrets. In early spring before the trees have leaves, aerial surveys are conducted to locate colony sites and count nests. At larger colonies, ground counts are made of active nests.

In order to maintain a relatively stable, substantial population of great blue heron in the Chesapeake Bay watershed, protection of shallow water habitat, feeding areas and rookeries must remain a priority (USFWS–CBFO, 2009). On Mason Neck Refuge, we will continue to protect the rookery from human disturbance, while also monitoring its population and evaluating the habitat condition to determine whether any habitat enhancements are needed.

Strategies

Continue to

- Prohibit public access to Little Marsh and surrounding bluffs and adjacent forest. Both foot and boat access is prohibited.
- Communicate the unique and regional significance of the heron rookery at outreach opportunities such as refuge programs, events, on the website and in other refuge printed information
- Allow volunteer-led efforts to count nest sites
- Use law enforcement officer to conduct outreach and enforce closure area

Over the 15 years of CCP implementation:

- Work with experts to assess and implement measures to increase shoreline and bluff protection to reduce potential loss of nesting trees (also see objective 2.4)
- Using Sea Level Affecting Marshes Model (SLAMM) analysis results, monitor and evaluate conditions in the marshes over the next 15 years with respect to climate change and sea level rise. Coordinate with regional efforts and initiatives where possible and applicable.

- Increase Service visibility and law enforcement presence, increase signage, and other measures as warranted to keep unauthorized persons away from the rookery during breeding season
- Establish a rookery monitoring program with partners and volunteers, and incorporate data in GIS. Monitor such things as nest numbers, locations and shifts in their use between years, impacts to vegetation, and impacts from predators (e.g. raccoons) on the population.
- Consult with waterbird experts to determine whether any vegetation management actions could enhance rookery conditions. Incorporate any plans into HMP.

Monitoring Elements:

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, or trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Monitor changing heron roost and nest use and make modifications or repairs as necessary to ensure the favorable roosting conditions of the site.
 - Monitor and control invasive plants, erosion, human disturbance, predators and other sources of habitat degradation as staff and resources permit to protect the integrity of roost, nest, and concentration areas on refuge property.
- Continue to incorporate this habitat type into ongoing biological surveys, such as habitat-based landbird count surveys, winter and summer bald eagle surveys, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in or near roosts would be updated to track changes in habitat relative to bird habitat use.

GOAL 2:

Protect, enhance, and restore the biological integrity, diversity, and environmental health of wetland habitats and shorelines to support native wildlife and plant communities including species of conservation concern.

Objective 2.1 Great Marsh Management

Develop an index of ecological integrity for the Great Marsh wetland complex and establish a baseline for future monitoring the biological integrity, diversity, and environmental health of this 207 acre tidal freshwater marsh. Implement strategies, as warranted by monitoring results, to insure that no degradation of integrity occurs, including increases in the extent or abundance of invasive plants. Management will emphasize and reflect the composition, function and diversity of this habitat type, benefiting migrating/wintering waterfowl (e.g. American black ducks, blue and green-winged teal, northern shoveler) and wading birds (great egrets, great blue herons, and green-backed herons).

Rationale

Freshwater tidal marshes were once extensive along the Coastal Plain rivers of the mid-Atlantic region of the United States. After thousands of years of relatively low-impact use by Native Americans and several centuries of intense development by European Americans, freshwater tidal marshes have been reduced to scattered remnants that are now incapable of providing the extent of ecosystem services characteristic of widespread, healthy marsh ecosystems (Odum et al., 1984). Nonetheless, even remnant marshes provide numerous goods and services that benefit human society, including resident and migratory wildlife

habitat, refuge for endangered and other rare species, spawning and nursery grounds for anadromous fish, attenuation of tidal energy, shoreline stabilization, flood control, water quality enhancement, carbon storage, aesthetic enjoyment, and recreational activities (Odum et al., 1984). Consequently, maintenance and enhancement of remaining tidal marsh is imperative both socially and ecologically.

Chronic sea-level rise is advancing the salinity gradient upstream in rivers on the Atlantic Coast, leading to shifts in vegetation composition and the conversion of some tidal freshwater marshes into oligohaline marshes.

Great Marsh, at 207 acres, represents the largest tidal marsh on the refuge and is considered regionally significant due to its size and undisturbed setting. The marsh hosts the largest concentration of wintering waterfowl on the refuge. Species commonly seen include Canada geese, American black ducks, mallards, wood ducks, blue and green winged teal, northern shovelers, tundra swans, and pintails. Marsh birds commonly seen include great blue herons, great egrets, green-backed herons, and pied-billed grebes. Bald eagles have nested on an island in the marsh for over a decade and portions of the Woodmarsh Trail are closed during nesting to prevent nest disturbance. VDGIF annually conducts banding operations in the marsh, primarily for black and wood ducks. They also sample for Avian Influenza.

Strategies

Continue to

- Prohibit public access to Great Marsh; both foot and boat access is prohibited
- Communicate the unique and regional significance of the Great Marsh at outreach opportunities such as refuge programs, events, on the website and in other refuge printed information
- Partner with VDGIF to conduct winter waterfowl banding and avian influenza monitoring in this area
- Use law enforcement officer in the field to conduct outreach and enforce closure area

Over the 15 years of CCP implementation:

- Develop an index of ecological integrity to 1) determine the current integrity ranking, 2) determine what areas of integrity are low and need attention, 3) prioritize management actions to ensure that the index does not fall below 2010 levels, and, 4) to establish a baseline from which to measure against the targeted 5 to 10 percent improvement
- Inventory the flora and fauna of the marsh to establish a baseline of natural features and water quality to monitor in the future. In particular, determine presence and extent of native marsh and aquatic vegetation, such as spatterdock and wild rice, which are important waterfowl foods.
- Work with VADCR-Division of Natural Heritage and other experts to conduct inventories for rare, threatened, and endangered plants species in Great Marsh. Potential species occurring in the marsh include sensitive joint-vetch, Parker's pipewort, and river bulrush.
- Using SLAMM analysis results, monitor and evaluate conditions in the marshes over the next 15 years with respect to climate change and sea level rise. Coordinate with regional efforts and initiatives where possible and applicable.

- Work with State and Federal agency partners to address any significant water quality issues as they arise in the Potomac River
- Work with volunteers, the Friends Group, and/or other partners to establish a clean-up program in the marsh.

Monitoring Elements:

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, such as burning and selective removal to achieve structural and species diversity of native tidal freshwater marsh species. Results may trigger a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Develop the integrity index and use to determine what areas of integrity are low and need attention.
 - Conduct vegetation surveys within the marsh to determine species composition and diversity.
 - Conduct inventories and monitoring of waterfowl and wading birds. Utilize data to document the effectiveness of management activities and adjust management as necessary.
 - Conduct fish surveys to document species abundance, composition and diversity.
 - To maintain desired quality and characteristics of the tidal freshwater marsh, annually conduct scouting for invasive plant species. We will afford zero tolerance to species that are highly invasive and stand replacing. Occurrences or stands of more stable patches of invasive plants may be tolerated in the short term as long as their cumulative coverage is not more than 5 percent of refuge wetland acreage, and fundamental objectives are not compromised.
 - Monitor presence of beaver and work with APHIS or other licensed agent to control these species as necessary to protect public safety and refuge resources.

Objective 2.2 Little Marsh Management

Manage the existing 50-acre Little Marsh impoundment and 1.5-acre Little Marsh Road impoundment to enhance quality habitat available for wading birds (e.g., least bitterns, great blue herons, black-crowned night herons) and waterfowl (e.g., wood ducks and hooded mergansers) during the breeding season and during peak spring and fall migration periods, while also providing habitat for other priority species of concern identified in the BCR 30 plan (e.g., bald eagles, Louisiana waterthrush, and prothonotary warblers) and other native wildlife identified as species of greatest conservation concern in the Virginia WAP (e.g. American bittern, king rail, little blue heron, and yellow crowned night heron), through a combination of water level management, wetland restoration, and invasive species control. These measures will include:

- 1) Annually provide high quality foraging habitat for wading and marsh birds, specifically great blue herons (Summer: July-late August). This habitat would consist of open, shallow water (2-10 inches water depth) with patches of emergent wetland plants that support fish, invertebrates and amphibians.
- 2) Annually support migratory waterfowl through a mix of shallow (6-24 inches water depth) flooded vegetation (*Carex*, *Polygonum*, *Peltandra*) at times of peak migration (spring: late March, and fall: late October).

- 3) Annually support migratory wading birds through a mix of shallow remnant pools (6-12 inches water depth) at times of peak migration (spring: late March, and fall: late August)

Rationale

The Little Marsh impoundment provides bald eagles and great blue heron a relatively secluded wetland with surrounding mature hardwoods and conifers, and an abundance of food, in close proximity. This juxtaposition of habitat features is critical to supporting nestlings and fledglings for all the species noted in the objective, particularly bald eagles and great blue herons.

Little Marsh, at 50 acres, contributes significantly to the biological diversity on the refuge. It hosts a variety of wintering and migrating waterfowl, similar to Great Marsh. Water levels in the marsh can be regulated with a water control structure. Through most of the year the water level is kept high to control growth of undesirable woody vegetation and to provide winter habitat for waterfowl. In July, the marsh is drawn down to promote the growth of preferred waterfowl foods around the perimeter while concentrating fish in the deeper channels which increases the availability of prey for fledgling eagles and herons.

The Little Marsh Road impoundment is an upgradient impoundment on the refuge that provides opportunities for effectively managing a small freshwater wetland for a diversity of species of conservation concern. The following birds of conservation concern are known to breed on Mason Neck Refuge and could benefit from enhanced management of the Little Marsh Road impoundment: prothonotary warbler, Louisiana waterthrush, bald eagles, wood duck, hooded merganser, least bittern, black-crowned night heron, great blue heron, and green heron. Their conservation status in various ecoregional plans is presented in appendix A.

Hiring a biologist and obtaining increased project funding would allow us to upgrade our management and protection of the Little Marsh Road impoundment.

Strategies

Continue to

- Prohibit public access to Little Marsh; both foot and boat access is prohibited
- Maintain signs alerting boaters it is prohibited to land on the dike
- Use law enforcement officer to conduct outreach and enforce restrictions
- Maintain water control structures and road culverts
- Conduct a slow drawdown lasting about 4 weeks in summer to improve foraging habitat for wading birds, specifically great blue herons.
- Exclude public from Little Marsh Road to protect sensitive wildlife area

Over the 15 years of CCP implementation:

- Determine the water level regime by season, which would best promote quality marsh habitat favored by bald eagles, water and wading birds, and waterfowl. Implement plans to manipulate water levels and vegetation at draw down times throughout the year, and incorporate actions in HMP. In developing water level management, consider:

- Lowering water level to allow bottom to dry out and oxygenate to allow better emergent plant growth, and/or re-flooding to a lower level to provide better access to feeding areas by wading birds.
- Timing drawdown initiation when great blue heron young are observed in the nests. This will allow for sufficient time to conduct the drawdown and concentrate food resources.
- In the summer, consider only drawing down water levels to the point where water primarily remains only within the channels and various coves of the impoundment. Thus, concentrating prey resources into the smallest volume of water accessible to great blue herons.
- Maintain high water levels throughout a growing season and/or use of prescribed fire, to eliminate perennial woody vegetation that is encroaching upon the impoundment. Frequency of woody vegetation management may be dictated by heron use.
- Reflood the impoundment prior to Fall frost and freezing weather to allow amphibians and reptiles sufficient time to locate underwater over-wintering habitat. Maintain water depths throughout the winter that are sufficient for fish populations.
- Control beaver, if needed, to meet water regime objectives. Both non-lethal and lethal measures would be employed as warranted.
- Inventory the flora and fauna of the marsh to establish a baseline of priority natural resources to monitor in the future. In particular, determine presence and extent of native marsh vegetation.
- Work with VADCR-Division of Natural Heritage and other experts to conduct inventories for rare, threatened, and endangered plants species in Great Marsh. Potential species occurring in the marsh include sensitive joint-vetch, Parker's pipewort, and river bulrush.
- Determine fish species that currently and/or historically use the impoundment for spawning and rearing.
- Upgrade the water control structure as needed to improve management capability and consider placing a "windowed" stop-log water control structure to allow fish passage into the impoundment.
- Hire additional maintenance staff as indicated on the staffing chart (appendix E) to help manage and maintain water control structures.

Monitoring Elements:

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, such as burning and selective removal to achieve structural and species diversity of native wetland species. Results may trigger a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Monitor bird response to drawdown rates and water depths to determine optimal water depths for target species groups.

- Conduct vegetation surveys within the marsh to determine species composition and diversity.
- Conduct fish surveys to document species abundance, composition and diversity.
- To maintain desired quality and characteristics of the Refuge's impoundments, annually conduct scouting for invasive plant species. We will afford zero tolerance to species that are highly invasive and stand replacing. Occurrences or stands of more stable patches of invasive plants may be tolerated in the short term as long as their cumulative coverage is not more than 5 percent of refuge wetland acreage, and fundamental objectives are not compromised.
- Monitor presence of beaver and work with APHIS or other licensed agent to control these species as necessary to protect public safety and refuge resources.

Objective 2.3 Shoreline Protection

Increase efforts maintain the integrity of the 4.4 miles of Refuge shoreline and minimize bluff erosion on the Potomac River by working with partners to monitor and maintain the existing 200 feet of breakwater structures and conduct a risk assessment to prioritize restoration areas and methods.

Rationale

Refuge lands currently include approximately 4.4 miles of shoreline at the base of high bluffs along the Potomac River and Occoquan Bay. Erosion of the shoreline by tidal and storm flows, undermining of the bluffs by beach loss, and wind and rain erosion have been incrementally removing the substrate and the resulting tree loss shrinks important upland habitats. This is especially problematic along the refuge southwestern corner, where tree loss threatens the heron rookery. We will continue to explore and evaluate stabilization techniques to determine which is most effective and practical for refuge lands.

Obtaining increased funding and staffing would allow us to upgrade our efforts to address this continuing threat to refuge habitat integrity as well as better protect shoreline archeological resources.

Strategies

Continue to

- Minimize public access to shoreline
- Seek partnerships to fund and install breakwaters and/or other measures to protect the shoreline
- Work with partners to maintain the refuge shoreline and monitor the 200 ft of breakwater structures

Over the 15 years of CCP implementation:

- Engage in public outreach and education to explain the sensitive nature of shoreline habitats and the importance of reducing human disturbance, particularly along the proposed Captain J. Smith Trail.
- Manage public use in these areas to ensure compatibility of visitor's activities, especially during sensitive times of the year for wildlife.
- Work with experts to conduct a risk assessment to prioritize shoreline and identify practicable and feasible projects

- Work with the same experts and other partners to develop proposals, to seek funding for new shoreline protection projects, and to evaluate project success.

Monitoring Elements:

- Conduct appropriate monitoring and survey programs as funding and staffing permits. The following are all components of how we would measure our success with respect to our objectives, and the results may trigger adjustments to our management strategies, or trigger a reevaluation or revision to our objectives. Examples of monitoring or surveys that we may implement include:
 - Work with partners to monitor the effectiveness of existing refuge shoreline breakwater structures in reducing erosion along the protected area of the shoreline
 - Partners to monitor the erosion rates along unprotected areas of the shoreline and determine the areas in greatest need of protection.

Objective 2.4 Aquatic Habitat and Water Quality

Improve the water quality and available aquatic habitat of Great Marsh and other tidally influenced marshes and inlets through an active role in local, State, and Federal partnerships in order to reduce contaminants and enhance spawning, nursery, foraging, and cover habitat for Federal trust fish populations, including American eel, alewife, blueback herring, hickory and American shad, menhaden, striped bass, and Atlantic and shortnose sturgeon, and other native aquatic species. Partnerships may involve facilitation, research, monitoring, and management.

Rationale

The tidal Potomac River and associated marshes and tributaries support a diversity of interjurisdictional fish species that depend in part on the larger tributaries (including the Occoquan River and Neabsco Creek) the smaller streams that include Great Marsh creek, and the marshes along the Virginia shoreline for habitat. Interjurisdictional fish that are listed as species of concern by VDGIF (2005) and are Service Regional high priorities include the shortnose sturgeon (Tier I), Atlantic sturgeon (Tier II), alewife (Tier IV), American shad (Tier IV) and American eel (Tier IV). Other species of management concern listed in the Service's Region 5 Strategic Fisheries plan include: blueback herring, hickory shad, menhaden, and striped bass (USFWS, 2009b). All of the species listed above occur from the fall line to the mouth of the river at some time during their life cycle

Due to lack of available staff, the refuge is reliant upon partnerships to improve aquatic habitat and operates in the capacity of allowing others access to the Potomac River and its tributaries in order to support the needs of trust fish species. We respond to requests for assistance related to fisheries issues from our Virginia Fisheries Program Office, as well as from VDGIF and the Potomac River Fisheries Commission (PRFC). The VDGIF and PRFC regulate the fisheries of the main stem of the tidal Potomac River from the Maryland/District of Columbia boundary line (near the Woodrow Wilson Bridge), to the mouth of the river at Point Lookout, Maryland and Smith Point, Virginia. The PRFC regulates and issues licenses for all recreational and commercial fishing, crabbing, oystering and clamming in the main stem tidal Potomac River. The PRFC coordinates regulations with the Maryland Department of Natural Resources (DNR), the Virginia Marine Resources Commission (VMRC) and VDGIF, and with the other Atlantic coastal states through the Atlantic States Marine Fisheries Commission (ASMFC). Obtaining increased funding and staffing would allow us to upgrade our efforts to better facilitate this much needed monitoring, management and research.

Strategies

Continue to

- Provide assistance to researchers upon request, typically as logistical support, to facilitate their research on fish and other aquatic species on the refuge and in the tidal Potomac River
- Monitor invasive aquatic species and distribution, and treat when funding and staffing allows

Over the 15 years of CCP implementation:

- Coordinate with the Service's Virginia Fisheries Program Coordinator's Office to assess fisheries resources on the refuge and determine enhancement opportunities
- Participate in partnerships with other State and Federal agencies to address interjurisdictional fish issues related to the refuge and nearby Potomac River waters.
- Work with the Virginia Ecological Services Office to provide information and input to the contaminant and total maximum daily load (TMDL) regulation process at the Federal and State level.
- Participate in spill prevention, control, and countermeasure plans or other environmental emergency action plans as related to protection of Great Marsh and the Potomac River.
- Work with Virginia Ecological Services and the Virginia Fisheries Coordinators Office in coordinating and providing technical assistance to fish passage, stream, and riparian restoration projects within the Potomac River watershed that have potential to increase available habitat for species utilizing the refuge or improvements to water quality.

Monitoring Elements:

- Establish and coordinate development of a water quality monitoring station at the refuge with interested parties such as George Mason University.
- Work in partnership with local universities, as well as State and Federal agencies, to complete a series of fish inventories to obtain baseline information of fish species diversity and species health in order to evaluate impacts of tidal marsh water quality changes.
- Conduct inventory surveys of bird, mammal, amphibian, and turtle populations within and around the freshwater tidal marsh in partnership with local universities. Utilize data to assess the short-term and long-term impacts of management activities and adjust management protocols as necessary.

GOAL 3:

Provide quality, compatible wildlife-dependent recreational opportunities with particular emphasis on interpretation and wildlife observation.

Objective 3.1 Deer Hunting

Continue to improve the annual, public, high-quality white tailed deer hunt program to support deer population and forest health and condition objectives.

Rationale

Deer hunting accomplishes a very significant function on the refuge; to keep the deer population within the carrying capacity of the habitat. Our hunt program is primarily designed to manage the herd size on the refuge to benefit forest integrity, diversity and health as well as the health of the deer herd. The recreational opportunity it affords is a secondary benefit. We, however, recognize

hunting as a healthy, traditional outdoor pastime, deeply rooted in our American heritage and are pleased to be able to provide the opportunity. Public hunting opportunities have been on the decline as development pressures increase in the region. Hunting is one of the six priority wildlife-dependent public uses of the Refuge System as established in the 1997 Refuge Improvement Act. In addition, Presidential Executive Order #113443- Hunting Heritage, "...directs Federal agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat."

Deer management must occur across the entire Mason Neck Peninsula in order to be effective in balancing population with quality habitat conditions throughout the area. We will continue to cooperate with the Mason Neck Management Area to ensure that broader population goals are met. Our hunt is a joint effort with Mason Neck State Park, combining both land ownerships in the hunt area, in a permit-only and closely monitored hunt. Elsewhere on the peninsula, Gunston Hall has a limited hunt, but is exploring ways to expand it, and the BLM is working with VDGIF, Fairfax County, and the refuge to continue hunting opportunities initiated in 2009. Using data collected by the VDGIF from harvested animals, we extrapolate population condition, age, and sex structure to help adjust the hunt program annually, as needed.

Deer populations on the refuge increased from the time of refuge establishment in 1969 until 1990 when the refuge was opened to firearm and archery hunting. The refuge hunt program conforms to State regulations and additional refuge regulations stipulated in Title 50 of the Code of Federal Regulations. As the objectives in the 1990 hunt plan state, we intend to maintain the deer population at a level compatible with available refuge habitat (between 90 and 120 deer), to limit the amount of damage to public and private property in the vicinity of the refuge, and to provide a wildlife-oriented recreational opportunity for the public. As in all refuge programs, we make special accommodations upon request, whenever possible, to further facilitate accessibility.

The following are the guiding principles of our hunting program, according to Service policy (605 FW 2):

- 1) Manage wildlife populations consistent with refuge system-specific management plans approved after 1997 and, to the extent practicable, State fish and wildlife conservation plans.
- 2) Promote visitor understanding of and increase visitor appreciation for America's natural resources.
- 3) Provide opportunities for quality recreational and educational experiences.
- 4) Encourage participation in this tradition.
- 5) Minimize conflicts with visitors participating in other compatible, wildlife-dependent recreation.

Strategies

Continue to

- Cooperate with VDGIF in assessing deer population and condition estimates
- Provide technical support for deer hunt programs on other public lands on Mason Neck Peninsula
- Maintain current shotgun deer hunt program which includes:
 - State and local partners involvement in hunt administration;

- Mason Neck State Park as part of hunt area
- An average target of 90-100 deer harvested/year; or otherwise a target number recommended by VDGIF biologists

Over the 15 years of CCP implementation:

- Increase Service support for deer hunt programs on all public lands on Mason Neck Peninsula, encouraging each agency to implement a program; work collaboratively within the existing Mason Neck Manager's Working Group to design hunts.
- With additional refuge staff (appendix E—staffing chart), partners, and other resource support in place, consider increasing length of shotgun season, number of hunters, and their distribution when declining forest health and conditions warrant an increased harvest. Indicate changes each year in annual hunt plan.
- Annually review the amount of staff time involved with the hunt and consider ways to be more efficient with its administration, such as seeking new partners, staying informed of new technology, and use of web-based programs
- Provide an archery deer hunt for qualified archers during the regular State archery season (similar to the program that was implemented in past years) under the following guidelines:
 - Archery hunt area would be in refuge areas otherwise closed to visitors (so other refuge visitors are not affected), and would be a safe distance away from all trails open to non-hunting refuge visitors
 - New Refuge staff would need to be in place to help coordinate and support hunt, as would adequate funding, equipment and administrative resources (appendix E—staffing chart). VDGIF and other partners would also need to be involved to help administer the hunt
 - Archery hunters would park in designated hunter parking areas away from the trail-head parking areas
- Complete other administrative requirements to formally open the refuge to new hunts as soon as approved and determined practicable.

Objective 3.2 Youth Turkey Hunting

Work with VDGIF and other conservation partners to develop and implement a youth wild turkey hunt.

Rationale

As we mentioned in our discussion under objective 3.1—deer hunting, hunting is identified in the 1997 Refuge Improvement Act as a priority wildlife-dependent public use on refuges. In addition, Presidential Executive Order #113443-Hunting Heritage, "...directs Federal agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat." We also presented our guidelines for a quality hunt program under objective 3.1.

We recognize wild turkey hunting as a traditional outdoor pastime. When managed responsibly, it can instill a unique appreciation of wildlife, their behavior, and their habitat needs.

We also recognize that we must be proactive in engaging young people in wildlife conservation stewardship of the environment if we are to maintain a legacy of

abundant wildlife and healthy habitats for future generations. One way to do that is to offer quality opportunities for youth participation in hunting on our refuges.

Strategies

Over the 15 years of CCP implementation:

- Provide up to a 3-day turkey hunt for youth hunters under the following guidelines:
 - New Refuge staff would need to be place to help coordinate and support hunt, as would adequate funding, equipment and administrative resources (appendix E—staffing chart). VDGIF, National Wild Turkey Federation, and other partners would need to be involved to help administer the hunt
- Implement the hunt during the State’s spring and/or fall turkey season, allowing up to approximately 10 hunters access at one time, and distribute hunters to minimize impacts on other public use programs
- Hunt area would be in refuge areas otherwise closed to visitors (so other refuge visitors are not affected), and would be a safe distance away from all trails open to other refuge visitors
- Complete all other administrative requirements for a new hunt as soon as approved and determined practicable

Objective 3.3 Waterfowl Hunting

Enhance opportunities for more people to engage in waterfowl hunting in State waters near the refuge by actively supporting VDGIF’s program.

Rationale

Since Mason Neck Refuge was established in 1969, the Service has not allowed waterfowl hunting on the refuge because it conflicts with the original refuge establishment purpose of protecting bald eagles. Further, areas in Great Marsh are specifically closed to waterfowl hunting by Director’s order (FR 34:194 (October 9, 1969)).

In less sensitive areas on the Potomac River and Occoquan Bay, we fully support waterfowl hunting as a legitimate wildlife-based recreational pursuit. We plan to support VDGIF in ensuring the public has opportunities for waterfowl hunting in those State waters near the refuge where it is currently allowed.

Strategies

Continue to

- Coordinate with VDGIF conservation officer in addressing any waterfowl hunting issues
- Prohibit waterfowl hunting on refuge lands

Over the 15 years of CCP implementation:

- Work with VDGIF to evaluate the use of temporary floating blinds to replace fixed blinds in State waters near the refuge shoreline to provide waterfowl hunting opportunities to more people.

Objective 3.4 Wildlife Observation and Photography

Enhance opportunities for wildlife observation and photography by upgrading trail and parking facilities, and constructing new trails, observation platforms, and photography blinds.

Rationale

The 1997 Refuge Improvement Act identifies wildlife observation and photography as priority wildlife-dependent recreation. Wildlife observation has

also been identified by our Regional Visitor Services Review Team as an area of emphasis for this refuge. Both wildlife observation and photography promote the understanding and appreciation of natural resources and their management on all lands and waters in the refuge system. Since 1971, the refuge has provided daily opportunities for wildlife observation and photography on refuge trails.

Pursuant to Service policy (605 FW 4 and 5), we follow these guiding principles for wildlife observation and photography opportunities at the refuge.

- 1) Provide safe, enjoyable, and accessible wildlife viewing and photography opportunities and facilities.
- 2) Promote visitor understanding of, and increase visitor appreciation for, America's natural resources.
- 3) Focus on providing quality recreational and educational opportunities, rather than quantity, consistent with Service criteria describing quality found in 605 FW 1 Part 1.10.
- 4) Minimize conflicts with visitors participating in other compatible, wildlife-dependent recreation.

Existing opportunities are available on the Joseph V. Gartlan, Jr. Great Marsh (Great Marsh), and the Woodmarsh trails. These trails include parking areas, interpretative panels, and overlooks and observation platforms. These trails are promoted and described on informational signs, in refuge brochures, and on the refuge website. Under alternative B, we would enhance existing infrastructure and site accessibility to increase the safety, quality and diversity of these opportunities. We also plan to create additional trails, assuming archeological field surveys verify that acceptable, or no, impacts to archeological resources would occur, on Sycamore Road and Treestand Road (map 3.1). These new and existing trails will be supplemented with new viewing platforms and photography blinds. The location of the new trails, platforms, and blinds would provide visitors with quality viewing opportunities while also minimizing disturbance to wildlife or sensitive plant communities. Not all of the platform locations have been finalized yet, as additional archeological site evaluations would need to occur. Refuge trails would remain open during refuge hours of operation (typically April through September from 7am to 7pm and during October through March from 7am to 5pm, except as otherwise permitted under a special use or hunt permit). Only foot travel will be allowed on these existing and planned refuge trails.

One additional trail, the High Point Trail, begins outside the refuge boundary, but runs through the refuge and terminates at Mason Neck State Park (3.0 miles total; 0.5 miles on refuge). This is an asphalt multi-use trail, where bicycles and other non-motorized pedestrian uses are allowed. This trail is cooperatively administered and managed with Mason Neck State Park.

Strategies

Continue to

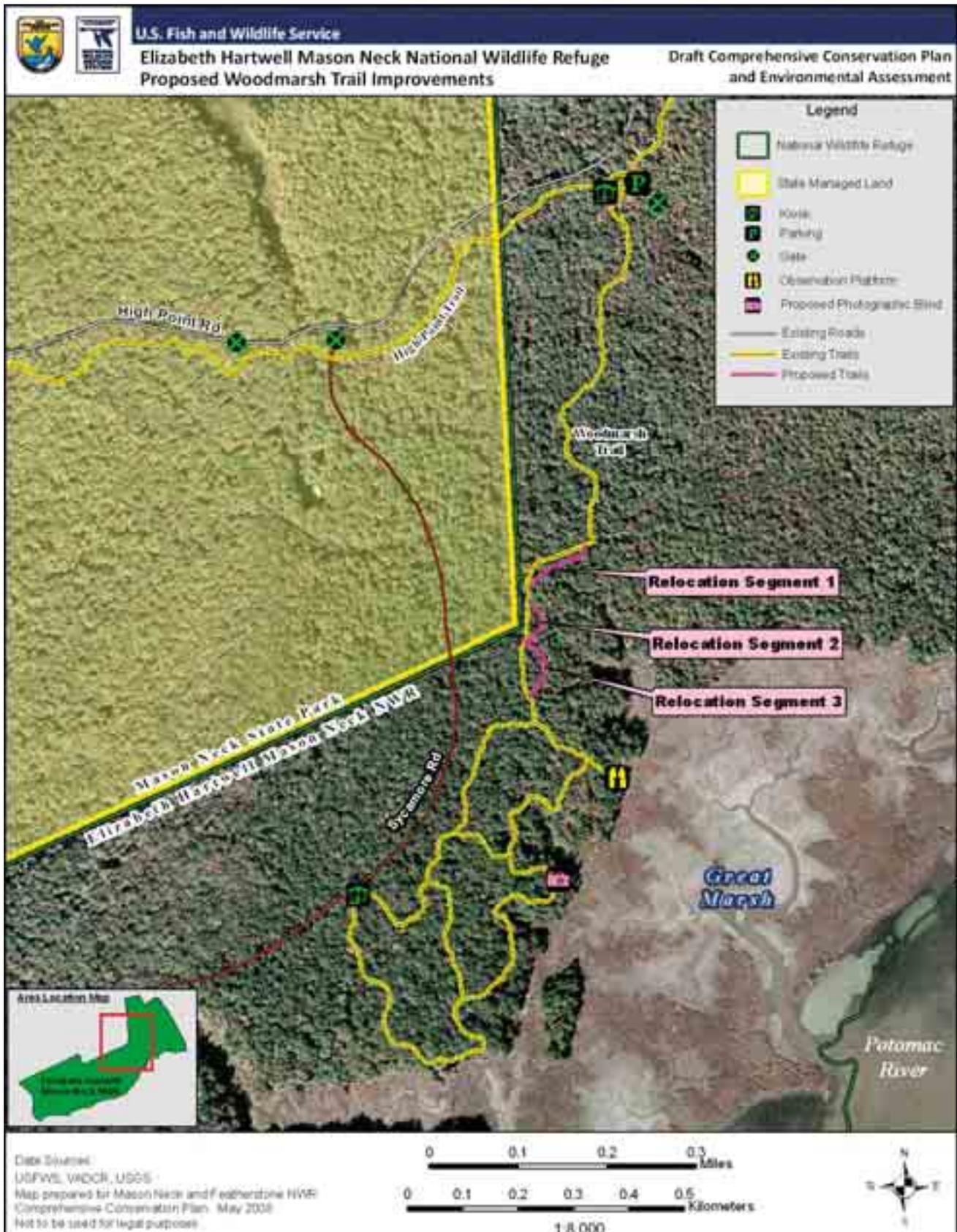
- Maintain the two current refuge trails: Woodmarsh (2.5 miles); Joseph V. Gartlan, Jr. Great Marsh (0.75 miles); and the High Point (3.0 miles total; 0.5 miles on refuge)
- Close portions of the Woodmarsh Trail from December to June to protect nesting bald eagles

- Allow foot travel as the only mode of transportation on Woodmarsh and Great Marsh Trails
- Cooperate in managing the High Point multi-use trail with Mason Neck State Park; allowing all forms of non-motorized pedestrian access and travel
- Prohibit motorized use and horseback riding on all trails
- Prohibit geo-caching, letterboxing and other forms of “treasure hunting” on the refuge
- Continue to collect monthly visitor use data for the High Point Trail, the Great Marsh Trail and the Woodmarsh Trail

Over the 15 years of CCP implementation:

- Hire visitor services and maintenance staff as indicated in staffing chart (appendix E) to support new and/or improved refuge facilities, increased and enhanced visitor and outreach programs, and other expanded public uses and outreach identified under goals 3 and 4
- Prioritize list of improvements and new construction noted below and implement projects as funding allows
- Improve Woodmarsh Trail, including (see map 3.2)
 - Trail realignment to higher ground along approximately 1,000 feet by rerouting trail through aesthetically pleasing terrain to afford sustainable upkeep
 - Improving trail surface to all-weather
 - Considering making part or all of the trail accessible
 - Improving boardwalks over wet areas
- Improve Woodmarsh trailhead including, drainage, paving, lighting, gates, the kiosk, and welcome and directional signs
- Reconfigure Woodmarsh Trail within existing loops to bypass sensitive eagle area, but allow for additional access
- Develop a trail leading from the Woodmarsh Trail-Sycamore Road kiosk to the end of Sycamore Road and the Potomac River overlook. This segment will be known as Sycamore Trail. Consider building a viewing platform overlooking Potomac River if feasible. Ensure trail and platform construction do not adversely affect archeological resources likely to be in the vicinity. Allow foot travel as the only mode of transportation on Sycamore Trail
- Develop Treestand Road as a trail that connects Woodmarsh and Great Marsh trails. This segment will be known as Treestand Trail. Create marsh viewing area if minimal vegetation would be impacted. Allow foot travel as the only mode of transportation on Treestand Trail.
- Collect visitor use data, according to Service guidance, to determine the number of visitors and what activities they are engaged in

Map 3.2 Proposed Woodmarsh Trail improvement at Mason Neck Refuge



Objective 3.5 Interpretation Program

Enhance the refuge's interpretive program to more effectively communicate to the public the values and regional significance of refuge habitats, wildlife, and cultural resources.

Rationale

The 1997 Refuge Improvement Act identifies interpretation as priority wildlife-dependent recreation. Interpretation has also been identified by our Regional Visitor Services Review Team as an area of emphasis for this refuge. Interpretation includes, but is not limited to, activities, talks, publications, audio-visual media, signs, and exhibits that convey key messages about natural and cultural resources to visitors. Visitors who experience interpretation have the opportunity to make their own connections to the resource leading to possible resource stewardship and the understanding of resource relationships and human impacts.

The refuge interpretive program includes a variety of experiences that appeal to varying audiences, visitor interests, and learning styles. By having quality self-guided programs, in addition to staff and partner-led interpretation, we are able to reach a larger audience, be more readily available, and allow visitors to explore at their own pace, while still allowing for discussion and providing answers to questions. Current efforts include on and off-site talks and tours as well as written information provided through informational signs, brochures, and refuge websites. We use visitor and attendee feedback to evaluate the effectiveness of our program.

FWS policy (605 FW 7) defines interpretive programs as management tools to accomplish the following:

- Provide opportunities for visitors to become interested in, learn about, and understand natural and cultural resource management and our fish and wildlife conservation history.
- Help visitors understand their role within the natural world.
- Communicate rules and regulations to visitors, thereby promoting understanding and compliance to solve or prevent potential management problems.
- Help us make management decisions and build visitor support by providing insight into management practices.
- Help visitors enjoy quality wildlife experiences on the refuge.

Further, the new policy provides these guiding principles for interpretive programs:

- Relate what is being displayed or described to something within the personality or experience of the visitor to provide meaningful context.
- Reveal key themes and concepts to visitors based on information.
- Inspire and develop curiosity.
- Relate enough of the story to introduce concepts and ideas and pique visitor interest, discussion, and investigation so that visitors develop their own conclusions.

- Organize activities around theme statements.

We strive to follow those principles, which will serve to enhance visitors' understanding of the area's significant resources, as well as the important role the refuge plays in their conservation.

Another effort underway related to interpretative activities on the refuge is the proposed Captain John Smith Chesapeake National Historic Trail. In September 2010, the NPS released for public review and comment the draft Comprehensive Management Plan and EA for this trail. The trail is the first national water-trail and commemorates the explorations of John Smith on the Chesapeake Bay and its tributaries in 1607-1609, tracing approximately 3,000 miles of his voyage routes.

The NPS is working with many partners to plan, develop, and manage the trail, including refuges in the Chesapeake Bay area. Other partners include the Friends of the Captain John Smith Trail, the Chesapeake Bay Gateways and Watertrails Network, Federal and State agencies, communities, nonprofit organizations, and businesses. The draft plan and EA outline how the NPS and these partners will develop component water trails, provide access to the trail, interpret the John Smith voyage, and protect the important resources related to the trail. Refuges in the Chesapeake Bay area, including the Potomac River Refuge Complex, have been coordinating with the NPS on identifying compatible opportunities on refuge lands to support this effort. We will continue to coordinate with the NPS on developing opportunities for the trail consistent with the final decision of the CCP.

Strategies

Continue to

- Distribute general refuge brochure and post at kiosks
- Maintain interpretive and other pertinent refuge information at the three kiosks located at the Woodmarsh trailhead, the Woodmarsh Trail near Sycamore Road, and the Joseph V. Gartlan, Jr. Great Marsh trailhead.
- Install interpretive panels along trails to explain refuge resources and management activities, and to enhance self-guided interpretive opportunities
- Work with the Mason Neck State Park to participate in events
- Coordinate with the National Park Service to identify opportunities to interpret the Captain John Smith Chesapeake National Historic Trail on the refuge, such as placing interpretative panels at strategic locations.
- Work with the Mason Neck Refuge area agencies in constructing a joint agency kiosk on Gunston Road near the entrance to the Mason Neck Peninsula to orient visitors and tell the story about each agency. This kiosk would:
 - Contain a map of the area including agency lands,
 - Information about the purposes and management of each agency, recreational opportunities, and regulations for each area

Over the 15 years of CCP implementation:

- Develop Visitor Services plan to address the agency mission, refuge purpose, infrastructure, and specific Service and Regional emphasis. Include the following:

- Interpretation of bald eagle biology and exploring options for meeting visitor expectations of seeing eagles without disturbing them
- Installation of interpretive panels along trails to explain refuge resources and management activities, and to enhance self-guided interpretive opportunities
- Clarification in materials distinguishing Mason Neck State Park and refuge through various forms of media and programming and standardized signing.
- Explanation of what is a compatible, wildlife-dependent public use and why that is a priority for the Refuge System
- Interpretation of management practices through various forms of media and in clear terms for urban visitors
- Addressing law enforcement issues relating to visitor safety and resource protection through interpretive programming
- Initiate Refuge Watch Program to provide a means for the public to report crimes and criminal activity.
- Provide access to quality materials via a refuge complex website
- Assess refuge signs to add, move, replace, or update them to conform to R5 Service sign standards and be consistent with Refuge Complex sign plan. Install appropriate welcome and directional signs, trailblazer signs, trailhead signs, waysides, and other required signs
- In coordination with Virginia Department of Transportation (VDOT), install standard State highway directional Trailblazer signs to the refuge on I-95 and US Route 1
- Explore option of using trained volunteers and Friends Group members to conduct onsite and offsite interpretive programs and interpretive walks.
- Explore option of installing a Travelers Information System on Mason Neck Peninsula. This AM radio station and frequency would be dedicated to broadcasting general, emergency and interpretive information about the refuge and Mason Neck State Park.

**Objective 3.6
Environmental Education
Program**

Enhance environmental education opportunities on the refuge by rehabilitating outdoor education facilities, and increasing education partnerships and educator-led programs.

Rationale

The Refuge Improvement Act identifies environmental education as a priority wildlife-dependent recreation activity. It teaches students of all ages the history and importance of conservation and ecological principals and scientific knowledge of our Nation's natural resources. Through that process, we can help develop a citizenry that has the awareness, knowledge, attitudes, skills, motivation, and commitment to work cooperatively toward the conservation of our Nation's environmental resources.

We have not actively pursued an environmental education program on the refuge in recent years due to limited staffing and funding. As discussed earlier

in this chapter, our Region made a difficult decision at each refuge regarding which two of the six priority public uses would receive management emphasis to make efficient use of what funding and staffing was available. Although it was determined that wildlife observation and interpretation would be the priorities for this refuge, it still contains valuable resources that offer excellent environmental education opportunities without expending significant staff or funding.

Our program to date has been limited to providing access for teacher-led research projects by students from Thomas Jefferson High School. While we facilitate these programs, we do not otherwise design or implement programs.

Additional staffing and funding would allow us to be more proactive in developing a core environmental education program in conjunction with the facilities and programs of Mason Neck State Park as well as through rehabilitation of our own educational facilities on Sycamore Road.

Strategies

Continue to

- Allow Thomas Jefferson High School to conduct environmental educational activities on the refuge including vernal pool studies and deer pellet counts
- Facilitate other environmental education opportunities and programs upon request

Over the 15 years of CCP implementation:

- Partner with Mason Neck State Park to integrate education programs into the existing teachers workshops being offered at the Park's Visitor Center
- Provide information to educators upon request that supports State curriculum standards and emphasizes key themes related to habitat management for bald eagles and heron, and Regional/National themes such as connecting children to nature and global climate change.
- Rehabilitate the old environmental education site and trail for use by teacher-led groups
- Encourage Friends Group and volunteers to work with local schools and other educational institutions to enhance utilization of refuge resources for educator-led environmental education programs; support development of basic lesson plans with these partners
- Support use of the refuge by Fairfax County School District.

GOAL 4:

Enhance efforts to promote public awareness, understanding, and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.

Objective 4.1 Volunteers

Improve the refuge's volunteer program by expanding the amount and types of meaningful and engaging opportunities that support refuge goals and objectives.

Rationale

Volunteers, Friends organizations and other partners are essential allies for many programs within the U.S. Fish and Wildlife Service. Every day these devoted individuals and organizations play vital roles in helping the Service fulfill its mission and many of our important goals. Each year, volunteers, Friends organizations, and partners generously give time, expertise and resources to the

National Wildlife Refuge System, fish hatcheries, and other Service offices. They play an important role in helping serve over 40 million visitors who enjoy our public lands.

Volunteers help the Service in a variety of ways. Some work full-time while others assist with a few hours a week or month, or during special events. Nationally, many volunteers conduct fish and wildlife population surveys, band ducks, lead tours and provide information to school groups and other visitors, assist with laboratory research, work on cultural resources projects, perform clerical and administrative duties, work with computers and other technical equipment, and much more. Our 40 or so volunteers over the past 3 years have spent between 300 and 800 hours annually on different activities at Mason Neck Refuge including wildlife and habitat, maintenance, and recreation support. Maintaining this level of volunteer support is critical to continuing to maintain our refuge programs.

We would have an opportunity to expand our volunteer program with additional staffing and funding to implement many of the strategies we have identified to meet our biological and public use objectives.

Strategies

Continue to

- Enlist the help of volunteers on an opportunistic basis to support refuge programs
- Develop community service projects to support County court system
- Have volunteers from the community assist in refuge cleanup activities, special events, routine maintenance of trails, roads, and other areas; invasive plant control; bald eagle and other bird counts
- Develop projects for Boy and Girl Scouts upon request
- Issue the monthly refuge complex volunteers newsletter to identify current and upcoming events
- Develop and implement annual volunteer recruitment, training, and appreciation/recognition events

Over the 15 years of CCP implementation:

- Increase the number of volunteers through development of quality, well-organized projects
- Use citizen science volunteer groups to conduct biological baseline studies and monitoring consistent with Service protocols
- Coordinate with other agencies on the Peninsula to recruit, train, and share groups and individual volunteers
- Use volunteers and Friends Group members as docents to lead interpretive walks and as general guides during peak use times (also see objective 3.5)
- Budget training money to provide special technical training to qualified volunteers to enhance their capability to assist in refuge programs
- Address desires of refuge neighbors to participate in refuge management through volunteer opportunities

- Pursue a resident volunteer program (e.g. for a retired couple); partner with another agency on the Mason Neck Peninsula and the region, if necessary, to find a suitable location for housing the volunteers. For example, this may be accomplished through a cooperative agreement with the Northern Virginia Regional Park Authority at Pohick Bay Regional Park.

Objective 4.2 Community Outreach

Ensure more than 50 percent of the adults contacted within Fairfax County will understand the importance of conserving wildlife, habitats, and cultural resources on the refuge, will know that the refuge is part of a national system of wildlife refuges, are 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.

Rationale

It is important to build a strong base of public understanding, support, and activism beyond the portion of the American public who visit refuges. To achieve this, 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 Fairfax County and the local commuting locales within the Washington D.C. Metropolitan area. We desire 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 Potomac River and Chesapeake Bay ecosystems. Our current outreach program consists of news releases, participating in community events and presentations to local organizations.

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 communication within the community is very important. News articles and personal appearances inform our neighbors about what we are doing and why, which could lead to increased understanding, appreciation, and support of our programs. The 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 Potomac River Refuges are vital to accomplishing our outreach activities. They assist us in community events and refuge visitor programs as well as support gathering of data and maintenance projects. 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

- 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
- Routinely respond to written, telephone, and in-person inquiries from the public.
- Maintain and regularly update contact information for the media, and the general public
- Inform refuge neighbors of refuge management activities via the website, press stories, and newsletters
- Promote our successes in the local community via refuge and community events, project demonstrations, and media stories
- Utilize volunteers to participate in community events in Fairfax County where effective outreach of refuge programs can occur
- Continue to maintain website with links to newsletters, the Potomac River Refuge's Friends Group, and other pertinent refuge information

Over the 15 years of CCP implementation:

- Develop and implement procedures to offer refuge "behind the scenes" tours to the media and the general public
- Create and maintain refuge-specific fact sheets
- Expand refuge outreach programs to include recognized events such as, but not limited to, International Migratory Bird Day, National Wildlife Refuge Week, and the Eagle Festival, and designed to promote wildlife-dependent recreation and natural resource education
- Work towards more informed and productive relationships with the local media; establish personal contacts at all media outlets, including radio and TV

Objective 4.3 Partner Outreach

Continue to foster and enhance cooperation and communication with other State and Federal agencies, museums, civic organizations, and environmental and conservation groups to promote and advance the Refuge System mission and refuge goals, and identify mutually beneficial outreach projects and activities.

Rationale

Beyond the Friends of Potomac River Refuges 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 Bureau of Land Management, National Park Service, United States



USFWS

Magnolia warbler

Department of Agriculture–National Resource Conservation Service, Virginia Department of Game and Inland Fisheries, Northern Virginia Regional Park Authority, Virginia Department of Environmental Quality, Virginia State Parks, planning district commissions, historical preservation commissions, soil and water conservation district commissions, chambers of commerce, Fairfax County government, and others. We plan to continue to work closely with some of 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.

Encouraging relationships with non-governmental conservation organizations active in the

Potomac River Basin and Chesapeake Bay region will also be important in our overall outreach strategies. Examples of these groups include the Potomac River Naturalists, Chesapeake Bay Foundation, the Potomac River region members of the Gateways Network, and Alliance for the Chesapeake Bay, and Fairfax Watershed Network.

Strategies

Continue to

- Maintain contact list and ensure regular contact with local groups, environmental groups, and other interested parties active in the Mason Neck Refuge area.

Over the 15 years of CCP implementation:

- Review existing partner relationships to determine if outreach, or the dissemination of information, could be more collaborative and effective
- Review Fairfax County Tourism, Gunston Hall, and other local community organization's events schedules to see if the refuge has a role or contribution
- Seek out new partnership opportunities with museums, historical and botanical groups, civic organizations, and environmental and conservation groups to achieve mutually beneficial projects and activities

Objective 4.4 Elected Official Outreach

Continue to inform elected officials representing the refuge area about refuge management priorities, and special events and activities, on an annual basis or as significant issues arise.

Rationale

Gaining support from Federal, State and local elected officials is essential to meeting our goals. This can only happen when these elected officials are fully informed, and understand and appreciate the significant contribution of the refuge to the refuge system and the quality of life and conservation of Federal trust resources in Virginia. We regularly inform elected officials about upcoming refuge events, and have encouraged them to visit to learn more about the refuge on several occasions. Additional staffing would allow us to increase our elected official outreach efforts to promote Mason Neck Refuge.

Strategies

Continue to

- Invite Federal, State, and local elected officials to attend outreach events held on the refuge
- Provide written or personal briefings for members of Congress, and their staffs, as needed or as requested, to inform them about important refuge issues

Over the 15 years of CCP implementation:

- Invite Federal, State, and local elected officials to attend a guided tour of the refuge, to showcase particular accomplishments, view outstanding natural resource areas, demonstrate management activities, and highlight challenges

Objective 4.5 Research

Enhance research partnership opportunities to provide information for making science-based management decisions or to support regional projects of interest to the Service.

Rationale

We can benefit from targeted research conducted by colleges and universities, such as George Mason University, Virginia Tech, University of Virginia, Virginia Commonwealth University and the College of William and Mary. Research often can answer complex questions about refuge management issues and add to the wealth of scientific knowledge upon which decisions about current and future resource issues will be based.

We plan to take a more proactive role in working with partners to identify and promote, and seek funding for research projects focused on resource issues at Mason Neck Refuge. Disseminating research results, so that others will benefit from what we have learned, will also be a priority.

Strategies

Continue to

- Support inventories and research led by others, such as the MAPS station, that is a priority for the refuge and compatible with refuge purposes, goals and objectives; use both refuge staff or volunteers to support efforts as funding allows

Over the 15 years of CCP implementation:

- In cooperation with State agency and conservation partners, identify the highest priority research and inventory needs for the refuge and the Mason Neck Peninsula which will further conservation and management of Federal trust resources. Refer to all proposed research and inventory and monitoring projects identified under the biological goals and objectives in CCP
- With priority research needs identified, work with partners to develop project specific research goals, study design and methodology and opportunities for alternative sources of funding
- Facilitate the publication and dissemination of refuge research results; consider opportunities to write for lay audiences to the extent possible, in addition to the scientific community

GOAL 5: Enhance efforts to protect and interpret refuge cultural resources.**Objective 5.1 Archeological Resources**

Enhance efforts to preserve archaeological resources on the refuge from damage by shoreline erosion and visitor foot traffic. Also, improve visitor outreach materials to raise awareness and promote stewardship of archeological resources.

Rationale

Cultural resources that illuminate the pre-contact life of Native Americans at Mason Neck Refuge are trust resources that we must protect and use to educate the public. Some of the peninsula's earliest known inhabitants were Native Americans of the Early Archaic period, over 9,000 years ago. The first recorded history of the area is from Captain John Smith, who wrote of his meeting with Dogue Indians in 1608 and charted the chief's village of Tauxenent on his map of Virginia. The area was at times referred to as Doggs Island and Doeg Neck, until it came into the hands of the Mason family (Lutz, 2003). Additional staffing and funding would allow us to upgrade our stewardship of cultural resources on the refuge and support enhanced interpretation of the archaeological heritage and environmental history of the refuge to the public.

Strategies*Continue to*

- Limit public access to designated trails in certain areas to keep visitors away from known archeological sites on the refuge
- Coordinate with the Service's Regional Archeologist to determine the level of consultation required in conjunction with refuge projects that have a potential to affect archaeological resources
- Conduct archaeological reviews, surveys, or studies of project areas as needed, or recommended, by the Service's Regional Archeologist
- Monitor known archeological sites for looting and trespass

Over the 15 years of CCP implementation:

- Complete refuge wide inventory with GPS data for known archaeological sites and resources
- Work with State and county archaeologists and avocational archeological societies willing to assist in performing targeted surveys with subsurface testing, and to locate and evaluate shoreline sites at risk. Ensure archaeological resources are protected from looting. Develop site management and protection plans as warranted
- Ensure that at least one law enforcement staff person receives ARPA training
- Facilitate research on the refuge to achieve cultural resource protection and conservation objectives
- Use proposed new Sycamore Road Trail as an opportunity to interpret archeological sites
- Raise awareness of the importance of protecting cultural resources through outreach and interpretive information and programs

- Design any new refuge trails, overlooks, or other amenities to avoid impacts to archeological resources
- Conduct targeted surveys with subsurface testing to identify more of the many unrecorded sites likely to be on the refuge and to evaluate their condition and any threats
- Ensure that an ARPA message is incorporated into refuge brochures and on interpretive signs at trailheads, including those produced by refuge partners

Objective 5.2 Historical Resources

Protect historical resources on the refuge from damage by visitors, while also increasing opportunities to engage visitors through interpretation and education to promote an appreciation and increased stewardship

Rationale

There is a rich legacy of post-contact history along the Potomac River shoreline. Mason Neck Peninsula was patented by adventurers in the mid-1600's who traveled up both sides of the peninsula via the Occoquan River and Pohick Creek, and gained familiarity with the lands in-between. In 1755, George Mason IV, author of the Virginia Declaration of Rights, built his home on the peninsula. This Georgian house, known as Gunston Hall Plantation, is on the National Register of Historic Places and is open to the public for tours. A 2,300-acre plantation owned by George Mason V included lands in both the refuge and adjacent Mason Neck State Park. The homesite has been the subject of study by a panel of historians and archaeologists (Lutz, 2003). While 15 historical archaeological sites are recorded on the refuge, at present, none have been formally listed on the National Register.

Additional staffing and funding would allow us to upgrade our stewardship of cultural resources on the refuge and support enhanced interpretation of the post-contact history and related changes in the natural environment of the refuge for the public.

Strategies

Continue to

- Limit public access to designated trails to keep visitors away from historic sites on the refuge
- Provide interpretation of historic importance of refuge in refuge brochures and kiosks
- Monitor known historical sites for looting and trespass

Over the 15 years of CCP implementation:

- Use new Sycamore Road trail as an opportunity to interpret historic resources on the refuge with sensitivity to ensure they remain protected
- Work with Mason Neck State Park and Gunston Hall to develop appropriate historical resources brochures and signage

Mason Neck Refuge Alternative C—Enhanced Public Use Management

Introduction

Alternative C would maintain our current biological program, with the exception of some additional measures for bald eagles, and focus additional resources on enhancing our visitor services and outreach program. This refuge has a unique opportunity, given its proximity to the Washington D.C. metropolitan area, to educate and inform tens of thousands of people each year on conservation issues, the importance of being a good land steward, and sharing how the refuge contributes to the missions of the Service and Refuge System. Management under alternative C would emphasize this opportunity.

Habitat Management

We would implement a biological program similar to alternative A, except our management of bald eagles would be enhanced similar to alternative B.

Visitor Services and Outreach

We would expand our visitor services and outreach programs the most under this alternative. We would build off our proposals under alternative B to add more wildlife-dependent program activities and amenities. Our objective would be to reach more visitors with our conservation message by increasing infrastructure, providing a broader array of accessible opportunities, and providing new programs with more effective communication strategies, all the while insuring that these increases do not exceed a level at which habitat values would be compromised.

Refuge Administration

Refuge administration would be the same as proposed under alternative B.

Objectives and Strategies to Meet Refuge Goals

GOAL 1:

Protect, enhance, and restore the biological integrity, diversity and environmental health of mature hardwood-mixed forests to support native wildlife and plant communities including species of conservation concern.

Objective 1.1 Mature Hardwood-mixed Forest — Bald Eagles

Same as alternative B

Objective 1.2 Mature Hardwood-mixed Forest—Migrating Forest Dependent Birds

Same as alternative A

Objective 1.3 Heron Rookery

Same as alternative A

GOAL 2:

Protect, enhance, and restore the biological integrity, diversity, and environmental health of wetland habitats and shorelines to support native wildlife and plant communities including species of conservation concern.

Objective 2.1 Great Marsh Management

Same as alternative A

Objective 2.2 Little Marsh

Same as alternative A

Objective 2.3 Shoreline Protection Same as alternative A

Objective 2.4 Aquatic Habitat and Water Quality Same as alternative A

GOAL 3: **Provide quality, compatible wildlife-dependent recreational opportunities with particular emphasis on interpretation and wildlife observation.**

Objective 3.1 Deer Hunting Enhance measures to improve and diversify the annual, public, high-quality white tailed deer hunt program to support deer population and forest health and condition objectives.

Rationale

In addition to the rationale for alternative B, objective 3.1, we recognize the importance of providing a diverse hunting experience. Under alternative C, we propose to add a muzzleloader season. This opportunity, while increasing our administration, outreach and enforcement responsibilities, provides an additional means of reducing deer impacts.

Strategies

In addition to alternative B strategies (assuming full staffing as listed in the staffing chart (appendix E) and assistance from partners)

Over the 15 years of CCP implementation:

- Provide a muzzleloader hunt as part of the deer hunt program; include details in required, revised hunt opening package.
- Complete administrative requirements to formally open the refuge to the new hunt opportunities as soon as practicable

Objective 3.2 Youth Turkey Hunting Same as alternative B

Objective 3.3 Waterfowl Hunt Same as alternative B

Objective 3.4 Wildlife Observation and Photography Enhance public opportunities for wildlife observation and photography by upgrading trail and parking facilities, constructing new trails, observation platforms and photography blinds, and by making Woodmarsh Trail fully accessible.

Rationale

In addition to the rationale for alternative B, objective 3.4, we recognize that upgrading and expanding our trail and parking facilities would provide additional opportunities for a broader spectrum of the public to enjoy wildlife and other natural resources. It would also allow us to further promote the Refuge System mission and enhance the public's understanding and appreciation for the conservation of natural resources. We would also seek additional partnerships with organizations that promote wildlife observation and photography, and that value wildlife resources. A principal objective of these activities would be to foster a sense of stewardship for the Refuge System, wildlife and habitat resources through direct experience.

Strategies

In addition to alternative B strategies

Over the 15 years of CCP implementation:

- Consult with area wildlife photographers to determine placement of up to two photography blinds on the refuge
- Develop a Little Marsh Road Trail to allow seasonal public access, outside the sensitive waterbird nesting season, to the Little Marsh dike
- Make Woodmarsh Trail wheelchair accessible
- Sponsor guided wildlife observation walks on selected trails and in areas otherwise closed to the general public access

Wood duck



Tim McCabe

Objective 3.5 Interpretation Program

Enhance the interpretive program to more effectively communicate to the public the values and regional significance of refuge wildlife, habitats and cultural resources.

Rationale

In addition to the rationale for alternative B, objective 3.5, we would expand our interpretive program to include other-than-sight materials and partnering with Mason Neck State Park on joint interpretive programs and materials would provide opportunities for broader array of the public to gain an understanding of the wildlife and habitat resources of Mason Neck Refuge and the Refuge System. We expect this would garner additional public support for refuge programs.

Strategies

In addition to alternative B strategies

Over the 15 years of CCP implementation:

- Develop and install interpretive materials at kiosks or for use in self-guided tours to provide other-than-sight sensory wildlife experiences: e.g. sound, touch, or smell stations
- Partner with Mason Neck State Park to conduct joint interpretive programs
- Partner with Mason Neck State Park to develop interpretive waysides on High Point Trail

Objective 3.6 Environmental Education Program

Enhance environmental education opportunities on the refuge by rehabilitating outdoor education facilities, and increasing education partnerships and education-led programs.

Rationale

In addition to the rationale for alternative B, objective 3.6, we would expand our environmental education program to include conducting teacher workshops, seniors programs, county school curricula development, and habitat mentoring to provide additional opportunities to educate a wide spectrum of the interested public about the wildlife and habitat resources of Mason Neck Refuge and the refuge system. We expect this would garner additional public support for refuge programs.

Strategies

In addition to alternative B strategies

Over the 15 years of CCP implementation:

- Conduct at least two annual teacher workshops on refuge to promote its use as an outdoor classroom
- Design a senior, Elderhostel, or other adult environmental education program
- Work with Fairfax County to develop public school curriculum based on refuge resources
- Become a Schoolyard Habitat mentoring site.

GOAL 4:

Enhance efforts to promote awareness, understanding and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.

Objective 4.1 Volunteers

Improve the refuge's volunteer program by expanding the amount and types of meaningful and engaging opportunities that support refuge goals and objectives.

Rationale

In addition to the rationale for alternative B, objective 4.1., we would further expand our volunteer program by providing resident volunteer housing and by coordinating with other land management agencies on Mason Neck Peninsula to offer volunteer programs and projects that enhance our ability to meet our biological and public use objectives.

Strategies

In addition to alternative B strategies

Over the 15 years of CCP implementation:

- Expand resident volunteer program to develop a site that would house multiple volunteers; work with land management agency partners on Mason Neck Peninsula to consider residential sites both on and off-refuge and to create a quality cooperative volunteer program

Objective 4.2 Community Outreach

Within 15 years of CCP approval, more than 50 percent of the adults contacted within Fairfax County will understand the importance of conserving wildlife, habitats, and cultural resources on the refuge, will know that the refuge is part of a national system of wildlife refuges, are 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.

Rationale

In addition to the rationale for alternative B, objective 4.2, we would focus on developing high-quality products to enhance our ability to reach a wide range of the public and inform them about the Refuge System and the role of this refuge in that system. We would also strive to produce products that foster stewardship

in natural resource conservation, both in their local communities as well as nationally and globally.

Strategies

In addition to alternative B strategies

Over the 15 years of CCP implementation:

- Develop and create a video/DVD about the Potomac River Refuges Complex

Objective 4.3 Partner Outreach

Same as alternative B

Objective 4.4 Elected Official Outreach

Same as alternative B

Objective 4.5 Research

Same as alternative A

GOAL 5:

Enhance efforts to protect and interpret refuge cultural resources

Objective 5.1 Archeological Resources

Enhance efforts to preserve archaeological resources on the refuge from damage by shoreline erosion and visitor foot traffic. Also, improve visitor outreach materials to raise awareness and promote stewardship of archeological resources.

Rationale

In addition to the rationale for alternative B, objective 5.1, we would seek additional funding to further upgrade our stewardship of cultural resources on the refuge and support enhanced interpretation of the pre-contact history and related changes in the natural environment of the refuge for the public.

Strategies

In addition to alternative B strategies

Over the 15 years of CCP implementation:

- Develop a prioritized program to perform additional surveys and research as funding allows; including a systematic program to monitor erosion impacts on shoreline resources

Objective 5.2 Historical Resources

Continue to protect historical resources on the refuge from damage by visitors, while also increasing opportunities to engage visitors through interpretation and education to promote an appreciation and increased stewardship

Rationale

In addition to alternative B, objective 5.2 rationale, we would develop an erosion monitoring system to further upgrade our stewardship of cultural resources on the refuge and support enhanced interpretation of the post-contact history and related changes in the natural environment of the refuge to the public.

Strategies

In addition to alternative B strategies

Over the 15 years of CCP implementation:

- Develop a prioritized program to perform additional surveys and research as funding allows; including a systematic program to monitor erosion impacts on resources
- Link with partners to seek research and other grants or supplemental funding to conduct priority projects.

Mason Neck Refuge—CCP Alternatives Comparison Table

Earlier in this chapter, in the section titled “Actions Common to All of the Alternatives,” we described many important actions which are not discussed in the table below. Those actions include:

- Using an adaptive management approach, where appropriate
- Consolidating and improving refuge lands and facilities
- Refuge staffing and administration
- Coordinating with refuge partners, Friends of Potomac River Refuges, and the Mason Neck Refuge community
- Protecting Federal-listed species
- Managing invasive plants
- Controlling pest plants and animals
- Monitoring and abating wildlife diseases
- Managing forest health and condition
- Supporting research and investigations
- Developing refuge step-down plans
- Distributing Refuge Revenue Sharing payments
- Protecting cultural resources
- Supporting wildlife-dependent recreational uses
- Continuing a fishing closure at Mason Neck Refuge
- Conducting appropriateness and compatibility reviews of refuge uses

The reader is encouraged to review that section, as well as the detailed discussions in chapter 3 for each alternative, for a complete perspective on each alternative.

Table 3.1 highlights those actions that distinguish the alternatives we analyzed in detail for Mason Neck Refuge. It is also organized to show how they relate to our refuge goals, and the resources and programs of importance to the refuge. Our intent is to provide an easy way to compare and contrast the alternatives. Please refer to the glossary to interpret any acronyms.

Table 3.1 Comparison of objectives and strategies for Elizabeth Hartwell Mason Neck NWR alternatives

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 1: Protect, enhance, and restore the biological integrity, diversity, and environmental health of mature hardwood-mixed forests to support native wildlife and plant communities including species of conservation concern.		
Objective 1.1 Mature Hardwood-mixed Forest		
<p>Strategies <i>Continue to</i></p> <ul style="list-style-type: none"> ● Protect all known active nest sites from human disturbance by restricting public access during sensitive nesting periods. ● Post trail closures and/or warning signs at appropriate, visible locations to explain to visitors the restriction. ● Cooperate with VDGIF and Mason Neck State Park staff in monitoring bald eagle nesting activity. ● Utilize refuge law enforcement officers to conduct outreach and enforce restrictions. 	<p>In addition to alternative A strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Hire additional biological staff as identified in the staffing chart (appendix E) to plan, coordinate, and implement activities. ● Work with Service and VDGIF bald eagle experts to define potential nest and roost stands; identify possible silvicultural treatments to enhance stands and/or individual trees, including thinning, planting, and fuel reductions (to protect from potential wildfires). ● Ensure actions meet or exceed the guidelines for protection and management of eagle sites as identified in the Service’s National Bald Eagle Guidelines (2007). ● Develop nest and/or roost site management plans as warranted, prioritizing actions; incorporate plans into HMP. ● Create and maintain a GIS database with locations of active and potential nest and roost sites, and any management activities. Annotate database with results of annual surveys. ● Work with VDGIF to conduct mid-summer and mid-winter surveys on the refuge. If funding allows, also conduct nest productivity surveys. 	<p>Same as alternative B</p>

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 1: (cont.) Protect, enhance, and restore the biological integrity, diversity, and environmental health of mature hardwood-mixed forests to support native wildlife and plant communities including species of conservation concern.		
Objective 1.2 Mature Hardwood-mixed Forest		
<p>Strategies <i>Continue to</i></p> <ul style="list-style-type: none"> ● Work with VDGIIF to assess deer populations, deer health, and deer impacts on native vegetation. ● Conduct annual deer hunt to control population and associated impacts on vegetation. ● Work with USFS to evaluate threat of gypsy moth. Be vigilant for unusual concentrations of pests, pathogens, and invasive plants; respond with respective treatments accordingly, including both chemical and mechanical controls (also see objective 1.5 below). ● Treat invasive plants to the extent resources are available; priority is to control mile-a-minute, Japanese stiltgrass, and beefsteak plant. <ul style="list-style-type: none"> ◆ Treat approximately 1 acre/year; priority along roads and trails, and sensitive resource areas. ◆ Cooperate with the adjacent Mason Neck State Park. ● Work with researchers, educators, and/or volunteers on an opportunistic basis to collect resource information. ● Conduct outreach, education, and interpretation with visitors to explain the refuge’s importance to the full complement of forest wildlife and plants. ● Restrict public access to designated trails only. ● Support partner-led Monitoring Avian Productivity and Survivorship (MAPS) station bird survey work. ● Support volunteer-led bird survey work on an opportunistic basis. 	<p>In addition to alternative A strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Develop forest prescriptions to benefit forest health and landbird habitat needs; work with partners to evaluate results of VDF forest health assessment to help identify the most significant threats to sustaining biodiversity, and stand structure, function, and composition. Prioritize and implement those treatments that would complement bald eagle and migratory bird objectives. ● Incorporate prescriptions, stand treatments, and implementation schedule in HMP. Possible treatments may include prescribed fire, thinnings, plantings, and patch cuts or regeneration cuts to restore/enhance/maintain desired structural and species composition. ● Hire additional biological staff as identified in the staffing chart (appendix E) to plan, coordinate, and implement activities identified under this and all other biological objectives. ● Maintain all data collected in GIS database; develop habitat map; incorporate survey updates and map occurrences of vernal pools and other unique habitat features. ● If prescriptions call for further reductions in deer herd to protect forest health and condition, implement a sharp-shooter program to supplement public hunt. ● Continue coordination with the USFS for gypsy moth or other pest monitoring and control; but, also coordinate with Mason Neck State Park and other adjacent landowners on Mason Neck Peninsula to make control measures more efficient. ● Evaluate all management actions to ensure they do not contribute to further forest fragmentation. ● Establish priority inventory needs and/or monitor for forest wildlife and plants of conservation concern. Incorporate planned activities, their priority and schedule in the IMP. Given available funding and staffing, or under partnerships, implement priority activities. 	<p>Same as alternative A</p>

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 1: (cont.) Protect, enhance, and restore the biological integrity, diversity, and environmental health of mature hardwood-mixed forests to support native wildlife and plant communities including species of conservation concern.		
Objective 1.3 Heron Rookery		
<p>Strategies <i>Continue to</i></p> <ul style="list-style-type: none"> ● Prohibit public access to Little Marsh and surrounding bluffs and adjacent forest; both foot and boat access is prohibited. ● Conduct outreach to communicate the unique and regional significance of the heron rookery at refuge programs, events, on the website and in other refuge printed information. ● Allow volunteer-led efforts to count nest sites. ● Use law enforcement officer to conduct outreach and enforce closure area. 	<p>In addition to alternative A strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Work with experts to assess and implement measures to increase shoreline and bluff protection to reduce potential loss of nesting trees (also see objective 2.4). ● Use SLAMM analysis results and monitor and evaluate conditions in the marshes with respect to climate change and sea level rise. Coordinate with regional efforts and initiatives where applicable. ● Increase Service visibility and law enforcement presence, increase signage, and other measures as warranted to keep unauthorized persons away from the rookery during breeding season. ● Establish a rookery monitoring program with partners and volunteers; incorporate data in GIS. Monitor nest numbers, locations and shifts in their use between years, impacts to vegetation, and impacts from predators (e.g. raccoons) on the population. ● Consult with wading and waterbird experts to determine whether vegetation manipulation could enhance rookery conditions. Incorporate any plans into HMP. 	<p>Same as alternative A</p>

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 2: Protect, enhance, and restore the biological integrity, diversity and environmental health of wetland habitats and shorelines to support native wildlife and plant communities including species of conservation concern.		
Objective 2.1—Great Marsh Management		
<p>Strategies <i>Continue to</i></p> <ul style="list-style-type: none"> ● Prohibit public access to Great Marsh. Both foot and boat access is prohibited. ● Conduct outreach to communicate significance of Great Marsh at refuge programs, community events, on the website and in other refuge printed information. ● Partner with VDGIF to conduct winter waterfowl banding and avian influenza monitoring in this area. ● Use law enforcement officer to conduct outreach and enforce closure area. 	<p>In addition to alternative A strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Develop index of ecological integrity to establish baseline condition, monitor changes in marsh over time, and determine where integrity is currently compromised. ● Conduct full inventory of flora and fauna; in particular, determine presence and extent of native marsh and aquatic vegetation, such as spatterdock and wild rice, and other important waterfowl foods. ● Use SLAMM analysis results to monitor and evaluate conditions over time with respect to climate change and sea level rise. Coordinate with regional efforts and initiatives where possible and applicable. ● Work with State and Federal agency partners to address any significant water quality issues in the Potomac River with potential to affect refuge. ● Work with volunteers, the Friends Group, and/or other partners to establish a clean-up program in the marsh. 	<p>Same as alternative A</p>

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 2: (cont.) Protect, enhance, and restore the biological integrity, diversity and environmental health of wetland habitats and shorelines to support native wildlife and plant communities including species of conservation concern.		
Objective 2.2—Little Marsh Management		
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Prohibit public access to Little Marsh; both foot access from Little Marsh road and boat access to dike is prohibited. <p>Maintain signs alerting boaters to closure.</p> <ul style="list-style-type: none"> ● Use law enforcement officer to conduct outreach and enforce restrictions. ● Maintain water control structures and Little Marsh road culverts. ● Conduct slow drawdown for 4 weeks in summer to improve foraging habitat for herons and other wading birds and to control woody vegetation encroachment. 	<p>In addition to alternative A strategies <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Enhance management by determining the best water level regime by season to promote quality marsh habitat favored by bald eagles, water and wading birds, and waterfowl. Implement plans to manipulate water levels and vegetation at draw down times throughout the year, and incorporate actions in HMP. Consider: <ul style="list-style-type: none"> ◆ Lowering water level to allow bottom to dry out and oxygenate to allow better emergent plant growth, and/or re-flooding to a lower level to provide better access to feeding areas by wading birds. ◆ Timing drawdown initiation when great blue heron young are observed in the nests. This will allow for sufficient time to conduct the drawdown and concentrate food resources. ◆ In the summer, consider only drawing down water levels to the point where water primarily remains only within the channels and various coves of the impoundment. Thus, concentrating prey resources into the smallest volume of water accessible to great blue herons. ◆ Maintaining high water levels throughout a growing season and/or use of prescribed fire, to eliminate perennial woody vegetation that is encroaching upon the impoundment. Frequency of woody vegetation management may be dictated by heron use. ◆ Reflooding the impoundment prior to Fall frost and freezing weather to allow amphibians and reptiles sufficient time to locate underwater over-wintering habitat. Maintain water depths throughout the winter that are sufficient for fish populations. 	<p>Same as alternative A</p>

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 2: (cont.) Protect, enhance, and restore the biological integrity, diversity and environmental health of wetland habitats and shorelines to support native wildlife and plant communities including species of conservation concern.		
Objective 2.2 (cont.)—Little Marsh Management		
	<ul style="list-style-type: none"> ● Control beaver, if needed, to meet water regime objectives. Both non-lethal and lethal measures would be employed as warranted. ● Inventory the flora and fauna of the marsh to establish a baseline of priority natural resources to monitor in the future. In particular, determine presence and extent of native marsh vegetation. ● Determine fish species that currently and/or historically use the impoundment for spawning and rearing. ● Upgrade the water control structure as needed to improve management capability and consider placing a “windowed” stop-log water control structure to allow fish passage into the impoundment. ● Hire additional maintenance staff as indicated on the staffing chart (appendix E) to help manage and maintain water control structures. 	
Objective 2.3—Shoreline Protection		
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Work with partners to monitor and maintain the existing 200 ft of refuge shoreline (e.g. breakwater structures). ● Prohibit public access to shoreline; utilize outreach and enforcement to maintain closures. 	<p>In addition to alternative A strategies <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Engage in public outreach and education to explain the sensitive nature of shoreline habitats and the importance of reducing human disturbance, particularly along the proposed Captain J. Smith Trail. ● Manage public use in these areas to ensure compatibility of visitor’s activities, especially during sensitive times of the year for wildlife. ● Work with experts to conduct a risk assessment to prioritize shoreline and identify practicable and feasible projects; work with partners to develop proposals, seek funding for new shoreline protection projects, and to monitor and evaluate project success. 	Same as alternative A

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 2: (cont.) Protect, enhance, and restore the biological integrity, diversity and environmental health of wetland habitats and shorelines to support native wildlife and plant communities including species of conservation concern.		
Objective 2.4—Aquatic Habitat and Water Quality		
<p>Strategies <i>Continue to</i></p> <ul style="list-style-type: none"> Facilitate compatible research led by partners on fish and other aquatic species in the tidal Potomac River. Monitor invasive aquatic species and implement control measures when funding and staffing allows. 	<p>In addition to alternative A strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> Coordinate with the Service’s Virginia Fisheries Program Office to assess and enhance fisheries resources on the refuge. Participate in partnerships with other State and Federal agencies to address interjurisdictional fish issues related to the refuge and nearby Potomac River waters. Work with the Virginia Ecological Services Office to provide information and input to the contaminant and total maximum daily load (TMDL) regulation process at the Federal and State level. Participate in Spill Prevention, Control, and Countermeasure Plans or other environmental emergency action plans as related to protection of Great Marsh and the Potomac River. Work with Virginia Ecological Services and the Virginia Fisheries Program Office in coordinating and providing technical assistance to fish passage, stream, and riparian restoration projects within the Potomac River watershed that have potential to increase available habitat for species utilizing the Refuge, or to improve water quality. 	<p>Same as alternative A</p>

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 3: Provide quality, compatible wildlife-dependent recreational opportunities with particular emphasis on interpretation and wildlife observation.		
Objective 3.1—Deer Hunting		
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Cooperate with VDGIF in meeting State deer management plan goals ● Maintain current hunt program; <ul style="list-style-type: none"> ◆ State and local partners involved in hunt admin ◆ Incorporate Mason Neck State Park as part of hunt area ◆ Target an average of 90-100 deer harvested/year or a number recommended by VDGIF biologists ● Provide technical support for deer hunt programs on other public land management agencies on Mason Neck Peninsula. 	<p>In addition to alternative A strategies <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Increase support for deer hunt programs on all public lands on Mason Neck Peninsula, encouraging each agency to implement a program; work collaboratively within the existing interagency Manager’s Working Group to design hunts. ● With additional refuge staff, partners, and funding resources in place, consider increasing length of shotgun season, number of hunters, and their distribution when declining forest health and conditions warrant an increased harvest. Indicate changes each year in annual hunt plan. ● Annually review the amount of staff time involved with the hunt and consider ways to be more efficient with its administration, such as seeking new partners, staying informed of new technology, and use of web-based programs. ● Evaluate opportunities to offer a general archery deer hunt for qualified archers during the regular State archery season, similar to years past, assuming new staff and support resources are in place. Hunt area would be away from trails and not affect trail use. Additional NEPA analysis would be required. ● Complete administrative requirements to formally open the refuge to new hunts as soon as approved and determined practicable. 	<p>In addition to alternative B strategies, and assuming new staff and other support resources are in place, including assistance from partners</p> <ul style="list-style-type: none"> ● Provide a muzzleloader hunt as part of the deer hunt program; include details in required, revised hunt opening package. ● Complete administrative requirements to formally open the refuge to the new hunts as soon as approved and determined practicable.
Objective 3.2—Turkey Hunting		
No program	<p><u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● With new staff and support resources in place, and in partnership with VDGIF and National Wild Turkey Federation, provide up to a 3-day turkey hunt for youth hunters during regular State seasons. Hunt area would be away from trails and not affect trail use. ● Complete administrative requirements to formally open the refuge to new hunt as soon as approved and determined practicable. 	Same as alternative B
Objective 3.3—Waterfowl Hunting		
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Prohibit waterfowl hunting on refuge lands as per Directors Order (FR 34:194). ● Coordinate with VDGIF conservation officer in addressing any waterfowl hunting issues. 	<p>In addition to alternative A strategies <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Work with VDGIF to evaluate the use of temporary floating blinds to replace fixed blinds in State waters near the refuge shoreline to provide waterfowl hunting opportunities to more people. 	Same as alternative B

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 3: (cont.) Provide quality, compatible wildlife-dependent recreational opportunities with particular emphasis on interpretation and wildlife observation.		
Objective 3.4—Wildlife Observation and Photography		
<p>Strategies <i>Continue to</i></p> <ul style="list-style-type: none"> ● Maintain the two trails located entirely on refuge lands: Woodmarsh (2.5 miles) and Joseph V. Gartlan, Jr. Great Marsh (Great Marsh) (0.75 miles) trails. ● Cooperate with Mason Neck State Park in maintaining the multi-use High Point Trail where it passes through the refuge (3.0 miles total; 0.5 miles on refuge). ● Close portions of the Woodmarsh Trail from December to June to protect nesting bald eagles. ● Allow foot travel only on Woodmarsh and Great Marsh trails. ● Prohibit motorized use and horseback riding on all trails. ● Collect monthly visitor use data on all 3 trails. 	<p>In addition to alternative A strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Hire a new visitor services and maintenance staff (see appendix E) to plan and implement new and/or improved refuge facilities, increase and enhance visitor and outreach programs, and other expanded public uses and outreach identified under goals 3 and 4. ● Conduct a Visitor Services Review and trail assessment and develop a detailed Visitor Services Plan according to Service guidelines. ● Prioritize list of improvements and new construction noted below and implement projects as funding allows. ● Improve Woodmarsh Trail and Trailhead as described in the chapter narrative under goal 3, objective 3.4. ● Develop a trail leading from the Woodmarsh Trail-Sycamore Road kiosk to the end of Sycamore Road and the Potomac River overlook. Build a viewing platform overlooking River if feasible and would not impact archeological resources. Allow foot travel as the only mode of transportation on new trail segment. ● Develop Treestand Road as a trail that connects Woodmarsh and Great Marsh trails. Create marsh viewing area if minimal vegetation would be impacted. Allow foot travel as the only mode of transportation on Treestand Road Trail. ● Collect visitor use data, according to Service guidance, to determine the number of visitors and their activities. 	<p>In addition to alternative B strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Consult with area wildlife photographers to determine placement of up to two photography blinds on the refuge ● Develop a Little Marsh Road Trail to allow seasonal public access to the Little Marsh dike, outside the sensitive wading and waterbird nesting season. ● Make Woodmarsh Trail wheelchair accessible. ● Sponsor guided group wildlife observation walks on selected trails and in areas otherwise closed to the general public access.

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 3: (cont.) Provide quality, compatible wildlife-dependent recreational opportunities with particular emphasis on interpretation and wildlife observation.		
Objective 3.5—Interpretation		
<p>Strategies <i>Continue to</i></p> <ul style="list-style-type: none"> ● Distribute general refuge brochure and post at kiosks ● Maintain interpretive and refuge information at the three kiosks located at the Woodmarsh trailhead, the Woodmarsh trail near Sycamore Road, and the Great Marsh trailhead. ● Install interpretive panels along trails to explain refuge resources and management activities, and to enhance self-guided interpretive opportunities ● Work with the Mason Neck State Park to support the annual Eagle Festival in April, including providing guided refuge tours. ● Coordinate with the National Park Service to identify opportunities to interpret the Captain John Smith Chesapeake National Historic Trail on the refuge, such as placing interpretative panels at strategic locations. ● Work with the Mason Neck Area Managers Working Group to complete the joint agency information kiosk on Gunston Road to orient visitors to Peninsula and provide information about each agency. 	<p>In addition to alternative A strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Develop Visitor Services Plan to address the agency mission, refuge purpose and goals, infrastructure, and specific Service and Regional emphasis. Include message and actions described in chapter narrative under goal 3, objective 3.5. ● Add, move, replace, or update refuge signs to conform to Service standards. Install appropriate welcome and directional signs, trailblazer signs, trailhead signs, waysides, and other required signs. ● In coordination with VDOT, install standard State highway directional Trailblazer signs to the refuge on I-95 and US Route 1. ● Use trained volunteers and Friends Group members to conduct onsite and offsite interpretive programs and interpretive walks. ● Explore option of installing a Travelers Information System (AM radio station). 	<p>In addition to alternative B strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Develop and install interpretive materials at kiosks or for use in self-guided tours to provide other-than-sight sensory wildlife experiences: e.g. sound, touch, or smell stations. ● Partner with Mason Neck State Park to conduct joint interpretive programs and ● Develop interpretive waysides on High Point Trail.
Objective 3.6—Environmental Education		
<p>Strategies <i>Continue to</i></p> <ul style="list-style-type: none"> ● Allow Thomas Jefferson High School to conduct educational activities along High Point, Anchorage, and Sycamore Roads, including their successive year study of: <ul style="list-style-type: none"> ◆ Vernal pools ◆ Deer pellet counts. ● Facilitate other environmental education opportunities upon request. 	<p>In addition to alternative A strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Partner with Mason Neck State Park to integrate education programs into the existing teachers’ workshops being offered at the Park’s Visitor Center. ● Provide information to educators upon request that supports State curriculum standards and emphasizes key refuge themes related to habitat management for species of concern, and Regional/National themes such as connecting children to nature and climate change. ● Rehabilitate the old environmental education site and trail for use by teacher-led groups ● Encourage Friends Group and volunteers to work with local schools and other educational institutions to enhance utilization of refuge resources for educator-led environmental education programs; support development of basic lesson plans with these partners. ● Support use of the refuge by Fairfax County School District for science curriculum activities. 	<p>In addition to alternative B strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Conduct at least two annual teacher workshops on refuge to promote its use as an outdoor classroom. ● Design a senior, Elderhostel, or other adult environmental education program ● Work with Fairfax County to develop public school curriculum based on refuge resources. ● Become a Schoolyard habitat mentoring site.

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 4: Enhance efforts to promote awareness, understanding and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.		
Objective 4.1—Volunteers		
<p>Strategies <i>Continue to</i></p> <ul style="list-style-type: none"> ● Use volunteers on an opportunistic basis to support refuge programs. ● Develop community service projects to support Fairfax County court system. ● Use volunteers in refuge cleanup activities, special events, routine maintenance of trails, roads, and other areas; invasive plant control; bald eagle and other bird counts. ● Develop projects for the Boy Scouts and the Girl Scouts upon request. ● Issue the monthly refuge complex volunteer newsletter to identify current and upcoming events. ● Develop and implement annual volunteer recruitment, training, and appreciation/ recognition events. 	<p>In addition to alternative A strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Increase the number of volunteers though development of quality, well-organized projects. ● Use citizen-science volunteer groups to conduct biological baseline studies and monitoring consistent with Service protocols. ● Coordinate with other public land management agencies on the Peninsula to recruit, train, and share volunteers. ● Use volunteers and Friends Group members as docents to lead interpretive walks and as general guides during peak use times (also see objective 3.5). ● Allocate funds to provide special technical training to qualified volunteers to enhance their capability to assist in refuge programs. ● Address desires of refuge neighbors to participate in refuge management through volunteer opportunities. ● Pursue a resident volunteer program (e.g. for a retired couple); partner with other agencies in the region, if necessary, to find a suitable location for volunteer housing. 	<p>In addition to alternative B strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> ● Expand resident volunteer program to develop a site that would house multiple volunteers; work with land management agency partners on Mason Neck Peninsula to consider residential sites both on and off-refuge and to create a quality cooperative volunteer program.

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 4: (cont.) Enhance efforts to promote awareness, understanding and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.		
Objective 4.2—Community Outreach		
<p>Strategies <i>Continue to</i></p> <ul style="list-style-type: none"> • Issue news releases to local and regional print and electronic media when newsworthy events occur; announce scheduled activities, and keep the public informed about refuge activities. • Routinely respond to written, telephone, and in-person inquiries from the public. • Maintain and regularly update contact information for partners, elected officials, the media, and the general public. • Inform refuge neighbors of refuge management activities via website, press stories, and newsletters. • Promote our successes in the local community via refuge and community events, project demonstrations, and media stories. • Utilize volunteers to participate in community events in Fairfax County where effective outreach of refuge programs can occur. • Continue to maintain the refuge website with links to newsletters, the Friends of the Potomac River Refuges, and other pertinent refuge information. 	<p>In addition to alternative A strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> • Develop and implement procedures to offer refuge “behind the scenes” tours to the media and the general public. • Create and maintain refuge-specific fact sheets. • Expand refuge outreach programs to include recognized events such as, but not limited to, International Migratory Bird Day, National Wildlife Refuge Week, and the Eagle Festival, and designed to promote wildlife-dependent recreation and natural resource education. • Work towards more informed and productive relationships with the local media; establish personal contacts at all media outlets, including radio and TV. 	<p>In addition to alternative B strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> • Develop and implement a video/ DVD about the Potomac River Refuge Complex.
Objective 4.3—Partner Outreach		
<p>Strategies <i>Continue to</i></p> <ul style="list-style-type: none"> • Maintain contact list and ensure regular contact with local groups, environmental groups, and other interested parties active in the Mason Neck Refuge area. 	<p>In addition to alternative A strategies <i>Over the 15 years of CCP implementation:</i></p> <ul style="list-style-type: none"> • Review existing partner relationships to determine if outreach, or the dissemination of information, could be more collaborative and effective. • Review Fairfax County Tourism, Gunston Hall, and other local community organization’s events schedules to see if the refuge has a role or contribution. • Seek out new partnership opportunities with museums, historical and botanical groups, civic organizations, and environmental and conservation groups to achieve mutually beneficial projects and activities 	<p>Same as alternative B</p>

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 4: (cont.) Enhance efforts to promote awareness, understanding and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.		
Objective 4.4—Elected Official Outreach		
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> • Invite Federal, State, and local elected officials to attend and participate in outreach events held on the refuge. • Provide written or personal briefings for members of Congress, and their staff, as needed or requested, to inform them about important refuge issues. 	<p>In addition to alternative A strategies <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> • Invite Federal, State, and local elected officials approximately once/year to attend a guided tour of the refuge, to showcase particular accomplishments, view outstanding natural resource areas, demonstrate management activities, and highlight challenges. 	<p>Same as alternative B</p>
Objective 4.5—Research		
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> • Support inventories and research led by others, such as the Monitoring Avian Productivity and Survivorship (MAPS) station, that are a priority for the refuge, and compatible with refuge purposes, goals and objectives; use both refuge staff or volunteers as funding allows. 	<p>In addition to alternative A strategies <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> • In cooperation with State agency and conservation partners, identify the highest priority research and inventory needs for the refuge and the Mason Neck Peninsula which will further conservation and management of Federal trust resources. • With priority research needs identified, work with partners to develop project specific research goals, study design and methodology and opportunities for alternative sources of funding. • Facilitate the publication and dissemination of refuge research results; consider opportunities to write for lay audiences to the extent possible, in addition to the scientific community. 	<p>Same as alternative A</p>

Alternative A— Current Management	Alternative B— Improved Management for Federal Trust Resources (Service-preferred Alternative)	Alternative C— Enhanced Public Use Management
Goal 5: Enhance efforts to protect and interpret refuge cultural resources.		
Objective 5.1—Archeological Resources		
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> • Limit public access to designated trails in certain areas to keep visitors away from known archeological sites on the refuge. • Coordinate with the Service’s Regional Archeologist to determine the level of consultation required in conjunction with refuge projects that have a potential to affect archeological resources. • Conduct archaeological reviews, surveys, or studies of project areas as needed, or recommended, by the Service’s Regional Archeologist. • Monitor known archeological sites for looting and trespass. 	<p>In addition to alternative A strategies <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> • Complete refuge wide inventory with GPS data for known archaeological sites and resources. • Work with State and county archaeologists and avocational archeological societies willing to assist in performing targeted surveys to locate and evaluate shoreline sites at risk. Ensure archaeological resources are protected from looting. Develop site management and protection plans as warranted. • Ensure that at least one law enforcement staff person receives ARPA training. • Facilitate research on the refuge to achieve cultural resource protection and conservation objectives. • Use proposed new Sycamore Road Trail as an opportunity to interpret archeological sites. • Raise awareness of the importance of protecting cultural resources through outreach and interpretive information and programs. • Design any new refuge trails, overlooks, or other amenities to avoid impacts to archeological resources. • Conduct targeted surveys with subsurface testing to identify more of the many unrecorded sites likely to be on the refuge and to evaluate their condition and any threats. • Ensure that an ARPA message is incorporated into refuge brochures and on interpretive signs at trailheads, including those produced by refuge partners. 	<p>In addition to alternative B strategies: <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> • Develop a prioritized program to perform additional surveys and research as funding allows; including a systematic program to monitor erosion impacts on resources.
Objective 5.2—Historical Resources		
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> • Limit public access to designated trails to keep visitors away from historic sites on the refuge. • Provide interpretation of historic importance of refuge in refuge brochures and kiosks. • Monitor known historical sites for looting and trespass. 	<p>In addition to alternative A strategies <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> • Use proposed new Sycamore Road trail as an opportunity to interpret historic resources on the refuge with sensitivity to ensure they remain protected. • Work with Mason Neck State Park and Gunston Hall to develop appropriate historical resources brochures and signage. 	<p>In addition to alternative B strategies <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> • Develop a prioritized program to perform additional surveys and research as funding allows; including a systematic program to monitor erosion impacts on resources. • Work with partners to seek research and other grants or supplemental funding to conduct priority projects.

Part Two—Featherstone Refuge CCP Alternatives

Actions Common to Both Featherstone Refuge CCP Alternatives

There are some common actions we would undertake in managing Featherstone Refuge over the next 15 years, regardless of which CCP alternative we select. Some actions are required by law or policy, or they may be administrative actions that do not necessarily require public review, but we want to highlight them in this public document. They may also be actions we believe are critical to achieving the refuge’s purpose, vision, and goals.

Those actions common to all alternatives are:

- Coordinating with Refuge partners, Friends, and the Prince William County community
- Protecting Federal-listed and recently de-listed species
- Controlling pest plants and animals
- Monitoring and abating wildlife diseases
- Supporting biological research and investigations
- Distributing Refuge Revenue Sharing payments
- Protecting cultural resources

Coordinating with Refuge Partners, Friends of Potomac River Refuges, and the Prince William County Community

We would continue to inform and coordinate with our refuge partners, including the Friends of Potomac River Refuges, VDGIF conservation officers, and Prince William County, in continuing efforts to protect the integrity of refuge wildlife and habitats and to identify opportunities for engaging the local community in stewardship of refuge resources.

Protecting Federal-listed and Recently De-listed Species

The bald eagle was recently removed from the Federal list of threatened and endangered species. However, it remains a focal species for the refuge and it continues to be protected under the Migratory Bird Treaty and Bald and Golden Eagle Protection Acts, as well as State of Virginia law. We would continue to protect bald eagles as a priority on the refuge under all alternatives. There are currently no active nesting pairs on the refuge; the last nesting pair documented was in 1996. However, at least one pair has been active in the vicinity of the refuge since the early 1990s. We would continue to work cooperatively with VDGIF to monitor for nesting and breeding activity and prohibit the public from disturbing them.

The Service has identified one Federal-listed aquatic invertebrate, the dwarf wedgemussel (*Alasmidonta heterodon*—endangered), and three Federal-listed plants—sensitive joint-vetch (threatened), small whorled pogonia (threatened), and harperella (*Ptilimnium nodosum*—endangered)—as occurring in Prince William or adjacent counties. None, however, have been documented on the refuge. The dwarf wedgemussel is known to occur in the Lower Potomac watershed which is downriver from Featherstone Refuge. It is possible that one of these four listed species may be present on the refuge. We would continue to support partner-led efforts to survey for them. If located, we would work with the respective species’ Recovery Team and other experts to develop protection measures.

Controlling Pest Plants and Animals

The establishment and spread of invasive plants is a significant problem that reaches across all habitat types. 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. 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). Guidance for managing invasive species on refuges is found in the Service Manual (620 FW 1.7G).

We, or our partners, would continue to treat invasive plants as needed using mechanical (e.g. mowing or trimming), biological, and cultural (e.g. hand-pulling) methods, as well as herbicides. Only herbicides approved by the Regional Contaminant Coordinator will be used, and only in accordance with approved rate and timing of application. Consideration of impacts on target and non-target species is part of the approval.

With regards to pest animals, we, or our partners, would continue to use both non-lethal and lethal control measures, as warranted, to control problem animals. Lethal control would only be conducted by refuge staff, their agent or contractor, to achieve a specie management objective. As such it would be considered a management or administrative activity and not subject to compatibility review.

Monitoring and Abating 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, significant attention has been given to those diseases that are transmitted through wildlife to humans. Lyme disease transmitted by ticks, and West Nile virus transmitted by mosquitoes, are examples.

A serious wildlife disease receiving considerable attention worldwide is avian influenza. 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 the Refuge Complex was approved in July 2006 (USFWS, 2007a). It discusses methods for dealing with this disease should it ever be identified on the refuge.

Another disease of significant concern to both the Service and VDGIF is chronic wasting disease (CWD). It attacks the brain and spinal cord of deer, elk and moose and is typically fatal. 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. 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 VDGIF is conducting active surveillance for (CWD) during deer hunting seasons. To establish whether CWD occurs in Virginia, VDGIF commenced statewide CWD surveillance in 2002. Deer have been sampled from every county in the Commonwealth. CWD was documented in white-tailed deer in Frederick County, Maryland, near the Virginia/West Virginia border in 2009. We developed a CWD plan for the Refuge Complex in 2006.

Supporting Research and Investigations

Guidance on conducting and facilitating 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 before a special use permit is issued to allow the activity. As noted in chapter 2—Affected 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:

- Seek qualified researchers and funding to help answer refuge-specific management questions;
- Participate in appropriate multi-refuge studies conducted in partnership with the U.S. Geological Survey;
- Facilitate appropriate and compatible research by providing temporary housing and equipment, if available, for persons conducting field work; and,
- Pursue peer-reviewed publications of research, and/or insure the Service is acknowledged as a contributor in research conducted on the refuge by others.

Generally, we will approve permits for research projects that provide a direct benefit to the refuge or that will strengthen our decisions on managing natural resources for biological or public use programs on the refuge. The refuge manager also may consider requests that do not relate directly to refuge objectives, but instead relate to the protection or enhancement of native species and biological diversity in the region and support the goals of ecoregional conservation teams, such as the Atlantic Coast Joint Venture.

All researchers will be required to submit detailed research proposals following the guidelines established by Service policy and refuge staff. Special use permits will also identify the schedules for progress reports, the criteria for determining when a project should cease, and the requirements for publication or other interim and final reports. All publications will acknowledge the Service and the role of Service staff as key partners in funding and/or operations. We will ask our refuge biologists, other divisions of the Service, USGS, select universities or recognized experts, and the VDGIF to peer review and comment on research proposals and draft publications, and will share research results internally, with these reviewers, and other conservation agencies and organizations. To the extent practicable, and given the publication type, all research deliverables will conform to Service graphic standards.

Some projects, such as depredation and banding studies, will require additional Service permits. The refuge manager will not approve those research projects until all required permits are received and the consultation requirements under the Endangered Species Act have been met.

Distributing Refuge Revenue Sharing Payments

As we described in chapter 2, we pay Prince William County refuge revenue sharing payments based on the acreage and the appraised value of Featherstone Refuge lands. These annual payments are calculated by formula determined by, and with funds appropriated by, Congress and authorized under the Refuge Revenue Sharing Act (16 U.S.C. 715s). All of the alternatives would 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

We would evaluate the potential for projects to impact archeological and historical resources, in consultation with the Regional Archeologist and/or SHPO to ensure compliance 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. In addition to surveys and reviews, we will also seek to minimize adverse impacts to eligible archaeological sites through public access restrictions and monitoring by law enforcement. For all archaeological sites on the refuge, preservation in place is our preferred treatment.

Conducting Additional NEPA Analysis

For all major actions, NEPA requires site-specific analysis and disclosure of their impacts, either in an environmental assessment (EA) or an environmental impact statement (EIS). NEPA categorically excludes other, routine activities from that requirement. Generally, those include administrative actions listed in chapter 4. Most of the major actions proposed in the alternatives and fully analyzed in this draft CCP/EA are described in enough detail to comply with NEPA, and would not require additional environmental analysis. Although this is not an all-inclusive list, the following project examples fall into this category: biological inventories and monitoring; pursuing safe public access to refuge lands and parking which would facilitate public use on the proposed trails for wildlife observation and nature photography, and fishing in designated areas, construction of identified public use facilities, and controlling invasive plants and animal pests.

Examples of actions not analyzed in enough detail in this document to comply with NEPA is our proposal under alternative B to consider hunting consistent with state seasons. If Alternative B is selected for implementation, within five years, we would evaluate in detail a proposal to offer hunting in cooperation with VDGIF. That evaluation would include a separate NEPA document, including an evaluation of other alternatives and public involvement, before making a decision.

Featherstone Refuge Alternative A—Current Management

Alternative A represents continuing our current management of Featherstone Refuge for the next 15 years. It provides the baseline for comparing alternatives B and C. Under alternative A, the refuge would remain closed to the public due to the lack of parking and safe and legal public access. Law enforcement would be the primary activity conducted on the refuge. Habitat and wildlife management would continue to be limited to actions necessary to monitor and protect sensitive nesting areas, or address critical issues, such as a major outbreak of invasive pests, pathogens, invasive plants or wildlife disease. Research requests would continue to be evaluated on a case-by-case basis. We would also continue to administer this refuge from our headquarters in Woodbridge, Virginia.

GOAL 1:

Protect forest, wetland, and shoreline habitats to support native wildlife and plant communities including species of conservation concern.

Objective 1.1 Mature Hardwood-mixed Forest Habitat and Associated Native Wildlife

Continue to protect the 80 acres of forested habitat on the refuge, with emphasis on providing habitat for bald eagles and other birds of conservation concern.

Rationale

See rationale for alternative B, goal 1, objective 1.1.

Strategies

Continue to

- Cooperate with VDGIF in monitoring bald eagle activity on the refuge
- Address injurious or nuisance wildlife as problems arise
- Address issues of invasive plants as problems arise

Objective 1.2 Shoreline Protection, Wetlands, and Water Quality

Continue to protect the 220 acres of wetlands on the refuge and its 2.2 miles of shoreline to maintain their integrity and protect their habitat values.

Rationale

See rationale for alternative B, goal 1, objective 1.2.

Strategies

Continue to

- Prohibit public access to refuge shoreline and wetlands
- Use refuge law enforcement to conduct outreach and enforce restrictions

Objective 1.3 Interjurisdictional and Federal Trust Fisheries

Continue to cooperate with partners to research or monitor interjurisdictional and Federal trust fisheries, and other aquatic species of concern, on the refuge and in surrounding waters.

Rationale

See rationale for alternative B, goal 1, objective 1.3.

Strategies

Continue to

- Provide assistance, typically logistical, to research partners upon request, to facilitate their research on fish and other aquatic species in the tidal Potomac River

GOAL 2:

Provide compatible, wildlife-dependent recreational opportunities to increase the enjoyment and appreciation of the refuge's resources to visitors and nearby residents.

Objective 2.1 Public Access

Continue to prohibit public access due to a lack of safe public access and parking.

Rationale

Since its establishment in 1979, the refuge has never been open to public access because there is no public parking area with provisions for a safe pathway from the parking area to the refuge.

Over the years, we have considered several options for public access, but none were determined practicable or feasible. The existing Service easement (allowing administrative access only) to the north of the refuge is often suggested, but it exits at a residential neighborhood that could not be used for parking. Building a parking area on the refuge proper would not be feasible given the relatively small size of the refuge and the extent of its wetlands. There is a public parking area at the VRE station that has been suggested for use, but there is no viable option for safely traversing the railroad tracks between the lot and the refuge. We continue to work with Prince William County to explore options as noted in the “Actions Common to Alternatives B and C Only” section of this chapter.

Strategies

Continue to

- Prohibit public access due to lack of safe public access and parking
- Use law enforcement officers to reduce trespass issues

Objective 2.2 Hunting

No program on the refuge due to a lack of safe public access and parking.

Rationale

Allowing hunting on the refuge is not feasible because of the lack of safe public access as described under objective 2.1.

Strategies

Continue to

- Coordinate with VDGIF conservation officer in addressing any illegal hunting issues

Objective 2.3 Recreational Fishing

No program on the refuge due to a lack of safe public access and parking.

Rationale

Allowing fishing on the refuge is not feasible because of the lack of safe public overland access as described under objective 2.1.

Strategies

Continue to

- Coordinate with the VDGIF conservation officer in addressing any illegal fishing issues

Objective 2.4 Wildlife Observation and Photography

No programs on the refuge due to a lack of safe public access and parking.

Rationale

Supporting wildlife observation and photography on the refuge is not feasible because of the lack of safe, public access as described under objective 2.1.

Objective 2.5 Interpretation

No program on the refuge due to a lack of safe public access and parking.

Rationale

Supporting an interpretation program on the refuge is not feasible because of the lack of safe public access as described under objective 2.1.

Objective 2.6 Environmental Education

No program on the refuge due to a lack of safe public access and parking.

Rationale

Supporting an environmental education program on the refuge is not feasible because of the lack of safe public access as described under objective 2.1.

GOAL 3: **Promote awareness, understanding, and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.**

Objective 3.1 Volunteers No program on the refuge due to a lack of safe public access and parking.

Rationale

Supporting a quality volunteer program on the refuge is not feasible because of the lack of safe public access as described under objective 2.1.

Objective 3.2 Community Outreach Continue outreach to the local community via the media when newsworthy events occur, and through contacts with law enforcement officer.

Rationale

Because there is no authorized public access, we strive to find alternative ways to educate the public about Featherstone Refuge and keep local communities informed about its resource values other than using onsite programs.

Strategies

Continue to

- Inform visitors at other units of the Refuge Complex and local residents about Featherstone Refuge and its resources through the media, interpretive materials available at Occoquan Bay Refuge visitor contact facility, and our website
- 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
- Respond to inquiries written, telephoned, or made in person by the public

Objective 3.3 Elected Official Outreach Continue to inform elected officials representing the refuge area about Refuge Complex priorities and planning for Featherstone Refuge.

Rationale

We seek support from elected officials for all our Refuge Complex programs. With regards to Featherstone Refuge, it is important we clarify to those officials why the refuge has remained closed and what management issues we face.

Strategies

- Continue to provide written or personal briefings for local officials and members of Congress or their staffs, as needed or as requested, to inform them about important events or about issues affecting the refuge.

Objective 3.4 Research Continue to facilitate compatible research opportunities to support management decisions.

Rationale

We need to support compatible, partner-led research that would help us maintain the wildlife and habitats at Featherstone Refuge or that contribute to addressing regional issues of concern to the Service.

Strategies

- As opportunities arise, support research that is compatible with refuge purposes, goals and objectives

Alternative B (Enhanced Management) is the Service-preferred alternative. Under alternative B, the Service would build off the wildlife and habitat actions in alternative A. Increased emphasis would be on monitoring and protecting

Featherstone Refuge Alternative B—Enhanced Management (Service-preferred Alternative)

sensitive areas from human disturbance, such as the refuge shoreline and riparian forest habitats. In addition, monitoring and controlling invasive plants, pests, and pathogens to avoid catastrophic loss or degradation of habitat would remain a priority. As funding, staffing, or partner assistance allows, we would also collect refuge habitat data, such as locations of vernal pools and nesting sites, to include in a GIS database. Research by partners would also be encouraged to support refuge goals and objectives, enhance our understanding of Federal trust resources, or address issues of concern.

Under alternative B, the Service would continue to pursue and evaluate options with Prince William County and other stakeholders to secure public parking, and safe and legal public access to the refuge--an issue since the refuge was established. In addition, many stakeholders are seeking a means to establish segment of the PHNS Trail on the Refuge, contributing to a concept of a continuous network between the Mount Vernon Trail (in southern Fairfax County) and Prince William Forest Park.

Once public access is secured, and we have additional staff to effectively manage a visitor program, we would provide opportunities for wildlife observation and nature photography on designated refuge trails, and fishing at designated sites. New proposed infrastructure construction would be contingent on available funding. Map 3.3 depicts potential locations for new public use infrastructure. Within 5 years we would also evaluate in detail a proposal to provide opportunities for hunting in cooperation with VDGIF. Other alternatives, including no action, would be considered in the hunt program evaluation, and there would be public involvement before making a final decision.

*Boundary marker on
Featherstone refuge*



USEFWS

Map 3.3. Proposed Public Use Features at Featherstone Refuge



Objectives and Strategies to Meet Refuge Goals

GOAL 1:

Protect forest, wetland, and shoreline habitats to support native wildlife and plant communities including species of concern.

Objective 1.1 Mature Hardwood-mixed Forest Habitat and Associated Native Wildlife

Monitor habitat conditions and protect sensitive areas from human disturbance on the refuge's 80 forested acres, with emphasis on nesting bald eagles, migratory birds, and other species of conservation concern identified in the Virginia Wildlife Action Plan.

Rationale

Sustaining a contiguous, healthy, and diverse mature hardwood-mixed forest on Featherstone Refuge contributes to migratory bird conservation due to the refuge's location in a highly urbanized area. Remaining coastal forests and woodlands within BCR 30, like those on the refuge, provide stopover sites during migration and overwintering for neotropical migrants (Steinkamp, 2008). Within BCR 30, forested upland communities provide habitat for the second highest number of priority bird species in the region (USFWS, 2007). Destruction and fragmentation of forests in both breeding and wintering areas are factors in the decline in forest bird species abundance (Roth et al., 1996). Many of these declining species are also associated with dense understory conditions created by local disturbance. These conditions have become less common due to a lack of forest management and over-browsing by white-tailed deer (Rich et al., 2004).

Management at Featherstone Refuge would be focused on protecting habitat for bald eagles and other migratory birds of conservation concern. Because of its size, the refuge only minimally contributes to conserving habitat for forest interior dwelling (FIDs) neotropical bird species which are regionally in decline due to habitat loss and fragmentation. FIDs species require large contiguous forested tracts to maintain viable populations. These species require a minimum habitat patch size of 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) (Jones et al., 2000). However, the 50-acre minimum habitat patch size is only capable of supporting less area-sensitive FIDs species; more area-sensitive species require larger continuous forest patches. Larger patches also increase the probability of supporting a diversity of productive breeding pairs.

FIDs such as wood thrush, Acadian flycatcher, and scarlet tanagers are known to occur on the refuge and are listed as birds of conservation concern by various authorities (appendix A). According to the PIF Area 44 Plan, the BCR 30 plan, and Virginia WAP, other birds species of conservation concern that would benefit from a diverse, mature, mixed-deciduous forest include raptors such as red-shouldered hawk (*Buteo lineatus*) and cavity-nesting birds such as pileated (*Dryocopus pileatus*) and red-bellied woodpeckers (*Melanerpes carolinus*) (Rosenberg et al., 1999; PWCA, 2008).

Among a number of management recommendations for forest birds made by the ACJV in the BCR 30 Plan are:

- Increase/improve active management of forests to improve habitat quality within existing and high priority upland forest (e.g., loss of shrub layer).

- Manage upland forest communities to provide post-fledging habitat (e.g. a habitat mosaic, including shrubby areas and openings; targeted species is the wood thrush).
- Develop and implement programs to control invasive plant species.

Bald eagle conservation also continues to be a priority on the refuge since their protection was a key reason for refuge establishment. After four decades of protection under the Federal Endangered Species Act, the bald eagle was officially removed from the Federal list of endangered and threatened wildlife in 2007. However, they are still protected under the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Bald eagles also continue to be listed as species of concern in Virginia.

The refuge shoreline provides important foraging and perching habitat for bald eagles. Although the refuge does not currently support any breeding pairs of bald eagles, it has previously and will hopefully again in the future as Virginia's eagle population continues to grow. There are active pairs in the vicinity of the refuge. The State's population has steadily increased from a low of 33 nests in 1970 to current numbers of nearly 550 pairs in Virginia's Coastal Plain, and over 1,000 pairs throughout the Chesapeake Bay region.

For more than 30 years, the VDGIF has cooperated with the Service, with academic and research partners—the Center for Conservation Biology (CCB) at The College of William and Mary, in particular—and with public and private landowners to achieve and document recovery of bald eagles. Both VDGIF and the Service remain committed to protecting bald eagles to ensure that a healthy population can be sustained. Widespread urban sprawl and habitat destruction in the Coastal Plain pose serious risks to some of the region's best eagle nesting, foraging, and roosting habitat. To address these and other threats, both agencies have developed management guidelines: the Virginia Bald Eagle Management Guidelines (2007) and the Service's National Bald Eagle Guidelines (2007). Under alternative B, we would support VDGIF in implementing both agencies' guidelines as they apply to Featherstone Refuge.

The refuge's forests also provide habitat for native mammals, amphibians and reptiles. Appendix A presents a listing of all species thought to occur on the refuge. Of the reptile species that likely to occur, three are listed by the Virginia WAP as species of conservation concern, including the eastern hog-nosed snake (Tier IV), spotted turtle (Tier III) and eastern box turtle (Tier III).

Strategies

Continue to

- Cooperate with VDGIF in monitoring bald eagle activity on the refuge

Over the 15 years of CCP implementation

- Identify potential habitat improvements for bald eagle, waterfowl, or other migratory birds
- Identify partners to conduct surveys of neotropical migratory birds and other birds of concern;
- Enlist USDA–FS, State or conservation organizations with ecological expertise, to conduct forest health and condition inventory and identify any significant threats;

- Map in GIS, and protect from adverse impacts, any vernal pools or other unique habitat features;
- Inventory invasive plant species and prioritize their treatment;
- Use chemical, mechanical, biological, hand-pulling or prescribed fire treatments as warranted;
- Address injurious or nuisance wildlife as problems arise
- Hire additional wildlife program staff as outlined in appendix E—staffing chart to plan, implement, and monitor biological program

Objective 1.2 Shoreline Protection, Wetlands, and Water Quality

Protect the refuge’s 220 acres of wetlands and its 2.2 miles of shoreline to maintain their integrity and protect their habitat values.

Rationale

Adopting measures to monitor and evaluate shoreline erosion, and minimize other threats to the integrity of the shoreline, is important to protecting refuge lands. Once lost, attempting to restore segments of river shoreline would be tremendously expensive and may be infeasible. However, shoreline protection will be evaluated within the context of climate change and sea level rise to determine the feasibility of shoreline protection projects.

Minimizing impacts to water quality and wetlands is also vital to maintaining the integrity, and sustaining the health and diversity of refuge habitats and wildlife populations over the long-term. Water quality impacts may come from contaminant in water draining the landward side upgradient of the refuge in the Farm Creek and other smaller drainages and from stormwater flows immediately adjacent to the refuge. From the Potomac River side, impacts may come from contaminants in the river water. The refuge has no water quality data regarding the upland side drainages. The tidal Potomac River is monitored by the EPA and surrounding jurisdictions for a variety of water pollutants and sources.

Section 303(d) of the Federal Clean Water Act requires Virginia 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.

Featherstone Refuge is located in the Upper Tidal portion of the Potomac River. The Virginia Department of Environmental Quality (VA DEQ, 2008) has identified the waters of the Potomac River Lower Tidal, Potomac River Middle Tidal, and Potomac River Upper Tidal on the State’s 303(d) List as impaired by nutrients (1996), sediments (1996), toxics (PCBs found in fish tissue (2002), and impacts to biological communities (2004 and 2006) (Potomac River Lower and Middle Tidal only). Additionally, the Potomac River Lower Tidal was listed as impaired by bacteria in 2004, the Potomac River Middle Tidal was listed as impaired by metals (cadmium, chromium, copper, and lead) in 1996, and the Potomac River Upper Tidal was listed as impaired by metals (copper) in 1996 and impacts to biological communities in the non-tidal portions of the basin in 2006. A TMDL for fecal coliform to address the Potomac River Lower Tidal 2004 bacteria

listing was approved by the EPA in 2005, a water quality analysis (WQA) for cadmium, chromium, copper, and lead to address the Potomac River Middle Tidal 1996 metals listing was approved by the EPA in 2006, and a WQA for copper to address the 1996 metals listing was approved by the EPA in 2006.

We would work with the VDGIF to address these water quality issues.

Strategies

Over the 15 years of CCP implementation

- Monitor areas of substantive loss and work with experts to determine the feasibility of projects to mitigate shoreline erosion and wetlands impacts within the context of sea level rise.
- Seek funding to implement priority projects assuming they are practical and feasible, cost effective, and commensurate with resource values
- Facilitate a citizen science-based water quality monitoring program if an interest and a long-term commitment are present
- Work with VADCR-Division of Natural Heritage and other experts to conduct inventories for rare, threatened, and endangered plants species in Great Marsh. Potential species occurring in the marsh include sensitive joint-vetch, Parker's pipewort, and river bulrush.

Objective 1.3 Interjurisdictional and Federal Trust Fisheries

Support the Service's Fisheries Program, VDGIF, and other partners' efforts to manage, protect, and monitor interjurisdictional and Federal trust fisheries and other aquatic resources of conservation concern on the refuge and in surrounding waters.

Rationale

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 (USFWS, 2002). 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 tidal Potomac River and tributaries support a diversity of interjurisdictional fish species that depend in part on the larger tributaries (including the Occoquan River and Neabsco Creek) the smaller streams that include Farm Creek, and the marshes along the Virginia shoreline for habitat. Interjurisdictional fish listed as species of concern by the VDGIF (VCWCS, 2005) include the shortnose sturgeon (a Federal-listed endangered species and a listed by VDGIF as Tier I), Atlantic sturgeon (Tier II), alewife (Tier IV), American shad (Tier IV) and American eel (Tier IV).

It will be important to coordinate the strategies in this objective with VDGIF, and other State and Federal agencies and organizations with jurisdiction or a mission to protect these resources. For example, the National Marine Fisheries Service (NMFS), and the Service's Fisheries Program Office in Virginia would be a key partners in meeting this objective. As would the Potomac River Fisheries Commission (PRFC), which regulates, and issues licenses for, all recreational and commercial fishing, crabbing, oystering and clamming in the main stem tidal Potomac River. The PRFC also coordinates regulations with the Maryland Department of Natural Resources (DNR), the Virginia Marine Resources Commission (VMRC) and VDGIF, and with the other Atlantic coastal states through the Atlantic States Marine Fisheries Commission (ASMFC).

Strategies

Continue to

- Provide assistance, typically logistical, to research partners upon request, to facilitate their research on fish and other aquatic species in the tidal Potomac River

Over the 15 years of CCP implementation

- Assist VDGIF, NMFS, the Service's Virginia Fisheries Program office, and other Federal and State agencies, when needed, to address interjurisdictional fish issues related to the waters of the refuge and the Potomac River.

GOAL 2:

Provide compatible, wildlife-dependent recreational opportunities to increase the enjoyment and appreciation of the refuge's resources to visitors and nearby residents.

Objective 2.1 Public Access

Continue to work with Prince William County and other stakeholders to establish safe public parking and access.

Rationale

As we described in chapter 2, we do not currently allow public access to the refuge because we are unable to provide parking and safe, legal access to the refuge. This is essential to implementation of visitor programs on this refuge. It is important to recognize, however, that once parking and legal access is secured, we would also need to construct trails in locations that minimize impacts to natural resources. Unfortunately, there are very few options to develop public access, given the refuge's location between a residential single-family area, an industrial park, a high density housing development, and an active railroad line. However, we would continue to actively explore all possibilities as we describe below.

We have heard recommendations to open the refuge to those who live within walking distance or to boaters who can access the refuge from the water, as neither of these user groups would require parking. We do not believe that providing these limited opportunities to select groups of people is in the best interest of the American public, nor an efficient use of our limited funding and staffing resources.

Given our interests in providing access to the general public, we are only aware of one viable option. This option focuses on the using the current Virginia Rail Express (VRE) parking area and platform. This has the potential to provide parking for refuge users and safe access across the CSX railroad tracks. In addition, it presents an opportunity to construct a trail from the west side of the railroad tracks to the refuge boundary and along an old roadway that has the potential to become part of the Potomac Heritage National Scenic Trail (PHNS Trail)

We would continue to discuss with Prince William County, the National Park Service (NPS), and other stakeholders, all viable options for resolving the access and parking issue and establishing and maintaining a 1.1 mile segment of the PHNS Trail through Featherstone Refuge. The PHNS Trail includes 830 miles of existing and planned trail segments linking the mouth of the Potomac River to the Allegheny Highlands with the goal of providing "... a means to explore the origins and continuing evolution of the Nation" (<http://www.nps.gov/pohe/index.htm>). The NPS is the Federal agency providing oversight and coordination for the PHNS Trail. The NPS is currently working on a Memorandum of Understanding with state and Federal partners to develop a regional trails plan in the vicinity of Featherstone refuge. The refuge would consider becoming a signatory, if there is potential to resolve the public access issue. As a multi-use facility (i.e., for foot and bicycle uses), the PHNS Trail segment would likely require an improved surface constructed according to American Association of State Highway and Transportation Officials (AASHTO) standards.

Strategies

Over the duration of the cooperative agreement

- Support Prince William County in pursuing VRE and CSX Station parking and crossover and platform access, as well as other viable options to provide safe public access
- With access and parking secured, support partner development of PHNS Trail
- Assist VDGIF in implementing other public access needs and compatible opportunities that would facilitate their management of hunting and fishing programs.
- Hire visitor service and maintenance staff as identified in staffing chart (see appendix E)

Objective 2.2 Hunting

Evaluate opportunities for a quality hunting program in partnership with VDGIF

Rationale

Members of the public and VDGIF have recommended we allow hunting on the refuge. Specifically mentioned to us are interests in waterfowl and deer hunt consistent with state seasons. At present, we have not developed a hunt program proposal to the extent that we could conduct a NEPA analysis and involve the public. Instead, within five years of CCP approval, we would identify and analyze a detailed proposal, and involve the public, before making a decision.

Hunting, if approved, would provide a priority public use in an area where public hunting opportunities are rapidly declining as development increases. The 1997 Refuge Improvement Act specifically identifies hunting as a priority wildlife-dependent recreational activity on refuges. Our particular interest in evaluating a hunt program on this refuge is similar to our reason for offering one at Mason Neck Refuge; that is, we are concerned about the impacts on native vegetation and forest regeneration from deer overbrowsing. Any negative affects on the ecological integrity, diversity, and health of the forest habitat would cause us to consider hunting as a potential management tool to minimize harmful impacts.

Strategies

Within 5 years of CCP implementation

- Evaluate in detail a proposal to provide opportunities for hunting consistent with state seasons in partnership with VDGIF. Other alternatives, including no action, would be considered in the hunt program evaluation, and there would be public involvement before making a final decision.

Objective 2.3 Recreational Fishing

Provide a quality recreational fishing opportunity at designated refuge sites.

Rationale

The 1997 Refuge Improvement Act identifies fishing as priority wildlife-dependent recreation for refuges. Fishing provides an opportunity for the Service to promote an understanding and appreciation of natural resources and their management in the Potomac River and Chesapeake Bay ecosystems and on all lands and waters in the Refuge System.

We would facilitate fishing at designated sites, in partnership with VDGIF, assuming access and staffing are secured to manage the program. Map 3.3 depicts where up to four fishing sites would be developed and designated.

By increasing the use and enjoyment of this refuge, and raising its visibility, we can better communicate its importance to wildlife and habitat. In turn, we hope this increases support for the Refuge System, and promotes stewardship of natural resources in the local community, the country, and globally.

Strategies

Over the 15 years of CCP implementation

- Within 5 years, with staffing in place, complete administrative requirements to open the refuge to fishing
- Develop up to four designated fishing sites (see map 3.3)
- Enlist assistance from VDGIF to help manage the program

Objective 2.4 Wildlife Observation and Photography

Provide self-guided wildlife observation and photography opportunities at designated locations on the refuge.

Rationale

The 1997 Refuge Improvement Act identifies wildlife observation and photography as priority wildlife-dependent recreation on refuges. These activities promote the understanding and appreciation of natural resources and their management on all lands and waters in the refuge system.

Assuming safe public access and parking is secured, and staffing and funding to construct and maintain infrastructure is in place, we would develop a self-guided wildlife observation and photography program. Our objective would be to promote an understanding of the wildlife and habitat resources of Featherstone Refuge, as well as other refuges in the Refuge Complex. Tentative locations for infrastructure are presented on map 3.3.

Strategies

Over the 15 years of CCP implementation

- Continue to pursue discussions with Prince William County on 1.1 mile segment of the PHNS Trail and public access and parking as in alternative B, objective 2.1 above

- Assuming public access is secured, pursue staffing, as indicated in appendix E, and funding to develop and maintain a self-guided wildlife observation and photography program
- Seek funding to develop infrastructure as presented on map 3.3 which includes approximately 0.75 miles of trails (in addition to the PHNS Trail) and up to four observation platforms. Trails would be surfaced with dirt or stone dust.

Objective 2.5 Interpretation

Provide informational and interpretive panels at trailheads, or other focal points of visitor activity to facilitate a self-guided experience.

Rationale

The 1997 Refuge Improvement Act identifies interpretation as priority wildlife-dependent recreation on refuges. It may include activities, talks, publications, audio-visual media, signs, and exhibits that convey key messages about natural and cultural resources to visitors. Visitors who experience interpretation have the opportunity to make their own connections to the resource leading to possible resource stewardship and the understanding of resource relationships and human impacts.

Similar to objective 2.5, once safe public access and parking is secured, and staffing and funding to construct and maintain infrastructure is in place, we would develop informational and interpretive panels at trailheads to facilitate self-guided opportunities. Occasional interpretive talks and tours would be given upon request.

Another effort underway related to potential interpretative activities on the refuge is the proposed Captain John Smith Chesapeake National Historic Trail. In September 2010, the NPS released for public review and comment the draft Comprehensive Management Plan and EA for this trail. The trail is the first national water-trail and commemorates the explorations of John Smith on the Chesapeake Bay and its tributaries in 1607-1609, tracing approximately 3,000 miles of his voyage routes.

The NPS is working with many partners to plan, develop, and manage the trail, including refuges in the Chesapeake Bay area. Other partners include the Friends of the Captain John Smith Trail, the Chesapeake Bay Gateways and Watertrails Network, Federal and State agencies, communities, nonprofit organizations, and businesses. The draft plan and EA outline how the NPS and these partners will develop component water trails, provide access to the trail, interpret the John Smith voyage, and protect the important resources related to the trail. Refuges in the Chesapeake Bay area, including the Potomac River Refuge Complex, have been coordinating with the NPS on identifying compatible opportunities on refuge lands to support this effort. We will continue to coordinate with the NPS on developing opportunities for the trail consistent with the final decision of the CCP.

Strategies

Over the 15 years of CCP implementation

- Continue to pursue discussions with Prince William County on PHNS Trail and public access and parking as in alternative B, objective 2.1 above
- Assuming public access is secured, pursue staffing, as indicated in appendix E, and funding to develop and maintain a limited self-guided interpretive program

- Encourage trained volunteers, Friends Group members, and partners to conduct interpretive walks and related programs.
- Coordinate with the National Park Service to identify opportunities to interpret the Captain John Smith Chesapeake National Historic Trail on the refuge, such as placing interpretative panels at strategic locations.

**Objective 2.6
Environmental Education**

Support partner-led environmental educational opportunities upon request.

Rationale

The 1997 Refuge Improvement Act identifies environmental education as priority wildlife-dependent recreation on refuges. Visitors would benefit from environmental education opportunities on the refuge. These activities would promote understanding and appreciation of natural resources and their management and would help to raise awareness, understanding, and appreciation of the role of the refuge in the tidal Potomac River and Chesapeake Bay watershed and its contribution to migratory bird conservation. We would support partner-led efforts to design and implement an environmental education program. That program could include teacher-training or on-site student programs.

Strategies

Over the 15 years of CCP implementation

- Continue to pursue discussions with Prince William County on PHNS Trail and public access and parking as in alternative B, objective 2.1 above
- Assuming safe public access is secured, encourage partners to lead quality environmental educational programs, operating under a special use permit

GOAL 3:

Promote awareness, understanding, and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.

Objective 3.1 Volunteers

Provide volunteer opportunities to facilitate public use, wildlife and habitat management programs

Rationale

We benefit from volunteer support of programs on the refuge. Volunteer projects also can be an effective outreach tool to increase awareness and understanding of local and regional resource concerns.

Strategies

Over the 15 years of CCP implementation

- Develop a list of volunteer opportunities and recruit for projects as needed

Objective 3.2 Community Outreach

Conduct outreach to inform the local community about programs or activities.

Rationale

Because there is no authorized public access, we strive to find alternative ways to educate the public about Featherstone Refuge, and keep the local community informed about its values to wildlife and habitat resources, other than using onsite programs. We would continue to develop and pursue community outreach activities which promote natural resource stewardship, and raise awareness of the Refuge System, the Refuge Complex, and this refuge's contribution to maintaining natural resources in the region.

Strategies

Continue to

- Inform visitors at other units of the Refuge Complex and local residents about Featherstone Refuge and its resources through the media, interpretive materials available at Occoquan Bay refuge visitor contact facility, and our website
- 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
- Respond to inquiries written, telephoned, or made in person by the public

Over the 15 years of CCP implementation

- Increase communication and outreach efforts, when needed, to enhance community relations

Objective 3.3 Elected Official Outreach

Conduct outreach to elected officials to explain management priorities or highlight management issues and challenges.

Rationale

We seek support from elected officials for all our Refuge Complex programs. It is important to keep them apprised, especially when significant new programs are implemented. Also, as issues arise, it is important to provide updates and explain how the issues are being addressed.

Strategies

Continue to

- Provide written or personal briefings for members of Congress or their staffs, as needed or as requested, to inform them about important events or about issues affecting the refuge.

Over the 15 years of CCP implementation

- Enhance outreach to Federal, State and local officials

Objective 3.4 Research

Facilitate research, monitoring, and inventory opportunities that will enhance science-based decision-making and adaptive management.

Rationale

We would encourage partner-led research that would increase our understanding of wildlife and habitats at Featherstone Refuge, or that would contribute to addressing issues of regional concern to the Service and the State.

Strategies

Over the 15 years of CCP implementation

- Identify and prioritize research and monitoring needs for the refuge
- Encourage partners to conduct research and assist them in seeking alternative funding sources

Featherstone Refuge—CCP Alternatives Comparison Table

Earlier in this chapter, in the section titled “Actions Common to Both Alternatives,” we described many important actions which are not discussed in the table below. Those actions include:

- Coordinating with Refuge partners, Friends, and the Prince William County community
- Protecting Federal-listed and recently de-listed species
- Controlling pest plants and animals
- Monitoring and abating wildlife diseases
- Supporting biological research and investigations
- Distributing Refuge Revenue Sharing payments
- Protecting cultural resources

The reader is encouraged to review that section, as well as the detailed discussions in chapter 3 for each alternative, for a complete perspective on each alternative.

Table 3.2 highlights those actions that distinguish the two alternatives we analyzed in detail for Featherstone Refuge. It is also organized to show how they relate to our refuge goals, and the resources and programs of importance to the refuge. Our intent is to provide an easy way to compare and contrast the alternatives. Please refer to the glossary to interpret any acronyms.

Table 3.2 Comparison of objectives and strategies for Featherstone NWR alternatives

Alternative A Current Management	Alternative B Enhanced Management (Service-Preferred Alternative)
Goal 1: Protect forest, wetland, and shoreline habitats to support native wildlife and plant communities including species of concern.	
Objective 1.1 Mature Hardwood-mixed Forest Habitat and Associated Native Wildlife	
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Cooperate with VDGIF in monitoring bald eagle activity on the refuge. ● Address injurious or nuisance wildlife as problems arise. ● Address issues of invasive plants as problems arise; treat on limited scale as funding and staff resources allow. 	<p>In addition to alternative A strategies, <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Identify potential habitat improvements for bald eagle, waterfowl, or other migratory birds. ● Enlist partners to conduct surveys of Neotropical migratory birds and other birds of concern. ● Enlist USDA–FS, State or conservation organization ecological expertise, to conduct forest health and condition inventory and identify any significant threats. ● Map in GIS, and protect from adverse impacts, any vernal pools or other unique habitat features. ● Inventory invasive plant species and prioritize their treatment; treat via chemical, mechanical, biological, hand-pulling or prescribed fire methods as warranted. ● Hire Biological program staff as identified in staffing chart (appendix E).
Objective 1.2 Shoreline Protection, Wetlands, and Water Quality	
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Prohibit public access to refuge shoreline and wetlands. ● Use refuge law enforcement to conduct outreach and enforce restrictions. 	<p>In addition to alternative A strategies, <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Monitor areas of substantive loss and work with experts to develop projects to mitigate shoreline erosion and wetlands impacts. ● Seek funding to implement priority projects assuming they are practical and feasible, cost effective, and commensurate with resource values ● Facilitate a citizen science-based water quality monitoring program if an interest and a long-term commitment are present. ● Hire biological program staff as identified in staffing chart (appendix E).
Objective 1.3 Interjurisdictional and Federal Trust Fisheries	
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Provide assistance, typically logistical, to research partners upon request, to facilitate their research on fish and other aquatic species in the tidal Potomac River. 	<p>In addition to alternative A strategies, <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Assist VDGIF, NMFS, the Service’s Virginia Fisheries Program office, and other Federal and State agencies, when needed, to address issues of interjurisdictional fish related to the waters of the refuge and the Potomac River. ● Hire biological program staff as identified in staffing chart (appendix E).

Alternative A Current Management	Alternative B Enhanced Management (Service-Preferred Alternative)
Goal 2: Provide compatible, wildlife-dependent recreational opportunities to increase the enjoyment and appreciation of the refuge's resources to visitors and nearby residents.	
Objective 2.1 Public Access	
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Prohibit public access due to lack of safe public access and parking ● Use law enforcement officers to reduce trespass issues. 	<p><u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Continue discussions with Prince William County, NPS, and other stakeholders about viable options for establishing and maintaining the 1.1 mile segment of the PHNS Trail through the refuge, including resolution of the access and parking issue. ● Support Prince William County in pursuing VRE and CSX Station parking and crossover and platform access, as well as other viable options. ● Implement other proposed trails (approx 0.75 miles) and up to 4 observation platforms ● Hire visitor service and maintenance staff as identified in staffing chart (see appendix E).
Objective 2.2 Hunting	
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Coordinate with VDGIF conservation officer in addressing any illegal deer hunting issues. 	<p><u>Within 5 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Evaluate in detail a proposal to provide opportunities for hunting consistent with state seasons in partnership with VDGIF. Other alternatives, including no action, would be considered in the hunt program evaluation, and there would be public involvement before making a final decision.
Objective 2.3 Recreational Fishing	
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Coordinate with the VDGIF conservation officer in addressing any illegal fishing issues 	<p><u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Hire visitor services staff as outlined in appendix E to plan and implement programs. ● Complete administrative requirements to formally open the refuge to fishing. ● Assuming safe public access is secured, construct proposed infrastructure as indicated on map 3.3 to support fishing at designated sites. ● Manage program in partnership with VDGIF
Objective 2.4 Wildlife Observation and Photography	
<p>Strategies No program</p>	<p><u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Continue to lead discussions with Prince William County and NPS on PHNS Trail as in alternative B, objective 2.1 above. ● Hire visitor services staff as outlined in appendix E to plan and implement programs. ● Assuming safe public access is secured, construct proposed public use infrastructure as indicated on map 3.3 to support program including approx 0.75 miles of new trail and up to 4 observation platforms.

Alternative A Current Management	Alternative B Enhanced Management (Service-Preferred Alternative)
Goal 2: (cont.) Provide compatible, wildlife-dependent recreational opportunities to increase the enjoyment and appreciation of the refuge's resources to visitors and nearby residents.	
Objective 2.5 Interpretation	
<p>Strategies No program</p>	<p><u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Hire visitor services staff as outlined in appendix E to plan and implement programs. ● Assuming safe public access is secured: <ul style="list-style-type: none"> ◆ Install interpretive panels at key locations to explain refuge regulations and any other resource information. ◆ Encourage trained volunteers, Friends Group members, and partners to conduct interpretive walks and related programs. ● Coordinate with the National Park Service to identify opportunities to interpret the Captain John Smith Chesapeake National Historic Trail on the refuge, such as placing interpretive panels at strategic locations.
Objective 2.6 Environmental Education	
<p>Strategies No program</p>	<p><u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Assuming safe public access is secured and visitor services staff is in place as indicated in appendix E, then: <ul style="list-style-type: none"> ◆ Encourage partner-led programs on refuge lands, operating under a special use permit.
GOAL 3: Promote awareness, understanding, and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.	
Objective 3.1 Volunteers	
<p>Strategies ● No program</p>	<p><u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Develop and maintain a list of volunteer projects and recruit on an as-needed basis.
Objective 3.2 Community Outreach	
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Inform visitors at other units of the Refuge Complex and local residents about Featherstone Refuge and its resources through the media, interpretive materials available at Occoquan Bay refuge visitor contact facility, and our website. ● 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. ● Respond to inquiries written, telephoned, or made in person by the public. 	<p>In addition to alternative A strategies, <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Conduct outreach efforts, when needed, to enhance local community relations.

<p style="text-align: center;">Alternative A Current Management</p>	<p style="text-align: center;">Alternative B Enhanced Management (Service-Preferred Alternative)</p>
<p style="text-align: center;">GOAL 3: (cont.) Promote awareness, understanding, and support of the values of the refuge, the resources of the Chesapeake Bay watershed, and the mission of the National Wildlife Refuge System.</p>	
<p>Objective 3.3 Elected Official Outreach</p>	
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● Provide written or personal briefings for local officials and members of Congress or their staffs, as needed or as requested, to inform them about important events or about issues affecting the refuge. 	<p>In addition to alternative A strategies, <u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Enhance outreach to Federal, State and local officials to share benefits of refuge programs
<p>Objective 3.4 Research</p>	
<p>Strategies <u>Continue to</u></p> <ul style="list-style-type: none"> ● As opportunities arise, continue to support research that is compatible with refuge purposes, goals and objectives. 	<p><u>Over the 15 years of CCP implementation:</u></p> <ul style="list-style-type: none"> ● Identify and prioritize research and monitoring needs for the refuge. ● Encourage partners to conduct research and assist them in seeking alternative funding sources.

Chapter 4

Steve Hillebrand/USFWS



Great blue heron

Environmental Consequences

- Introduction
- Environmental Consequences of Mason Neck Refuge CCP Alternatives
- Environmental Consequences of Featherstone Refuge CCP Alternatives

Introduction

This chapter describes the foreseeable environmental consequences we predict from implementing the refuge management alternatives presented in chapter 3. Part 1 describes the impacts of the three CCP alternatives for Mason Neck Refuge; part 2 the impacts of the two CCP alternatives for Featherstone Refuge. Where detailed information is available, we present a scientific and analytic comparison between alternatives and their anticipated consequences, which we describe as “impacts” or “effects.” In the absence of detailed information, we make comparisons based on our professional judgment and experience.

Existing Contexts for Impacts Analyses at Mason Neck and Featherstone Refuges

- Woodbridge, Virginia—6,912 acres
- Fairfax County*—260,480 acres
- Prince William County*—222,720 acres
- Atlantic Coast Joint Venture (ACJV) Lower Potomac River Focus Area—416,551 acres
- Bird Conservation Region (BCR) 30—24,428,000 acres
- Potomac River Tidal Fresh Important Bird Area (IBA)—281,024 acres
- Mason Neck Peninsula—9,000 acres
- Mason Neck Refuge—2,277 acres
 - ◆ Little Marsh Road Impoundment—1.5 acres
 - ◆ Little Marsh—50 acres
 - ◆ Great Marsh—207 acres
 - ◆ Existing Trails—3.75 miles
 - ◆ Kiosk/sign footprint—< .05 acre
- Featherstone Refuge—325 acres

We focus our discussion in each part on the impacts associated with the goals and key issues identified in chapter 1—Purpose and Need for Action. Direct, indirect, short-term, beneficial and adverse effects likely to occur over the 15-year life span of the plan are discussed. Beyond the 15-year planning horizon, we give a more approximate description of the direct, indirect, and cumulative effects. Table 4.2 summarizes the effects predicted for each Mason Neck Refuge alternative and allows for a side-by-side comparison. Similarly, table 4.3 summarizes the predicted effects for each Featherstone Refuge alternative. Finally, each part of this chapter identifies cumulative impacts, any irreversible and irretrievable commitment of resources and the relationship between short-term uses of the environment and its long-term productivity.

As required by the Council on Environmental Quality (CEQ) and U.S. Fish and Wildlife Service (Service) regulations regarding implementing the National Environmental Policy Act (NEPA), we assessed the importance of the effects of the CCP alternatives based on their context and intensity. The context of the impacts ranges from site-specific to broader regional and eco-regional scales. Although refuge lands comprise a small percentage of these larger regional area contexts, all alternatives were developed to contribute towards conservation goals in these larger contexts. The proposed species and habitat actions are

*Mason Neck NWR is located in Fairfax County; Featherstone NWR in Prince William County

consistent with the State, regional, ecosystem, and watershed conservation plans identified in chapter 1. At varying levels, each of the alternatives would make positive contributions to these larger-scale conservation endeavors.

We based our evaluation of the intensity of the effects of the alternatives on these factors:

- the expected degree or percentage of resource change from current conditions;
- the frequency and duration of the effect;
- the sensitivity of the resource to such an effect or the natural resiliency of the resource to recover from such an effect, and;
- the potential for implementing effective preventative or mitigation measures to reduce the effect.

The duration of effects vary from those that would occur only once for a brief period of time during the 15-year planning horizon, for example, the effects of road construction, to those that would occur every day during a given season of the year, for example, impacts from hunting or fishing.

There are certain types of actions identified in chapter 3 that do not require additional NEPA analysis because they do not individually, or cumulatively, have a significant effect on the human environment. These actions are “categorically excluded” from further analysis or review and, as such, their consequences are not further described in this chapter. These categorically excluded actions include, but are not limited to, the following:

- environmental education and interpretation programs (unless major construction is involved)
- research, resource inventories, and other resource information collection activities
- operations and maintenance of existing infrastructure and facilities (unless major renovation is involved)
- routine, recurring management activities and improvements
- small construction projects (e.g. fences, berms, small water control structures, interpretative kiosks, development of access for routine management purposes)
- vegetation plantings
- reintroduction of native plants and animals
- minor changes in amounts or types of public use
- issuance of new or revised management plans when only minor changes are planned
- law enforcement activities

The specific environmental impacts of certain aspects of Refuge management discussed in Chapter 3 are not explicitly evaluated herein. These include aspects of management that are both common to all alternatives and do not individually

or cumulatively have a significant effect on the quality of the human environment. They would qualify for exclusion under the FWS' list of categorical exclusions if individually proposed. These elements of Refuge management include: a new youth turkey hunt, invasive plant control, visitor service program enhancements, a new refuge housing facility, recreational vehicle (RV) pad for trailer parking, and research, inventories and monitoring.

We describe in chapter 3—"Alternatives considered including the Service-preferred alternative," under "Additional NEPA analysis" those future management decisions that may require more detailed analysis before a choice is made. We analyze the impacts of the available choices in this document to the extent possible, but more detailed analysis will inform a final choice.

We have organized this chapter by major resource heading so that each section describes the impacts of all management activities proposed under each of the three alternatives that would likely have an effect on a given resource, for example air quality or bald eagles. Under each heading, we discuss the resource context and the types of benefits and adverse impacts we evaluated for our proposed management actions. We then discuss the benefits and adverse effects that would occur regardless of which alternative we select and the benefits and adverse effects of each of the alternatives. Appendix B—Findings of Appropriateness and Compatibility Determinations, should also be referred to as it provides additional details on impacts that might occur for respective refuge uses and activities proposed under the alternatives.



Bill Wallen

Male cardinal

Part 1— Environmental Consequences of Mason Neck Refuge CCP Alternatives



USFWS

Great blue heron

Impacts in the Refuge Vicinity

Air Quality Impacts

Chapter 2, “Affected Environment,” discusses the status of regional air quality. We evaluated the management actions proposed for each alternative for their potential positive or negative effects on air quality. Potential positive effects include:

- Reducing the Refuge Complex’s contribution to carbon emissions by continuing and expanding energy efficient practices, such as using high mileage or low emission vehicles and upgrading lighting, heating and cooling facilities to be more energy efficient
- Reducing sources of emissions and the loss of forest vegetation by promoting regional land conservation to limit the growth of development
- Enhancing carbon sequestration and reducing greenhouse gases by protecting and restoring forest habitat

Potential adverse effects include:

- Increasing emissions from staff vehicles or equipment, and from visitor vehicles
- Increasing emissions from new or upgraded buildings

Air Quality Impacts that would not vary by Alternative

Our air quality analysis considered how refuge management actions may affect criteria air pollutants, visibility, and climate change. We focused on potential adverse impacts and improvements to localized air quality.

A major concern for regional air quality is automobile emissions. Visitors to the refuge and adjacent state park arrive primarily by car. However, once at the refuge, only non-motorized activities are permitted. Additionally, much of the refuge is not open to the public. Approximately 95 percent of the 2,227 acre refuge area is in natural vegetative cover, including 85 percent in mature forest (1,883 acres). This limits additional sources of carbon emissions, enhances carbon sequestration, and reduces greenhouse gases through filtering.

Visibility: None of the proposed management alternatives would cause visibility concerns due to emissions-based haze. In particular, the nearest Class I airsheds—lands that requires the highest level of protection from air pollutants under the Clean Air Act—would not be affected due to prevailing winds and/or distance. The two closest Class I airsheds are Shenandoah National Park in Virginia (88 miles away) and Brigantine Wilderness Area in New Jersey (166 miles away).

Under all alternatives, management actions and public use at the refuge would negligibly contribute to the overall regional and county air emissions levels.

Wildfire: The Mason Neck Peninsula, including the refuge, does not have a history of catastrophic wildfire. Nevertheless, we would seek to minimize the possibility of serious fires on refuge lands and their associated health and safety concerns. We would assess the wildfire hazards along the refuge boundaries common with privately owned land to ensure that our management practices are not creating excessive fuels that would lead to severe fires.

Emissions: Employee travel, visitor travel, and our facilities' heating and cooling systems would continue to contribute new sources of air pollution. However, we would reduce these impacts through the use of energy efficient systems and vehicles. We have already implemented actions such as installing fluorescent lighting, motion-activated night lighting, and low-emittance glass windows. These windows reduce the ultraviolet radiation factor by suppressing radiative heat flow, as well as fluorescent lighting, and motion-activated night lighting. We use "green" bio-degradable solvents whenever feasible. We have also achieved a 60-percent level of recycling of materials on the refuge complex.

Given the refuge's regional context and proximity to urban areas, we do not expect refuge visitors traveling by automobile would measurably add to current regional emissions levels. Under each alternative, we predict some level of increased visitation (see table 4.1). Organized group events, limited in time and duration, are expected to comprise much of the increased visitation. The community-proposed Gunston Road Trail project, if constructed, would also contribute to visitation increases under alternatives B and C. The proposed trail, which would cross part of the refuge, is described in greater detail in chapter 2 "Actions Common to All Alternatives—Community Initiatives."

Table 4.1. Estimate annual visitor days and predicted increases by alternative based on recent visitation reported during years 2005-2008

Fiscal Year	2005	2006	2007	2008
Annual Visitor Days	23,841	16,137	25,000	19,172
CCP Alternative	Alt A	Alt B	Alt C	
Predicted Percent Increase in Annual Visitation	10%	15%	20%	
Projected Number of Annual Visitor Days based on 2007 (highest recorded in recent years)	27,500	28,750	This	

We would continue to keep vehicle use on the refuge to a minimum. We would still limit vehicular access to trailhead parking areas for the general public and designated roadside parking locations for hunters. The only exception is during the deer hunt when hunters have vehicular access to other designated refuge areas.

Leaks and Spills:

There is a minimal risk for refuge activities and management operations to result in accidental leaks and spills of chemicals and petroleum products. These leaks and spill could indirectly impact air quality. However, we would diligently follow our leak and spill prevention and emergency clean-up procedures. These procedures would ensure that such occurrences are rare and are addressed immediately, with only short-term effects limited to the immediate location.

In summary, our management activities would not result in short- or long-term measurable negative contributions to regional air quality. None of the alternatives would violate EPA standards for criteria air pollutants; and all alternatives would comply with the Clean Air Act. Visibility of Class I areas would not be affected by management activities. We would comply with all Federal and State permitting requirements applicable to refuge lands. All required permits would be obtained before implementing management activities potentially affecting air quality. There would be no major new stationary or mobile sources of air pollutants at the refuge created under any of the refuge management alternatives.

Alternative A. Current Management

Benefits

Under alternative A, there would be continuing benefits to air quality from maintaining native vegetation on the refuge, including 1,900 acres of uplands and 297 acres of tidal and freshwater marsh. These benefits are two-fold; first, vegetation serves to filter air pollutants and, second, the presence of the refuge precludes development and the introduction of attendant sources of pollutant emissions on refuge lands. Continuing to protect 1,883 acres of mature forest would also provide some additional benefit due to the ability of forests to sequester carbon. Trees serve as long-term carbon “sinks” reducing the amount of atmospheric carbon (i.e. CO₂), which contributes to global climate change (USEPA, 2010).

Adverse Impacts

Ongoing trail maintenance activities would cause negligible short-term, localized effects from dust and vehicle and equipment exhausts. Operation of the refuge maintenance facility would continue to contribute negligibly to local stationary source emissions. Vehicles and equipment used by staff would contribute a negligible amount to local mobile source air emissions and particulates.

Increased annual refuge visitor use (see table 4.1) would slightly increase vehicle emissions on refuge lands over the longer term. These localized increases from refuge activities would be negligible compared to current off-refuge contributions to pollutant levels and likely increases in air emissions in the Fairfax County airshed from land development, road construction and maintenance, and industrial sites over the next 15 years. Any adverse air quality effects from refuge activities would be more than offset by the benefits of maintaining over 2,200 acres of refuge in natural vegetation.

Alternative B. Improved Management for Federal Trust Resources (Service-Preferred Alternative)

Benefits

As in alternative A, there would be continuing benefits to air quality from maintaining natural vegetation on more than 1,900 acres of refuge uplands and 297 acres of tidal and impounded freshwater marsh. Benefits would be

slightly higher because of an increased level of invasive plant control under this alternative. Reducing invasive plants would allow us to better maintain the native vegetation that filters air pollutants. Refuge lands preclude human development and attendant sources of pollutant emissions, and its forest, in particular, contributes to carbon sequestration. Under alternative B, refuge staff would continue to implement energy efficient practices, and additional practices would be adapted as feasible.

Adverse Impacts

Ongoing trail maintenance activities would cause localized and negligible short-term effects from dust and vehicle and equipment exhausts. Operation of the refuge maintenance facility would continue to contribute negligibly to local stationary source emissions. Also, permanent and seasonal staffing and numbers of volunteers would increase while refuge visitation would increase by up to 15 percent based on our predictions. As noted above some of this increase in visitation would be the result of more organized group activities, but most would likely be the result of the community-proposed Gunston Road trail.

The associated increased vehicle use by staff, volunteers and visitors, and increased equipment use by staff, under alternative B would contribute some minimal additional but negligible increment to local mobile source air emissions. Similar to alternative A, the contributions from other sources of air pollution in the Fairfax County and the greater region far outweigh any refuge contributions. As we maintain or construct new facilities we would continue to use energy efficient practices that reduce emissions, and pursue alternative energy sources such as solar and wind power, if practicable and feasible.

Alternative C. Management to Enhance Public Uses

Benefits

Habitat management under alternative C would be the same as alternative A, therefore the benefits to air quality from maintaining natural vegetation would be the same as those described above for alternative A.

Adverse Impacts

Under alternative C, refuge visitation is predicted to increase by 20 percent over current numbers. The amount of staffing would also increase similarly to alternative B. Compared to alternative B, the increase of vehicle and equipment emissions by staff, volunteers, and visitors would negligibly increase local mobile source air emissions, but would still represent a negligible contribution to regional air quality.

Water Quality, Wetlands, and Aquatic Biota Impacts

Good water quality is essential to sustaining healthy ecosystems within the Tidal Potomac River Basin and on the refuge. Water quality problems in the Basin caused by nutrient and sediment loading and chemical pollutants are a major concern. These concerns can directly contribute to a decline or loss of wetlands and aquatic species across the Basin and on the refuge. Please also refer to the section in this chapter under “Refuge-Specific Impacts, Freshwater Marsh Impacts” for additional details on the beneficial and adverse effects we predict to the refuge’s Great Marsh and Little Marsh.

We evaluated the benefits of actions that would protect or restore forested buffers and maintain or restore tidal wetlands which filter water pollutants. Those actions which would maintain or improve water quality include:

- Shoreline protection projects that would reduce the rate of erosion
- Retention of riverside buffers
- Improved water quality monitoring for early problem identification

We evaluated and compared the impacts of the refuge's management actions with the potential to cause adverse effects to water quality including the:

- Use of herbicides to manage invasive species
- Refuge construction projects
- Increases in annual visitation to the refuge
- Constructing new or improved administration and visitor facilities

Water Quality, wetlands, and Aquatic Biota Impacts that Would Not Vary by Alternative

Clean water is a critical and essential resource value on the refuge and its protection would be given full consideration in management planning and operations. All of the alternatives propose protection measures to insure management activities would not cause a decline in water quality, wetlands, or aquatic biota, either on refuge lands or in the Tidal Potomac River Basin. All Federal and State permits required for refuge lands would be obtained before any proposed management actions are taken in wetlands, along the refuge shoreline, or in open water in order to insure compliance with Sections 305(b) and 319 of the Clean Water Act, 33 U.S.C. § 1251 *et seq.* as amended.

Benefits

Our ongoing protection of refuge lands and maintenance of native habitats would continue to benefit water quality in the Tidal Potomac River Basin by excluding development in this portion of the watershed, sustaining natural water filtering vegetation, maintaining forested buffers, and partnering for water quality improvements and tidal marsh protection.

Adverse Impacts

Some potential for adverse impacts is predicted with our visitor activities and facilities. There is also a negligible risk that petroleum products used in staff or visitor vehicles or other chemicals used in daily operations at the refuge would adversely affect water quality or harm aquatic species in the tidal marsh or in other wetlands within the refuge. Risks from the use of selected low-toxicity chemical herbicides for aquatic weed control are also low as is the risk from the use of other herbicides for control of terrestrial invasive plants because precautions would be taken to keep them out of wetlands.

Research studies in aquatic habitats could also directly impact wetlands and aquatic biota, but is expected to be negligible as all studies would only be implemented under a special use permit with stipulations to protect resources. We describe the potential for each of these impacts in more detail below.

While some potential risk exists from the increased visitor activities we are predicting under all alternatives, we believe these would be negligible when managed properly. We recognize that visitor activities near wetlands may directly impact water quality and aquatic biota over the long-term, especially if people wander off trail. However, we regularly conduct outreach and enforcement in visitor areas to minimize this potential. Potential adverse effects to wetlands could also arise if visitor facilities are improperly placed in wetlands habitats, or if erosion is allowed to occur unchecked during maintenance or construction. We try to minimize those effects in a variety of ways. None of our refuge parking lots is located directly adjacent to streams, rivers, or other wetlands. Refuge staff routinely monitors roads and trails for damage and remediate any problems encountered. We are vigilant during maintenance and construction activities to watch for resource damage and will stop activities as soon as they are observed. Where ever there is the potential for runoff we use silt fences or other best management practices to avoid impacts.

Contaminants from routine operations: While managing the refuge, we would closely monitor and mitigate all of our routine activities that have some potential to result in chemical contamination of water directly through leakage and spills,

or indirectly through soil runoff. These include control of weeds and insects around structures, use of chemicals for deicing roads and walkways, and use of soaps and detergents for cleaning vehicles and equipment. We would continue to take the following precautions to minimize the potential for chemicals and petroleum products to be introduced into aquatic systems:

- Ensuring all staff are up-to-date on the spill prevention plan
- Obtaining advanced training in spill prevention and spill response
- Pouring or mixing chemicals or petroleum products will be conducted no closer than 25 feet from surface water

Our spill prevention and emergency clean-up procedures, documented in a plan for the Refuge Complex, should ensure that such occurrences are rare and are addressed immediately, with short-term effects limited to the immediate location.

Wetland invasive plant control with herbicides: Regardless of the alternative selected, the herbicide active ingredient glyphosate, used in a brand-name formulation such as Rodeo®, and the herbicide active ingredient imazapyr, used in the brand-name formulation Habitat®, could be used as chemical treatments to control aquatic invasive plants such as *Phragmites* in the refuge tidal marsh. Both active ingredients are known to have low aquatic toxicity. Herbicides that would be used to control other terrestrial invasive plant species on the refuge would not be used for aquatic weed control and do not pose a direct risk to water quality or aquatic species. Those terrestrial plant herbicides are reviewed in the “Soils” section of this chapter. The Regional Contaminants Specialist, who is responsible for upholding Federal standards for water quality and soil protection, must review pesticide use proposals and approve all use of chemical herbicides on refuge lands.

Glyphosate Effects on Aquatic Species: In some formulations, such as the one in the brand name formula Rodeo®, glyphosate is not a problem aquatic contaminant because it does not contain the toxic adjuvant (auxiliary chemical) that is found in other formulations, such as in the brand name formula Roundup®. It is also quickly adsorbed to suspended soil particles in water, rapidly making it biologically unavailable. There would be some potential for herbicide concentrations in sediments and backwaters to build up over time. The potential depends on the balance of herbicide input and removal from the aquatic system. Herbicide inputs may occur either through direct application, water inflow, or through resuspension and diffusion from the sediment layer. Herbicide removal from the system may occur through outflow, degradation, volatilization, and settling or diffusion into the underlying sediment (Neitsch et al., 2001).

The rate of herbicide degradation is an important consideration for assessing the effects of a given herbicide on aquatic systems. Glyphosate degrades with a reported half-life of 3.5-70 days in water depending on the rate of transfer to the sediment layer and testing source (USDA-FS, 1996). Based on the relatively short half-life and the large flux in water volume of the tidal marshes, it is not expected that any greater than negligible effects would occur as a result of herbicide treatments.

According to a USDA Forest Service (Forest Service) risk assessment, glyphosate in less toxic formulations typical of refuge operations appears to have a very low potential to cause any adverse effects in aquatic animals (USDA-FS, 2003). The use of less toxic formulations results in hazard quotients that do not approach a level of concern for any species. Nevertheless, use of glyphosate near bodies of water where sensitive species of fish may be found should be conducted with substantial care to avoid contamination of surface water. The likelihood of

direct acute toxic effects on aquatic invertebrates, or longer term direct effects on any fish species, is predicted to be extremely remote based on estimates of even the upper ranges of the hazard quotient (USDA-FS, 2003).

Aquatic plants appear to be less sensitive to glyphosates than most aquatic animals, assuming the less toxic formulations typical of refuge operations are used. There is no indication that adverse effects on non-target aquatic plants are likely (USDA-FS, 2003).

Imazapyr Effects on Aquatic Species: According to the Forest Service, risk assessment, imazapyr appears to have a very low potential to cause any adverse effects in aquatic animals (USDA-FS 2004). Modeled concentrations of imazapyr in ambient water over prolonged periods of time are estimated to be no greater than 0.00045 milligrams/liter and peak concentrations of imazapyr associated with runoff or percolation are estimated to be no more than 0.036 milligrams/liter. Monitoring data from a field application similar to those that may be used in Forest Service programs was used as the basis for the peak concentrations that might be expected. The application rates would be similar in refuge operations. All of the hazard quotients (HQ) for aquatic animals are extremely low. The highest hazard quotient of 0.01 is below the level of concern (LOC) at the typical application rate (LOC=1.0) by a factor of 100 and below the level of concern at the highest application rate (LOC=0.36) by a factor of 36. Thus, there is no basis for predicting that effects on non-target aquatic species are a cause for concern.

In the case of an accidental spill of a large amount of imazapyr into a relatively small body of water, mortality in sensitive species of fish is likely. Actual concentrations in the water after a spill would depend on the amount of compound spilled and the size of the water body into which it is spilled (USDA-FS, 2004).

Aquatic plants, particularly macrophytes, are much more sensitive than aquatic animals to imazapyr exposure. For aquatic macrophytes, the upper range of the hazard quotient for peak concentrations (HQ=3) is above the level of concern by a factor of 3 at the typical application rate (LOC=1) and a factor of about 8 at the highest application rate (LOC=0.36, $3 \div 0.36 = 8.3$). Thus, under foreseeable worst case conditions, acute effects could be seen in aquatic macrophytes. Longer term concentrations of imazapyr, however, result in hazard quotients for macrophytes that are well below a level of concern. Hazard quotients for sensitive species of unicellular algae are below a level of concern based either on peak concentration of imazapyr in water (a hazard quotient of 0.02 at the upper range of exposure) as well as longer term concentrations that might be expected (hazard quotient of 0.003 at the upper range of exposure). Thus, at both the typical application rate (LOC=1), and the maximum application rate (LOC=0.36), the upper ranges of the hazard quotients for sensitive species of algae are substantially below the LOC. Accidental spills of large quantities of imazapyr into relatively small bodies of water could lead to much higher concentrations—i.e., 3 milligrams/liter to 4 milligrams/liter. After spills of this magnitude, adverse effects on aquatic plants could be anticipated from imazapyr in both macrophytes and sensitive species of algae.

Terrestrial invasive plant control with herbicides: There is a slight risk that herbicides used for terrestrial invasive plant control may reach the tidal marsh and affect water quality or harm aquatic species. However, our prediction is that this threat is low given the precautionary measures we would undertake. In addition, the two herbicides currently used are either non-toxic or of low toxicity to aquatic species.

Imazapic Effects on Aquatic Species (Trade Names: Journey®, Plateau®):

This herbicide is applied in broadcast and spot treatments with backpack and skid sprayers. Aquatic animals appear to be relatively insensitive to imazapic exposures, with lethal concentration (LC) values of >100 milligrams/liter for both acute toxicity and reproductive effects. Aquatic macrophytes may be much more sensitive, with an acute effective concentration (EC) of 6.1 grams/liter in duck weed (*Lemna gibba*). Aquatic algae appear to be much less sensitive, with EC values of greater than 45 grams/liter. Imazapic does not appear to be very toxic to aquatic fish or invertebrates according to Forest Service studies. The evidence suggests that no adverse effects in fish or aquatic invertebrates are plausible using typical or worst-case exposure assumptions at the typical application rate of 0.1 pounds/acre or the maximum application rate of 0.1875 pounds/acre (USDA-FS, 2004).

Triclopyr Effects on Aquatic Species (Trade Name: Garlon®):

This herbicide is applied in broadcast, spot treatment, cut stump and basal treatments with backpack and skid sprayers. It cannot be applied to open water or where runoff may occur. It is relatively nontoxic to terrestrial vertebrates and invertebrates, but can be extremely toxic to fish and aquatic invertebrates. For this reason, we use it only as a basal or cut stump application directly on the base of trees and do not use it as a broadcast spray. In soils, it is degraded by photolysis, microbial metabolism, and hydrolysis to the parent compound, triclopyr acid. Triclopyr acid has an intermediate adsorption potential, limiting movement of the acid in the environment. The acid degrades with an average half-life of 30 days. The ester formulation is not water-soluble and can take significantly longer to degrade in water (Tu et al., 2007).

Research Activities: Aquatic habitats and biota might be impacted by research conducted in or near wetlands. Sampling activities may cause soil compaction and the trampling of vegetation near waterways. The establishment of temporary

*Little Marsh on
Mason Neck Refuge*



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foot trails and boat trails through aquatic vegetation beds, disruption of bottom sediments, and minor vegetation damage when equipment is temporarily placed is possible. 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.

To minimize the potential for impacts, all research projects would operate under a special use permit, with stipulations as warranted to insure planned activities would not impact aquatic resources. As new and innovative techniques become available, we would encourage researchers to use the least intrusive research methodologies and techniques for testing and or information gathering.

In summary, regardless of the alternative implemented, none of the proposed actions would cause direct adverse impacts to water quality, or to shallow water environments and aquatic species in the vicinity of the refuge or elsewhere in the Potomac River. Rather, our management practices on the refuge and our projects partnering with local communities and other conservation agencies and organizations would continue to provide long-term benefits to the refuge's and regional water quality.

Alternative A. Current Management

Benefits

There would be continued benefits to wetland habitats and aquatic species from protection of the native plant communities on the refuge uplands. These plant communities filter runoff from operations on the refuge and adjacent roadways and developed areas. Benefits would also continue as we work with partners to monitor and maintain the approximately 200 feet of existing refuge shoreline breakwaters, minimize public access to shoreline, and design, fund, and install additional breakwaters and other shoreline protection measures in an effort to reduce erosion.

Adverse Impacts

Shoreline protection measures: Extensive, new shoreline protection measures are not planned under alternative A. However, we would continue to support partner efforts to maintain and monitor the off-shore breakwaters that were installed by the U.S. Army Corps of Engineers (USACOE) as part of the Wilson Bridge project mitigation. These breakwaters currently protect a portion of the refuge's western shoreline. As the unprotected portions of the refuge shoreline continue to be affected through shoreline erosion, there would be a net increase in riverine aquatic habitat. However, the resulting aquatic habitat would be of lower value than the upland and wetland habitats that now exist on the refuge. Shoreline erosion would continue to contribute to the river's sediment load and thereby negatively affect riverine aquatic resources and the habitats they depend upon. In the much longer term, as the refuge shoreline continues to erode, the major predicted environmental consequence to aquatic resources would likely be the loss of substantial portions of the refuge's uplands and tidal marsh and its value in the Potomac River Basin.

Terrestrial invasive plant control with herbicides: Under alternative A, there would be a minimal level of risk of herbicide used in terrestrial invasive plant control contaminating wetland habitats. We would continue to control those invasive plants with herbicides on up to 2 to 3 acres of invasive plants annually, and in total over the 15-year planning horizon, we predict no more than 20 acres

of invasive plants widely dispersed across the refuge would be treated. In the short term, these treatments would have some minimal potential to affect water quality as discussed above. Any potential risk would be mitigated through proper application procedures and because we would use only certified herbicides at an application rate and timing approved by the Regional Contaminants Coordinator. Herbicide use has occurred on the refuge for many years without any accidental spills or detectable non-target impacts.

Visitor services: Under alternative A, annual visitation on the refuge is expected to increase by approximately 10 percent over the next 15 years based on our predictions and regional recreational trend information. This presents an increased potential for contamination through runoff of petroleum products from roads and parking areas and through litter. Staff would remain observant of risks and would minimize threats where possible. Outreach and enforcement would continue at current levels. In particular, littering would continue to be an enforcement priority.

Alternative B. Improved Management for Federal Trust Resources (Service-Preferred Alternative)

Benefits

Compared to alternative A, there would be increased benefits to water quality and aquatic species from increased protection, monitoring, and management of the tidal marsh vegetation and native plant communities on the refuge uplands. Shoreline protection would also become a higher priority for management, with additional funding sought to implement protection measures, by the Service and partners. We also would more actively engage in efforts with refuge partners to address water quality issues in the Tidal Potomac River Basin.

Adverse Impacts

Shoreline protection measures: During construction of shoreline protection measures, which could include additional breakwaters or beneficial use of dredge material, temporary adverse impacts associated with additional turbidity would be expected. Long-term turbidity would be reduced, benefitting aquatic resources and aquatic habitats. Construction and its resulting disturbance would cause the temporary relocation of aquatic resources and the permanent displacement of some species within the footprint of fill material and structures. The use of stone breakwaters would provide hard surfaces as an additional habitat type for epiphytic attachment. Because these types of projects usually create additional shallow water habitat and eventually support emergent marsh vegetation, we expect overall beneficial consequences for aquatic resources in alternative B. The benefits and impacts of any new shoreline protection measures would be analyzed in greater detail in a separate NEPA-compliant document prior to implementation.

Trail building, realignment and maintenance: Trail maintenance and realignment, and kiosk construction activities, would increase the potential for sedimentation and turbidity in down-gradient marsh and shallow waters if erosion occurs from exposed soils. Because these activities would not be conducted immediately adjacent to the shoreline, the potential for these impacts to occur would be low. Proper site preparation and use of standard mitigation practices, such as silt fences, would be implemented and further limit any potential for impacts.

Herbicide use to treat invasive plants: Under alternative B, we would likely increase the acreage treated with herbicide for invasive plant control to the extent that funding and staffing would allow. As such, there would be an increased risk for herbicides to contaminate aquatic habitats compared to alternative A; however, all the provisions for using best management practices

(e.g. application rates and spill prevention) would be in place. All proposals for using herbicides would be annually reviewed and approved by the Regional Contaminants Coordinator before implementation. As noted under alternative A, herbicide use on the refuge has occurred for many years with no spills and no detections of adverse effects on non-target species.

Visitor services: Under alternative B, annual visitation on the refuge is expected to increase by approximately 15 percent over the next 15 years based on our predictions and regional recreational trend information, and enhanced programs. This presents a slightly increased potential above alternative A for contamination of the surrounding shallow water through runoff of petroleum products from roads and parking areas. However, as we mentioned above, a big part of the increase in visitor activity would be attributed to the Gunston Road Trail which only allows non-motorized use. Outreach and enforcement would be increased commensurate with increased staff that would occur under alternative B. In particular, enforcing access to trails only and against littering would be a priority. Similar to alternative A, refuge staff would remain observant of risks and would minimize threats to water quality when possible.

Alternative C. Management to Enhance Public Uses

Benefits

Alternative C would have the same long term benefits to water quality and aquatic species from vegetation protection and breakwater maintenance, and potential new shoreline protection measures, as described for alternative B.

Adverse Impacts

Shoreline protection measures: Alternative C would have the same short-term adverse impacts of breakwater construction as described for alternative B.

Herbicide use to treat invasive plants: We would continue to control invasive plants with herbicides on the refuge to the extent funding and staffing allows. Thus, predicted impacts from this program would be similar to alternative B.

Visitor services: Under alternative C, annual visitation on the refuge is expected to increase by approximately 20 percent over the next 15 years based on our predictions and regional recreational trend information and enhanced programs. Compared to alternative B, the increased number of visitors coupled with the new trail access to Little Marsh raises the potential magnitude of potential impacts to water quality. As with alternative B, enforcing access to trails only and against littering would be a priority. Refuge staff would remain observant of risks and would minimize threats to water quality when possible. Should monitoring results indicate water quality is threatened by visitor access, we would take measures to limit that use.

Socioeconomic Impacts

We evaluated socioeconomic impacts in terms of the degree to which the proposed alternatives might affect the local economy, refuge-community relations, or quality of life of the local communities on the Mason Neck Peninsula.

To evaluate potential benefits or adverse effects to the local economy from each alternative, we considered changes in:

- Jobs and income to the local community from changes in refuge staffing
- Jobs and income from jobs in temporary construction work on the refuge
- Expenditures into the local and regional economy from changes in public uses of the refuge

- Expenditures into the economy from changes in hunting
- The availability of opportunities for recreational activities that are in high demand by the public

We considered the Service's Division of Economics "Banking on Nature" report (USFWS, 2007) estimates of the economic effects of recreation visits to the refuge in terms of generating employment, income, tax revenue, and final demand in an analysis area defined by the Fairfax County economy. Combined, these factors represent the full "multiplier" effect of initial spending on recreation-related goods and services plus succeeding rounds of spending internal to the local area economy. The County economic effects were derived using the IMPLAN economic model with estimated refuge recreational use of 50,296 visits in 2006 comprised of 32,266 local area resident visits and 18,030 non-resident visits. Those visits were estimated to generate \$589,000 in expenditures, 99 percent of which (\$583,110) related to non-consumptive uses. Non-residents accounted for \$438,800 of all expenditures (75 percent). Those expenditures had an economic effect of generating \$775,100 of final demand (through the multiplier effect) in the County economy, with \$279,100 in job income based on seven direct and induced jobs.

Additional relevant statistics factored into the analysis were the most recently available economic statistics on business revenues, payroll, and jobs for Fairfax County, which had total personal income (TPI) of more than \$67 billion with \$14 billion in business income from Federal procurement expenditures alone in FY 2006. The \$775,100 in final demand comprises less than 0.002 percent of the Federal procurement expenditures. The seven jobs represent 0.034 percent of the total jobs in the County. Therefore, there would most likely be a negligible impact on the local economy from any increase or decrease of recreational expenditures at the refuge. Because activities at the refuge are more closely connected to the town of Lorton and nearby smaller communities, the economic effects would likely be somewhat increased, but still minor in this smaller local economy, as compared to the larger Fairfax County context. Local impacts are discussed under the alternatives below.

Socioeconomic Impacts that would not vary by Alternative

Regardless of which alternative we select, we would continue to make revenue sharing payments to Fairfax County. The amount of payment is determined by Congress each year; however, these revenue sharing payments would have only a negligible effect on the County budget. Non-resident visitors to the refuge would continue to spend some money in Fairfax County on their way to and from the refuge, thereby benefiting that economy.

We would also continue to meet a substantive portion of the public's demand for some, though not all, wildlife-oriented recreational activities, in particular for hunting, wildlife observation and photography, interpretation, and to a lesser extent environmental education. Hunting opportunities are becoming harder to find on public lands elsewhere in the region because of widespread and pervasive development and population growth. Fishing would continue to be prohibited on refuge lands because there is no safe public access outside of sensitive wildlife areas; however, this activity is accommodated on public lands and waters elsewhere on the Peninsula.

Alternative A. Current Management

Benefits

The local economy would continue to benefit minimally from recreationist expenditures for deer hunting, wildlife observation and photography, and visitor participation in interpretation and education programs. These benefits

would materialize by way of visitor expenditures for auto fuel, meals, hunting gear, binoculars and other wildlife equipment purchases, though many of these purchases would likely be made outside the local area.

We would also continue to contribute to the local economy in terms of refuge staff jobs, income, and expenditures.

We would continue to meet some of the public's demand for wildlife-dependent recreational activities, primarily wildlife observation, nature photography, and hunting. These activities add to the quality of life of the local community and benefit other recreationists and wildlife enthusiasts in the region. These social benefits would continue to positively affect the refuge at a minimum level in terms of sustaining some public goodwill that garners long-term support for refuge management efforts.

We would also continue to communicate with the local community on the values of the refuge and opportunities for recreation but on a limited basis due to staffing and funding constraints.

Adverse Impacts

No substantive management changes are planned and no staffing increases are proposed under this alternative. Thus, no appreciable changes to the refuge's contribution to the local economy would occur. We would likely see a minimal increase in public uses of the refuge, which we have indicated could be up to an annual 10 percent increase, and which would, in turn, minimally increase expenditures by those users in the local economy. However, we would not expect the increases to be noticeable as a contribution to the local or regional economies.

Under this alternative, and projecting into the future, we would fall short of meeting the public's increasing demands for wildlife-dependent recreational opportunities at levels projected under alternative A. We would not provide the additional environmental education, staff-led interpretation, or wildlife photography opportunities for which we have received numerous requests. We would not provide any expansion in hunting opportunities to offset the diminishing availability of those opportunities elsewhere in the area. We would continue to not offer fishing, as described under "Actions Common to All Alternatives" in Chapter 3, "Alternatives, Including the Service-preferred Alternative."

Alternative B. Improved Management for Federal Trust Resources (Service-Preferred Alternative)

Benefits

Management to improve habitat conditions under alternative B would also enhance other refuge programs that more directly benefit the local economy and local communities. For example, improved tidal marsh and water quality result in more waterfowl to observe in a quality setting, and contribute habitat to support the hunted population elsewhere in the Occoquan Bay. These increased opportunities on and off the refuge would potentially draw more people to the area and benefit the local economy in terms of expenditures for food, lodging, transportation and equipment.

Adding refuge staff would minimally increase benefits to the local economy in terms of proposed projects to upgrade refuge management infrastructure would also add expenditures to the local economy for labor, materials, and services.

Improved refuge habitat and visitor services programs would be expected to attract more visitors. We estimate up to a 15 percent annual increase in visitation over current levels. The local economy would experience minimally increased

benefits in terms of retail expenditures for auto fuel, food, lodging, and related expenses in the local economy. These increases would be negligible compared to the overall expenditures on these factors in the local and regional economies.

Expanded recreational programs would increase the appeal of the refuge to the public in terms of further enhancing their quality of life and thereby add to the positive feedback needed to sustain refuge programs in the longer term. Additional refuge hunting opportunities, namely a new youth turkey hunt and the potential for a new archery deer season, would help offset the loss of those opportunities at other locations. Expanded interpretive and educational programs would provide public benefits in terms of better understanding of the values of the refuge resources and the Refuge System in general. We would also be in a better position with additional staffing and funding to communicate with the community about the values of the refuge and opportunities for recreation under this alternative.

Adverse Impacts

We would expect an increase in visitation under alternative B that could result in an additional burden in terms of road maintenance, traffic enforcement, and law enforcement expenditures from County tax revenues. We predict those impacts would be negligible, and offset by the local economic benefits contributed by the refuge and described above.

Alternative C. Management to Enhance Public Uses

Benefits

Similar to alternative B, adding refuge staff under alternative C would minimally increase benefits to the local economy in terms of refuge jobs, income, and expenditures. Proposed projects to upgrade refuge management infrastructure would also add expenditures to the local economy for labor, materials, and services at approximately the same amounts as alternative B.

Alternative C would improve visitor services more than alternatives A and B and we predict that up to 20 percent increase in annual visitation would result. The local economy would, therefore, experience minimally increased benefits in terms of retail expenditures for auto fuel, food, lodging and related expenses. These increases would be minimal, however, compared to the other contributors to the overall local economy.

The social benefits of expanded recreational programs would likely be highest under this alternative. Similar to alternative B, expanded recreational programs would increase the appeal of the refuge to the public in terms of further enhancing their quality of life and thereby add to the positive feedback needed to sustain refuge programs in the longer term. Additional hunting opportunities on the refuge would help offset the loss of those opportunities at other locations. Expanded interpretive and educational programs would better meet and satisfy demand for those activities. We would best be able to conduct outreach and communicate the values and opportunities the refuge offers under this alternative because of the emphasis on quality visitor services programs, our increased staffing and funding, and the fact we would have more visitors to contact.

Adverse Impacts

Compared to alternatives A and B, the expected increase in visitation under alternative C would constitute the highest burden in terms of road maintenance, traffic enforcement, and law enforcement expenditures from County tax revenues. We predict, however, that the impacts would be negligible and offset by the local and regional economic benefits described above for alternatives B and C.

Refuge-Specific Impacts

Soil Impacts

Soils are the structural matrix and nutrient source for plant productivity and must be protected to sustain the variety of upland and wetland habitats needed to meet refuge habitat and species management goals. Soil biotic communities consume waste and the remains of dead organisms and recycle their constituent materials that are incorporated into the soil into forms usable by plants. In the process, soil organisms regulate the fluxes of carbon dioxide, methane, and nitrogen oxides in the atmosphere (Daily et al 1997). Productive and healthy soils also regulate groundwater quantity and quality by filtering excess nutrients and contaminants.

Overall, the soils of the refuge are productive and in good condition with little or no compaction or contamination problems. However, certain areas, particularly the shorelines, are experiencing erosion and are susceptible to disturbance. Other areas may be experiencing compaction from human activity. Compaction makes plant root penetration more difficult and may affect regeneration potential for some vegetation. In areas with moderate compaction, plant cover and biomass may be decreased. In areas with high compaction, plant species abundance and diversity is reduced over the long term as only the hardiest and resistant species survive (Liddle 1975). Under all alternatives, we would continue to manage areas of high traffic to minimize human impacts on soils, and implement restoration measures where there are concerns with habitat degradation or loss.

We evaluated and compared the management actions proposed for each of the refuge CCP alternatives on the basis of their potential to benefit or adversely affect refuge soils.

We considered the benefits from:

- Protection of soils from conversion to impervious surfaces or restoration of disturbed sites
- Reduction of erosion along interior water courses and refuge shorelines

We considered the potential adverse impacts to soils from:

- Habitat management activities to benefit bald eagles, great blue herons, waterfowl and other migratory birds
- Construction of new refuge housing
- Realignment and construction of interpretive trails and kiosks
- Refuge visitor activities

Soils Impacts that would not vary by Alternative

Benefits

The soils of the refuge are in good condition and would remain so under all management alternatives. We would continue to maintain the refuge's protective vegetative cover to minimize soil losses through erosion. Native vegetation supports natural functioning and production of the ecological services that improve soil fertility and sustain soil health. For example, healthy soils would also potentially dampen pest and disease outbreaks (Lavelle et al 1997), improve the growth of trees and other plants without additional need for nitrogen input, improve water quality, regulate greenhouse gas emissions, increase carbon sequestration, and increase carbon stock equilibrium of soil vegetation.

We would continue to prohibit high impact recreational activities such as all-terrain vehicle (ATV) use, horse back-riding, or biking off road or off the asphalt High Point Trail, to avoid damage to refuge soils. Hiking trails, wildlife observation areas, parking areas and other high-use areas would continue to be well maintained to keep soil effects to a minimum. Any erosion problems will be noted during routine refuge monitoring and corrected as soon as feasible.

Regardless of which CCP alternative we select, we would continue to use best management practices for all management activities that may affect refuge soils to ensure that we maintain soil productivity. Site conditions, including soil composition, condition, and hydrology, will be the ultimate determinant of what management actions can occur on any particular site on the refuge. No site would be managed in a manner that permanently degrades site conditions.

In general, no soil from off-site will be brought onto the refuge unless bringing in clean soil is determined to be less disturbing to refuge resources than using onsite soils.

Adverse Impacts

There is a potential for adverse impacts from the management tools we propose to use at varying scales under all alternatives to help maintain, enhance or create wildlife habitat. These tools include replanting with native species, mowing, and use of herbicides. Soils in the upland areas could also be affected by trail, parking lot, or other maintenance or construction projects.

Herbicides: All chemical use on the refuge must first be approved through the Pesticide Use Proposal process. The Refuge Manager submits proposals to the Regional Contaminants Coordinator who must approve the chemical, application procedure, and location of all treatments. The following list of herbicides, currently used on the refuge, and their potential effects on soils and soil organisms are derived mainly from the products' labels and material safety data sheets, except where noted:

Glyphosate Effects on Soils and Soil Organisms: This herbicide is applied in broadcast or spot treatment with backpacks or a skid sprayer. It is degraded by microbial action in both soil and water, with an estimated half-life of 30 days in soil. It is highly soluble, but adsorbs rapidly and tightly to soil (USDA-FS, 2003). Glyphosate has low leaching potential because it binds so tightly to soil. Numerous soil bacteria, fungi, invertebrates, and other microorganisms have been studied for effects of glyphosate application. None of these studies suggest glyphosate would adversely affect soil organisms. Glyphosate is readily metabolized by soil microorganisms and some species can use glyphosate as their sole source of carbon (USDA-FS, 2003). Sylvia and Jarstfer (1997) found that after 3 years, pine trees in plots with grassy weeds had 75 percent fewer mycorrhizal root tips than plots that had been treated 3 times per year with a mixture of glyphosate and metsulfuron methyl to remove weeds. Modeling results indicate glyphosate runoff is highest in loam soils with peaks after the first rainfall (USDA-FS, 2003; WSSA, 2002).

Imazapic Effects on Soils and Soil Organisms: This herbicide is a relatively new herbicide, and there are no studies on the effects of imazapic on either soil invertebrates or soil microorganisms. We are also not aware of any reports of secondary signs of injury to microbial populations (USDA-FS, 2004a). Imazapic degrades in soil, with a half-life of about 113 days. Its half-life is decreased by the presence of microflora. Imazapic is primarily degraded by microbes and does not degrade appreciably under anaerobic conditions. Imazapic is weakly adsorbed in high soil pH, but adsorption increases with lower pH (acidic soils) levels and

increasing clay and organic matter content. Field studies indicate that imazapic remains in the top 12 to 18 inches of soil and do not indicate any potential for imazapic to move with surface water. Modeling results indicate imazapic runoff is highest in clay and loam soils with peaks after the first rainfall. Imazapic percolation is highest in sandy soils (USDA-FS, 2004a; WSSA, 2002).

Imazapyr Effects on Soils and Soil Organisms: This herbicide has no studies on its effects on soil invertebrates, and there is incomplete information on the effects on soil microorganisms. One study indicates cellulose decomposition, a function of soil microorganisms, can be decreased by soil concentrations higher than concentrations expected from Forest Service applications (USDA-FS, 2004b). Degradation rates are highly dependent on microbial action. Anaerobic conditions slow degradation. Imazapyr is weakly bound to soil, but adsorption increases with lower pH and increasing clay and organic matter content. Adsorption increases with time as soil dries and is reversible. Field studies indicate that imazapyr remains in the top 20 inches of soil and do not indicate any potential for imazapyr to move with surface water. In forest field studies, imazapyr did not run off and there was no evidence of lateral movement. Modeling results indicate imazapyr runoff is highest in clay and loam soils with peaks after the first rainfall. Imazapyr percolation is highest in sandy soils (USDA-FS, 2004b; WSSA, 2002).

Triclopyr Effects on Soils and Soil Organisms: This herbicide exists in five commercial formulations, in one of two forms, BEE (butoxyethyl ester) or TEA (triethylamine). Triclopyr BEE is much more toxic to aquatic organisms than triclopyr TEA. A breakdown product, TCP (3,5,6-trichloro-2-pyridinol), is more toxic than either form of triclopyr. Site-specific cumulative effects analysis buffer determinations need to consider the form of triclopyr used and the proximity of any aquatic triclopyr applications, as well as toxicity to aquatic organisms (USDA-FS, 2004c). Triclopyr has not been studied on soil invertebrates. Soil fungi growth was inhibited at concentrations 2 to 5 times higher than concentrations expected from Forest Service application rates. Triclopyr has an average half-life in soil of 46 days, while TCP has an average half-life in soil of 70 days. Warmer temperatures decrease the time to degrade triclopyr. Soil adsorption is increased as organic material increases and decreased as pH increases. Triclopyr is weakly adsorbed to soil, though adsorption varies with organic matter and clay content. Both light and microbes degrade triclopyr (USDA-FS, 2004c; WSSA, 2002).

Public Uses: People walking off-trail have the potential over the short term to damage vegetation. If the area is repeatedly trampled on, over the long term, soil productivity could be directly affected by exposing roots, and reducing soil porosity, aeration, and nutrient availability if enough compaction occurs (Kuss 1986, Roovers, et al 2004). Soil compaction can, in turn, affect plant regeneration and revegetation, especially in rare or sensitive plant populations (Hammit and Cole 1998). Kuss (1986) found that plant species adapted to wet or moist habitats was the most sensitive and increased moisture content reduces the availability of the soil to support recreational traffic.

The hunt program for deer under all alternatives, and the hunt program for turkey under alternatives B and C, has the potential to cause some soil compaction since off-trail foot travel would occur. However, with a limited number of hunters well-dispersed across the refuge during the shotgun deer hunting season (currently 90 hunters with no more than 30 hunters per day proposed during the archery season) and proposed youth turkey hunt season (up to 10 hunters over a 3-day period), the impacts would be minimal based on our monitoring and field observations of hunting impacts over the past 5 years.

Vehicles would continue to be confined to existing refuge roads and parking lots to minimize impacts outside of that developed footprint. Sensitive wildlife areas, such as eagle roosting and wintering sites, would remain closed to hunter access.

Visitors engaged in wildlife observation, wildlife photography, interpretation and environmental education activities and programs would cause localized impacts in trail areas, but with posted refuge regulations stating visitors should remain on trails, coupled with our enforcement of those regulations, we predict only a negligible impact outside of the trail footprint. This is consistent with our field observations and the monitoring we have conducted to date on existing trail use and resulting impacts on this refuge. Most people tend to stay on trails due to a healthy concern with poison ivy and ticks. Furthermore, designated trails are on existing logging roads, gravel roads, or hardened trails used for many years. None of these routes has any known rare or sensitive plant species, nor has soil compaction or erosion been observed.

Alternative A. Current Management

Benefits

Continuing to maintain the existing shoreline breakwaters and armoring structures would help refuge soils in areas protected by these structures from being exposed and eroded away by wave and wind action. Also, maintaining mature forest vegetation on the majority of the refuge would continue to help sustain the productivity of refuge soils and afford further protection against extreme weather events.

There would be minimal loss or damage to soils on the upland portions of the refuge resulting from management under alternative A since no ground disturbing activities are planned.

Adverse Impacts

Soils adjacent to the currently unprotected sections of the shoreline would continue to be at risk of being exposed and eroded away due to wave and wind action. These impacts would be exacerbated given the anticipated effects of climate change (e.g. more frequent and more intense storm events, tide surges, and sea level rise). Our monitoring to identify shoreline erosion areas would continue to be very limited given resources currently available, but we would continue to look for opportunities to work with partners to address shoreline protection in areas at high erosion risk.

We anticipate minimal adverse impacts on refuge soils from continuing current refuge management using best management practices. Refuge staff would continue to mow the 5-acre grassland at the outdoor environmental education site to maintain the area for education activities, managing under conditions that minimize compaction and soil displacement (e.g. avoiding excessively wet periods).

Visitation under alternative A is expected to increase by approximately 10 percent. This presents an increased potential for visitor activities that might impact soils, such as hiking off designated trails. The greatest future threat to soils under alternative A would be unauthorized use and access in sensitive areas. Refuge staff would continue to monitor public use areas to determine if soil erosion may be a problem and take steps to mitigate problems if they occur. Outreach and enforcement to minimize unauthorized activities would continue at current levels.

Alternative B. Improved Management for Federal Trust Resources (Service-Preferred Alternative)

Benefits

Without protection, and anticipating the effects of climate change (e.g. more frequent and more intense storm events, tide surges, and sea level rise), erosion would continue to gradually expose and wear away portions of the refuge

shoreline that are not currently protected. Under alternative B, we would evaluate those shoreline areas most at risk and work with partners to design and implement actions to minimize the threats. This would help prevent the future loss of soils and vegetation along a more extensive area of shoreline compared to what is planned under alternative A.

Adverse Impacts

Very little additional soil disturbance is predicted with management actions under alternative B, as compared to alternative A. Some soil disturbance and localized soil compaction and loss might occur in conjunction with trail projects. However, we would employ management practices to ensure that no long-term problems, such as unchecked erosion, would result.

Increased annual visitation, estimated to be 15 percent under alternative B, would increase the likelihood of disturbance and compaction of soils in areas of the refuge where visitation is allowed. It would also increase the likelihood of unauthorized entry to areas where visitation is not allowed, for example, off trails and along the shoreline where soils might be affected. The design of new and improved trails and other infrastructure would include consideration of the potential to effect soils. We would also increase monitoring of intensive public use areas, and develop more effective signs and brochures to notify people of the times, areas, and reasons for the closure of certain areas, reducing the potential for long-term impacts from unauthorized access. In addition, outreach and enforcement on site would increase once proposed new staff is in place.

Under alternative B, we propose building one new staff quarters on the refuge to reduce driving time from refuge headquarters and the other Refuge Complex units, and to provide affordable housing to seasonal and volunteer staff. More importantly, however, the staff quarters would assure a greater Service presence at Mason Neck Refuge during the year. Site selection for the building would include consideration of subsurface water, geology, water quality and quantity, and compatible soils, along with other necessary surveys to assure proper location of the facility and to minimize the impacts to refuge resources. Current consideration is for a site location north of and adjacent to High Point Road, offset to minimize disturbance to refuge and State Park visitors. The facility would require an upland area of no more than one acre cleared of trees to allow laying a foundation, parking area, storage, and septic system.

Under alternative B, we also propose to build an RV pad near the maintenance shop. Less than one-tenth acre is predicted to be impacted. Concerns and considerations are similar to those identified for the new refuge quarters, but on a smaller scale.

Best management practices would be used to minimize impacts to soils from new construction, but there may be localized compaction and some erosion losses while the site is under construction. While some permanent loss of soil productivity would occur, seeding with native grasses and other protective native vegetation would be used to return open areas of the site to a vegetated status as soon as practicable to protect soils. All Federal, State, and local permits applicable to constructing a facility of this type on refuge lands would be obtained before activities begin.

In addition to building the new refuge staff quarters and RV pad, we would prioritize our list of other refuge improvements and implement projects as funding allows, with the intent to complete them in 10 years. Appendix C lists projects currently in our RONS and SAMMS databases. Soil impacts on these projects would be minimal and localized to areas already developed. Best

management practices to control erosion and minimize compaction would be employed as needed to assure no long term soil loss or damage.

Summary of construction projects under Alternative B

- Realigning Woodmarsh Trail to higher ground along approximately 1,000 feet currently in low, wet areas, restoration of old alignment sections, building viewing platform, improving trail surface to all-weather; making part or all accessible; and, improving boardwalks over wet areas
- Improving Woodmarsh trailhead including: drainage, paving, lighting, gates, the kiosk, and welcome and directional signs
- Reconfiguring Woodmarsh Trail within existing loops to bypass sensitive eagle area, but allow for additional access
- Developing a trail from the Woodmarsh Trail-Sycamore Road kiosk to the end of Sycamore Road and the overlook. Building a viewing platform overlooking Potomac River if feasible. Allow foot travel only.
- Developing Treestand Road as a trail that connects Woodmarsh and Great Marsh Trails; creating a marsh viewing area if minimal vegetation would be impacted. Allow foot travel only.
- Building refuge staff quarters on the refuge off High Point Road
- Building an RV pad near the existing maintenance shed

Alternative C. Management to Enhance Public Uses

Benefits

The same benefits to soils would accrue under alternative C as under alternative A.

Adverse Impacts

Annual refuge visitation would increase by approximately 20 percent under alternative C, as compared to the annual increases predicted under alternatives A (10 percent) and B (15 percent). In addition, allowing seasonal public access via the Little Marsh road to the dike increases the potential for soils impacts in an area that had not previously been open. As a result, there would be the highest potential for localized increases in soil impacts compared to alternatives A and B, especially in areas where public access is new or further enhanced under this alternative. However, the types of impacts from visitors described under alternatives A and B would be the same under alternative C. Careful design, management, and monitoring of the enhanced visitor program, coupled with improved visitor outreach, enforcement, and increased Service visibility given additional staff proposed, would help mitigate the potential for long-term soil impacts.

Also similar to alternative B, alternative C proposes to build refuge housing and the RV pad. The impacts described under alternative B, and the measure we would take to mitigate those impacts, would be the same under alternative C.

Forest Habitat Impacts

The diverse forest habitats on the refuge provide a wide array of wildlife including bald eagles, nesting herons and egrets, forest interior breeding birds, neotropical migrants, and other native wildlife. We evaluated the benefits and adverse impacts on forest habitats from management actions under the three alternatives.

We considered the benefits from:

- Management actions to maintain forest health, such as thinning and invasive plant control
- Fuels management
- Controlling or managing deer populations

We considered the potential for adverse impacts from:

- Unhealthy forest conditions, including the presence of invasive plants
- Facilities construction and maintenance

**Forest Habitat Impacts
That Would Not Vary by
Alternative**

Benefits

Regardless of alternative selected, native mature forest habitat would continue to be protected on the refuge contributing to what remains as intact riverine forest habitat along the Potomac River. Thus, the refuge would retain its value to migratory birds and other native forest wildlife where elsewhere in rapidly developing Northern Virginia those values are being lost or degraded. Wherever practicable, we would replace non-native plant species with native forest species capable of growing under the current site conditions to restore the ecological integrity and diversity of the refuge. In addition, deer management under all alternatives would help control excessive browse levels which are impacting forest regeneration (VDF 2009).

Adverse Impacts

Regardless of which alternative we select to manage the refuge, certain activities may affect forest habitat at various levels depending on the alternative:

- Areas where invasive plants are established and where treatment is not planned
- Vegetation treatments to maintain fire breaks
- Refuge infrastructure maintenance and improvements (e.g. roads and trails)

The impacts of existing and planned mechanical methods and herbicides were discussed previously in the sections on water quality and soils. Their affect on other resources is also described in those sections. Both mechanical and herbicide treatments would only be implemented to support goals and objectives for wildlife habitat. Strict best management practices and Service protocols would be followed so as not to affect non-target resources. The alternatives would vary in terms of the extent and frequency of use of these management practices.

A potential long-term negative impact is the unintentional introduction or spread of invasive species on the refuge from visitors, including deer hunters who range over large portions of the refuge. People can be vectors for invasive plants by moving seeds or other propagules from one area to another. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife. Refuge staff work diligently to control the most threatening of these plants, as described in chapter 2—Affected Environment. We have identified several projects which may involve seeding or vegetation plantings to control erosion, or to otherwise establish vegetation on a site that was disturbed by refuge activities. Only native vegetation would be used in those instances to avoid the introduction of non-native or invasive species. The threat of invasive plant establishment will always be an issue, and will require annual monitoring, treatment, and hunter and visitor education.

Alternative A. Current Management

Benefits

Under alternative A, benefits would continue to be based mainly from the maintenance of mature forest cover. Protection of the existing 1,883 acres of forested upland is assured through permanent or long-term Service management and conservation. In addition, maintaining the refuge deer hunt would continue to reduce the potential for the adverse effects of diminished forest regeneration on long-term forest health. As noted previously, excessive deer browsing was a major concern in the VDF Forest Health report (VDF 2009). When deer become overabundant they browse forest understory, including emerging seedlings of canopy tree species, thereby reducing forest regeneration and the capability of the forest to establish trees to replace those lost through natural mortality.

Adverse Impacts

There would continue to be a minimal risk to forest vegetation involved with the use of mechanical and herbicide treatments described above. Routine maintenance of roads and facilities, control of invasive plants, and maintaining the grassland education site would continue to affect forest development in those areas; however, they amount to less than 3 percent of the refuge area. Herbicides would be used only under strict application precautions approved by the Regional Contaminants Coordinator, to ensure that only the targeted plants are affected. The routine maintenance of roads and trails may result in the loss of individual trees, but we do not expect the number of trees felled would affect the quality or diversity of forest habitat present.

Alternative B. Improved Management for Federal Trust Resources (Service-preferred Alternative)

Benefits

Under alternative B, implementing a more active program to sustain forest health and diversity would provide the more beneficial impacts over the long-term to forest habitats on the refuge as compared to alternative A. Alternative B would pursue further evaluation and management to implement recommendations in the VDF forest assessment (VDF 2009). We predict that through implementing best management forest practices to thin stands or do small group selection cuts, fuel treatment reductions, and more strategic deer and invasive plant control, we would further enhance the existing health and vigor of the forest. Over the long-term, sustaining a healthy forest would result in less risk of a significant environmental impact from a catastrophic fire event, or pest and pathogen epidemic, and would reduce the need for less ground-disturbing management intervention. We would continue deer management through our public deer hunting program, and by other control means if necessary, to assure long-term forest health objectives are met.

Adverse Impacts

Habitat Management: Similar to alternative A, there would continue to be a minimal level of loss or damage to forest vegetation involved with use of the mechanical and herbicide treatments described above to maintain roads and facilities, reduce forest fuel loads and maintain fire breaks, control invasive plants, or to maintain the grassland education site. As described under alternative A, herbicides would be used only under strict application precautions approved by the Regional Contaminants Coordinator to ensure that only the targeted plants are affected.

Construction projects: Under B we propose to construct a new refuge quarters facility. There would be some permanent loss of forest habitat at the site of the facility. The site is currently proposed off High Point Road, which is the main road accessing part of the refuge and Mason Neck State Park. Less than one acre of land would be cleared for the building, driveway, and septic field. This site loss, which constitutes less than 0.03 percent of the current refuge forest acreage, is not in a sensitive resource area, and would be located near an asphalt road

and other existing developments to minimize new utility corridors. As such, we predict the impacts on the refuge's forest health, biodiversity and integrity, or its long term sustainability, would be negligible.

Road and trail maintenance: Routine maintenance of roads and trails may result in the loss of individual trees, but we do not expect the number of trees felled would affect the quality or diversity of forest habitat present. Trail improvements and the development of two trails (one linking Woodmarsh Trail-Sycamore Road kiosk to the end of Sycamore Road, and the second on Treestand Road, connecting Woodmarsh Trail to Greatmarsh Trail) lie along existing road beds where minimal clearance involving few trees would be needed.

Alternative C. Management to Enhance Public Uses

Benefits

Alternative C would provide the same benefits to the refuge's forest habitats as alternative A.

Adverse Impacts

Alternative C would cause the same adverse impacts to the refuge's forest habitats as discussed under alternative A.

Shoreline Impacts

We evaluated impacts to the refuge's shoreline based on whether refuge management actions would help reduce the rate of shoreline erosion and limit human activities that have the potential to cause increased shoreline erosion. Please also refer to our discussion on Soils earlier in this chapter for additional comments on shoreline impacts.

Factors that would benefit shoreline protection include:

- Maintenance of existing shoreline protection infrastructure
- Plans for additional shoreline protection projects

Factors that may adversely affect the refuge shoreline:

- Unauthorized public access to the shoreline
- Management activities on the refuge that have the potential to increase shoreline erosion

Shoreline Impacts That Would Not Vary by Alternative

Benefits

Regardless of which alternative we select, we would continue to support State efforts to maintain and monitor the off-shore breakwaters. They were installed by the USACOE as part of the Wilson Bridge project mitigation, and currently protect a portion of the refuge's western shoreline. Erosion of the shoreline by tidal and storm flows and the undermining of the bluffs by beach loss and wind and rain erosion has been incrementally removing the substrate and the resulting tree loss shrinks important shoreline and upland habitats. This is especially problematic along the refuge southwestern corner, where tree loss threatens the heron rookery. We would review and evaluate potential stabilization techniques to determine which is most effective and practical for refuge lands. We would also continue to work with State and Federal partners to explore, develop and implement additional shoreline protection projects to further reduce impacts to shoreline.

Adverse Impacts

Under all the alternatives, there is some minimal potential that unauthorized refuge visitors might cause localized shoreline erosion. We would continue to restrict public access to designated trails and prohibit access to the shoreline areas from either the land or river side to avoid shoreline impacts in any location.

The only exception to this restriction is under alternative C where seasonal access to Little Marsh dike is proposed.

Alternative A. Current Management

Benefits

Although we do not propose expanding shoreline protection projects under this alternative, we would continue to conduct outreach to visitors and the media, to express concerns about the need for shoreline protection. We would continue to monitor the existing infrastructure, in conjunction with other refuge work in the area, and alert State partners to any concerns with how it is functioning.

Adverse Impacts

This alternative would not actively pursue and implement new shoreline protection projects. We would depend entirely on other entities to initiate any new shoreline protection efforts. We would continue to have limited capability to quickly respond to erosion threats at any particular locations along the refuge shoreline.

We would continue the closure on public access to the refuge shoreline, but given the limited staff presence on the refuge, there remains a risk that refuge visitors would go off designated trails and enter restricted parts of the refuge where they might inadvertently cause damage to the shoreline and locally accelerate erosion. However, we would continue to post rules and regulations, educate the public about this issue, and address any instances of unauthorized entry that we might encounter.

Alternative B. Improved Management for Federal Trust Resources (Service-Preferred Alternative)

Benefits

Under alternative B, we would expand our involvement in initiating additional shoreline protection efforts to benefit the refuge. We would work with our partners and the Service's Chesapeake Bay Field Office to actively pursue funding sources and seek expertise in designing and installing shoreline protection measures in high risk areas. In particular, we are concerned with the refuge's western and southern shorelines, and we would explore options for protecting or stabilizing them. Providing long-term protection to the refuge's shoreline and tidal marsh habitat are identified under alternative B as one of the highest management priorities to implement over the next 15 years.

Adverse Impacts

Because annual refuge visitation under alternative B would likely increase by 15 percent compared to alternative A, there would be a somewhat increased potential for refuge visitors to gain unauthorized access to unprotected sections of shoreline either from land or boat access. In these instances, there may be minor damage to protective vegetation potentially leading to localized erosion. However, the increased monitoring, outreach, and law enforcement proposed under this alternative would be expected to identify and remedy this type of damage before any substantive long-term or permanent effects result.

Alternative C. Management to Enhance Public Uses

Benefits

The same benefits would accrue under this alternative from partners maintaining the existing breakwaters as described for alternative A.

Adverse Impacts

Because annual refuge visitation is predicted to increase by 20 percent under alternative C, there would be more potential than under alternatives A and B for increased potential for members of the public gaining unauthorized access to unprotected sections of shoreline either from land or boat access. Outreach and enforcement against unauthorized activities would increase in response to these concerns, similar to alternative B. Other impacts would also be similar to alternative B.

Freshwater Marsh Impacts

The Service currently manages the 207-acre Great Marsh, a freshwater tidal marsh, and the 50-acre Little Marsh, an impounded freshwater tidal marsh which is no longer tidally influenced. We evaluated the benefits and adverse impacts of the management actions under the three CCP alternatives on these tidal wetlands.

We considered the benefits from:

- Protecting and restoring tidal marsh habitat
- Maintaining a forested shoreline buffer
- Treating invasive species

We considered the potential adverse impacts of:

- Refuge habitat management activities that may affect the wetlands
- Facilities construction and maintenance
- Unauthorized public access to the wetlands

Freshwater Marsh Impacts That Would Not Vary by Alternative

Benefits

Great Marsh supports breeding bald eagles and marsh birds, provides protective cover for migrating and wintering waterfowl, shorebirds, and other species of conservation concern, and serves as reproductive habitat for fish and other aquatic species in the Tidal Potomac River. Except for the Great Marsh trail that provides a viewing area, the wetland is closed to public use and access. Management activities would continue to emphasize outreach and enforcement against unauthorized activities. We would also continue to monitor the area for external threats and conduct periodic trash removal using volunteers.

Little Marsh provides foraging habitat for nesting bald eagles and colonial nesting great blue herons from the refuge rookery. We would maintain the dike on Little Marsh, including addressing beaver or other animal damage as needed, to ensure the continued integrity of this wetlands area.

Regardless of the management alternative we select, we would continue to conserve these wetlands and the wildlife they support as one of our highest priorities.

Adverse Impacts

Refuge staff would continue to prohibit all public use and access on Great Marsh year round. While seasonal trail access to Little Marsh dike is proposed under alternative C, under all alternatives Little Marsh would remain closed to all public use and access during the nesting season. Of particular concern in these areas are unauthorized fishing and boating which have the potential to adversely affect these marsh areas and associated species through trampling and disturbance. Unauthorized entry to Great Marsh and Little Marsh areas could disturb nesting, roosting, and foraging eagles and herons, or degrade marsh vegetation through trampling. Other examples of degradation include litter from used fishing line, tackle and other forms of trash, or disturbance to bank areas creating erosion and turbidity to the water. Liddle and Scorgie (1980) documented that shoreline trails made by anglers and waterfowl hunters, the two activities we have recorded causing the most violations at Little Marsh, are usually 2-3 feet wide, and typically parallel to the shore at the junction of two vegetation communities. They observed that on little used pathways the dominant native emergent vegetation was present, but that on moderate use pathways, the composition changed to more hardy species, including the higher likelihood

of invasive species. On high use pathways, there was largely bare soil with occasional invasive species.

Refuge signage, flyers, and other public information materials would continue to be used along the major public entry points, including the Woodmarsh and Great Marsh trails, to ensure that the public remains out of sensitive, closed areas. While some people express concern with the restrictions on public access for fishing and boating, these recreational activities are offered at other nearby public facilities on the Peninsula, for example in Occoquan and Pohick bays, and on the Potomac River.

Alternative A. Current Management

Benefits

Continued management of the existing freshwater marsh under alternative A would conserve the wildlife habitat values described above, though no substantive improvements in management and protection of Great Marsh and Little Marsh would be implemented under alternative A.

Adverse Impacts

There are currently no plans to modify existing marsh habitat, whether directly through a restoration or habitat improvement project, or indirectly through other Service projects.

The marsh areas may be at some minimal risk of being indirectly affected by Service activities in adjacent upland areas that drain into them from leaks or spill accidents involving chemicals or petroleum products used in refuge management operations. Our leak and spill prevention and emergency clean-up procedures should ensure that such occurrences are rare and are addressed immediately, with short-term effects limited to the immediate location.

A predicted annual increase in refuge visitation (10 percent over existing levels) would likely result in a somewhat greater potential for adverse impacts to the Great Marsh since the adjacent Great Marsh and Woodmarsh Trails receive the highest public use on the refuge. These impacts include the potential for refuge visitors to leave trash and for unauthorized entry from these trail access points. We would continue to conduct outreach and enforcement within our current staff capability. We would also continue to maintain signage and monitor impacts in high use areas, and enforce against littering and off-trail traffic, to insure adverse impacts are kept to a minimum.

Alternative B. Improved Management for Federal Trust Resources (Service-Preferred Alternative)

Benefits

We would increase benefits to the freshwater marsh habitat and marsh-dependent species under alternative B as compared to alternative A. We would increase our baseline information on the marshes through inventorying the flora and fauna. This information would support development of a more detailed Habitat Management Plan (HMP) and achieve the greatest benefits for wildlife species of conservation concern. For example, increased benefits to waterfowl would accrue from determining the presence, extent, and potential expansion of native marsh and aquatic vegetation, such as spatterdock and wild rice, which are important waterfowl foods.

Water quality issues would be addressed for the marshes and greater Potomac River through more active partnership work with State and Federal agencies. An upgraded comprehensive program of marsh clean-up would also help reduce the trash that tends to degrade the marsh. We would also implement a more comprehensive program of treatment of invasive plants and nuisance wildlife affecting the marsh and other natural areas.

Adverse Impacts

Similar to alternative A, there are no proposals to modify the existing marsh habitat. As such, the extent of this habitat would not change over existing conditions.

The marsh areas may be at some minimal increased risk of indirect effects from increased Service activities in adjacent upland areas that drain into them from leaks or spill accidents involving chemicals or petroleum products used in refuge management operations. However, our leak and spill prevention and emergency clean-up procedures should ensure that such occurrences are rare and are addressed immediately, with short-term effects limited to the immediate location.

We would monitor more intensively for the presence of invasive plants in Great Marsh and Little Marsh and implement a prioritized control program. With a more comprehensive control program, there may be a slightly higher risk to native marsh vegetation from increased use of herbicides as compared to use under alternative A to control invasive plants in the marsh or to control other invasive plants in nearby upland areas. However, we would minimize that risk by using only approved herbicides in the marsh when necessary to control invasive plants that pose a threat of displacing native marsh vegetation. We would use only herbicides approved by our Regional Contaminants Coordinator in this setting to control invasive plants that pose a threat to displace native marsh vegetation. These herbicides are generally non-toxic to fish and other aquatic species and would be used only with strict precautions taken to minimize the potential to affect non-target native plants.

A predicted increase in annual refuge visitation (15 percent over existing levels) would likely result in a greater potential for impact to both Great Marsh and Little Marsh. The types of impacts are the same as those described under alternative A, namely unauthorized use and access, and accumulated trash. However, we would continue to maintain signage and increase our capacity to conduct outreach and enforcement commensurate with our proposed staffing increases, and prioritize monitoring in high use areas to insure adverse impacts are kept to a minimum.

Alternative C. Management to Enhance Public Uses

Benefits

Alternative C would lead to the same benefits to the refuge freshwater marshes as alternative A.

Adverse Impacts

The types of impacts described under alternative B would be the same for alternative C; however, the scope and magnitude of impacts attributed to authorized and unauthorized visitor access would be highest (a 20 percent increase over existing levels) under this alternative. In addition, a slightly higher risk of impact would be attributed to allowing seasonal trail access along the 1.0 mile Little Marsh road. This area has not been open to the public. Similar to alternative B, we would maintain signage and increase our capacity to conduct outreach and enforcement commensurate with our proposed staffing increases, and prioritize monitoring in high use and new use areas to insure adverse impacts are kept to a minimum. Should monitoring results indicate unacceptable impacts are occurring, we would implement restrictions as warranted.

Impacts to Birds

Bald Eagle Impacts

The refuge was established to protect bald eagles which nest, roost, and winter along in the Potomac River and elsewhere in the Chesapeake Bay. Although the species is no longer on the Federal list of endangered and threatened species, bald eagles are still listed as State threatened by Virginia and federally

protected under the Migratory Bird Treaty Act and the Bald Eagle and Golden Eagle Protection Act.

Bald Eagle Impacts That Would Not Vary by Alternative

Benefits

The bald eagle was removed from the Federal list of endangered and threatened species in 1997. Nevertheless, we would continue to ensure the species' sustained recovery through habitat management, conservation partnerships, and limiting human disturbances to nesting, roosting, and foraging areas under all alternatives. There are currently three nesting pairs on the refuge, we would continue to work with our partners to monitor the nests and breeding activities and prohibit the public from disturbing them.



USFWS

Bald eagle on a snag

Adverse Impacts

Regardless of alternative selected, breeding, wintering, and migrating bald eagles may be adversely affected by management activities occurring in the area, such as mowing, applying herbicides to control invasive plants, or by the minor construction projects such as trail work. None of these activities typically occurs within one-quarter mile of nest sites, and there has been no documentation of failed nests or loss of productivity due to management activities.

Alternative A. Current Management

Benefits

Under alternative A, we would continue long-term benefits to bald eagles by ensuring protection of 1,883 acres of forest, which provides nesting and roosting habitat, and 297 acres of freshwater marsh, which provides foraging habitat. We would also benefit bald eagles from our continued efforts to protect and maintain a forested shoreline, protect active nests from human disturbance, and annual active nest searches.

Adverse Impacts

Trail management activities, including proposed realignments, would potentially cause negligible short-term, localized effects to bald eagles by creating a disturbance. We would not conduct trail or other refuge management activities, such as herbicide treatments for invasive plant control, when there is likelihood that the activity might disturb nesting birds. In addition, regardless of season, we would attempt to minimize the time we are working in the area to the extent possible. Disturbance impacts from unauthorized public access may increase commensurately with the predicted increase (10 percent annual over existing levels) in annual refuge visitation. The decline in forest stand conditions, namely the poor tree regeneration that exists, identified by VDF in their forest health assessment (VDF 2009) may result in a loss of quality bald eagle habitat over the long-term.

Alternative B. Improved Management for Federal Trust Resources (Service-preferred Alternative)

Benefits

Under alternative B, bald eagles would benefit from our proposed plans to implement actions to improve forest health and stand conditions. Stand

treatments, which may include thinnings, small created openings, and fuel reductions, would enhance the potential for sustaining larger nest and roost trees over the long-term, and would reduce the potential for windthrow or wildfire losses. Alternative B also proposes to develop nest and roost site management plans as part of the HMP.

Adverse Impacts

The types of adverse impacts are similar to A, but their scope may be greater due to the increased management activities planned and the predicted 15 percent increase in annual refuge visitation. Concerns with disturbing bald eagles during routine maintenance would be the same as those described under alternative A. Additionally, alternative B proposes some new trail work and construction of a new refuge quarters and RV pad. Neither the proposed location of the refuge quarters, or the RV pad are within one-half mile of known nesting or roosting eagles. Therefore, disturbance is predicted to be negligible both during construction and in their use afterwards. None of the proposed new trail construction would occur within one-quarter mile of known nesting sites; however, we would avoid or minimize trail work during the nesting season, but if work is necessary during this time, we would monitor bird response to construction activities and adjust our work if the birds appear agitated or disturbed. Once construction is complete, we would continue to monitor bald eagle activity in the area to ensure visitor proximity is not creating a disturbance. The potential for disturbance to nest sites would be slightly higher under alternative B, compared to alternative A, because of the expected increase in visitation and the greater potential for unauthorized use and access. However, under alternative B, with our increased capabilities in outreach and law enforcement capabilities, and or increased visibility with staff on site more regularly, we would expect violations to be at a minimum.

Alternative C. Management to Enhance Public Uses

Benefits

Benefits under alternative C would be the same as those described for alternative B.

Adverse Impacts

The types of adverse impacts described under alternative B would be the same under alternative C. However, the predicted annual increase in visitors under alternative C (20 percent over existing levels) would pose a higher degree of risk of human disturbance to bald eagles than under alternatives A or B.

Forest Dependent Bird Impacts

The refuge is an important site in the region for breeding and migrating forest dependent songbirds, and for breeding and wintering raptors. Many of these species are listed as birds of conservation concern by the Service and VDGIF, including the Acadian flycatcher, prothonotary warbler, and red-headed woodpecker.

Great horned owl fledging



BIII Wallen/USFWS

Forest Dependent Bird Impacts That Would Not Vary by Alternative
Benefits

Continued protection of the 1,883 acres of refuge forest habitat under all alternatives would benefit forest dependent birds that use the refuge for breeding, wintering or migration. Maintaining the deer hunt to reduce deer overbrowsing of forest regeneration and other understory vegetation would also benefit forest birds. Overbrowsing reduces the forest physical structure and diversity. Casey and Hein (1983) have found greatly reduced bird species diversity in areas with long term, high density populations of deer. These changes were mainly attributed to habitual landscape alteration with pronounced browse line and sparse cover caused by overbrowsing. DeCalesta (1997) also found that deer browsing affects vegetation that songbirds need for foraging surfaces, escape cover, and nesting. DeCalesta noted that species

richness and abundance of intermediate canopy nesting songbirds was reduced in areas with higher deer density. Intermediate canopy-nesting birds declined 37 percent in abundance and 27 percent in species diversity at higher deer densities. Five species of birds were found to disappear at densities of 38.1 deer per square mile and another two disappeared at 63.7 deer per square mile. Casey and Hein (1983) found that three species of birds were lost in a research preserve stocked with high densities of ungulates and that the densities of several other species of birds were lower than in an adjacent areas with lower deer density.

Adverse Impacts

Regardless of alternative selected, breeding, wintering, and migrating forest birds may be adversely affected by current management activities such as mowing or the application of herbicides to control invasive plants. These activities would at least temporarily disturb or displace birds from treatment areas, because of the disturbance from human activity and equipment. Also, if any nests are present near treatment areas, they might be damaged or destroyed by equipment. However, given that mowing and brush cutting occur on a rotational basis, would not result in a habitat type conversion, and avoids sensitive areas during the bird nesting season, the impacts are predicted to be minor, highly localized and short-term with no long-term threats to the long-term viability of bird populations due to adult bird mortality or breeding failure. No significant loss of habitat would occur from management, and we predict that birds would come back to the area within days of management activities.

Construction of the new staff quarters would permanently displace birds from the location due to the need to clear the trees from the site. The site clearing and footprint would constitute less than .02 percent acres in an area already disturbed by High Point Road, the main road accessing Mason Neck State Park.

Refuge visitor activities may disturb birds, occasionally to the point of abandonment, along roads and trails, especially where there is concentrated human activity. However, not all bird species are impacted similarly, and documented sensitivity to human presence ranges widely.

Gutzwiller et al. (1994) found that singing behavior of some songbird species was altered by low levels of human intrusion. Some studies have found that some bird species habituate to repeated intrusion; frequently disturbed individuals of some species have been found to vocalize more aggressively, have higher body masses, or tend to remain in place longer (Cairns and McLaren, 1980). Disturbance may affect the reproductive fitness of males by hampering territory defense, mate attraction and other reproductive functions of song (Arrese, 1987). Disturbance, which leads to reduced singing activity, would make males rely more heavily on physical deterrents in defending territories which are time and energy consuming (Ewald and Carpenter, 1978).

Travel routes can disturb wildlife outside the immediate trail corridor (Miller et al., 2001). Miller et al. (1998) found bird abundance and nesting activities (including nest success) increased as distance from a recreational trail increased in both grassland and forested habitats. Bird communities in this study were apparently affected by the presence of recreational trails, where “generalists” (American robins) were found near trails and “specialist” species (grasshopper sparrows) were found farther from trails. Nest predation was also found to be greater near trails (Miller et al., 1998).

Disturbance can cause shifts in habitat use, abandonment of habitat and increase energy demands on affected wildlife (Knight and Cole, 1991). Flight in response to disturbance can lower nesting productivity and cause disease and death. Hammitt and Cole (1998) conclude that the frequent presence of humans in “wildland” areas can dramatically change the normal behavior of wildlife mostly through “unintentional harassment.”

Seasonal sensitivities can compound the effect of disturbance on wildlife. Examples include regularly flushing birds during nesting. The Delaware Natural Heritage Program, Division of Fish & Wildlife and the Department of Natural Resources and Environmental Control prepared a document on the “The Effects of Recreation on Birds: A Literature Review” which was completed in April of 1999. The following information was obtained from that document:

Several studies have examined the effects of recreationists on birds using shallow-water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger, 1981; Klein 1993; Burger et al., 1995; Klein et al., 1995; Rodgers & Smith, 1995, 1997; Burger & Gochfeld, 1998). Overall, the existing research clearly demonstrates that disturbance from recreation activities always has at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger, 1981, 1986; Klein, 1993; Burger et al., 1995; Klein et al., 1995; Rodgers & Smith, 1997; Burger & Gochfeld, 1998). The findings that were reported in these studies are summarized below in terms of visitor activity and avian response to disturbance.

- Presence: Birds avoided places where people were present and when visitor activity was high (Burger, 1981; Klein et al., 1995; Burger & Gochfeld, 1998).
- Distance: Disturbance increased with decreased distance between visitors and birds (Burger, 1986), though exact measurements were not reported.
- Approach Angle: Visitors directly approaching birds on foot caused more disturbance than visitors driving by in vehicles, stopping vehicles near birds, and stopping vehicles and getting out without approaching birds (Klein, 1993). Direct approaches may also cause greater disturbance than tangential approaches to birds (Burger & Gochfeld, 1981; Burger et al., 1995; Knight & Cole, 1995; Rodgers & Smith, 1995, 1997).
- Type and Speed of Activity: Joggers and landscapers caused birds to flush more than fishermen, clammers, sunbathers, and some pedestrians, possibly because the former groups move quickly (joggers) or create more noise (landscapers). The latter groups tend to move more slowly or stay in one place for longer periods, and thus birds likely perceive these activities as less threatening (Burger, 1981, 1986; Burger et al., 1995; Knight and Cole, 1995). Alternatively, birds may tolerate passing by with unabated speed whereas if the activity stops or slows birds may flush (Burger et al., 1995).
- Noise: Noise caused by visitors resulted in increased levels of disturbance (Burger, 1986; Klein 1993; Burger & Gochfeld, 1998), though noise was not correlated with visitor group size (Burger & Gochfeld, 1998).

Dogs on-leash on designated trails would continue to be allowed under all alternatives. Even if dogs do not give chase to wildlife, studies show that dog presence can cause disturbance to wildlife species in the form of disruption, harassment, and displacement (Sime 1999). Dogs extend the zone of impact from an individual visitor, especially if the dogs are off leash or running, barking, or jumping. Dogs alone may be less of a threat to songbirds than dogs with people, as indicated in two studies, as the authors surmised that songbirds viewed the dogs as a coyote or fox (Leach and Frazier 1953, Andelt et al. 1987). Leashed or not, disturbance from dogs was noted to be greater off trail than on trail.

While all of the above impacts are well-documented, the scope and scale of activities on this refuge are important to keep in mind. Approximately 1.85 miles of trail (approximately 2.2 acres) would be open to public access, and use is only allowed on those designated trails or in parking areas, with the exception of hunting during fall. Deer hunting, however, occurs after bird nesting season and when many migratory birds have already left the area.

We would take all necessary measures to mitigate these effects and avoid or minimize long-term impacts. Sensitive bird areas, such as bald eagle nesting sites and wintering waterfowl concentration areas, would continue to be closed to public access. When group activities are planned, they would be held in areas and during seasons where minimal impact would occur. Periodic evaluation of sites and programs will be conducted to assess if objectives are being met and to prevent site degradation. If evidence of unacceptable adverse impacts appears, the location(s) of activities would be rotated with secondary sites, curtailed or discontinued. Refuge regulations will be posted and enforced. Closed areas will be established, posted and enforced. The known presence of a threatened or endangered species would preclude the use of an area until the Refuge Manager determines otherwise.

Special use permits would continue to be issued to organizations conducting environmental education or interpretive and/or wildlife observation and photography tours or activities on the refuge. The areas used by such tours would continue to be closely monitored to evaluate the impacts on the resource. If adverse impacts appear, the activity would be moved to secondary locations, curtailed or discontinued. Specific conditions may apply depending upon the requested activity and would be addressed through the special use permit.

All photographers would continue to be required to follow refuge regulations. Photographers allowed via special use permit into closed areas must follow the conditions outlined in the permit which normally includes notification of refuge personnel each time any activities occur in closed areas. No baits, calls, or scents would be allowed. All litter would have to be removed daily. Law enforcement patrol of public use areas would continue to minimize the above-mentioned types of violations.

Research activities that would be supported under all the alternatives may also 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 in-trap predation, and indirectly through capture injury or stress caused to the organism. Even if such mortalities to individual birds do occur, the total number of birds impacted would be negligible relative to the overall local or regional population of any bird forest dependent bird species.

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 adversely affecting birds and other wildlife. The threat of invasive plant establishment would likely continue to be an issue over the long term and will require annual monitoring, treatment, and public outreach and education.

Alternative A. Current Management

Benefits

Under alternative A we would continue to benefit refuge bird species by permanently protecting from development over 1,883 acres of contiguous forest cover.

Adverse Impacts

The potential impacts from alternative A are described above. In summary, there would be short-term localized impacts to bird habitat and temporary

displacement of birds from management activities such as mowing or herbicide treatments for invasive plant control. Trail maintenance activities would also cause negligible short-term, localized effects from disturbance. Impacts from visitor disturbance may increase minimally in volume due to a predicted 10 percent increase in refuge visitation; however, visitors would continue to be required to stay on designated roads and trails.

Alternative B. Improved Management for Federal Trust Resources (Service-preferred Alternative)

Benefits

In addition to the benefits mentioned under alternative A, there would be increased long-term benefits to forest dependent birds under alternative B due to plans to more actively manage forest health. This would include implementing stand treatments recommended by VDF to restore the native forest composition, age class, and structure that support a diversity of wintering, migrating, and breeding forest dependent birds. For example, thinning and fuel reduction treatments would be considered that would help sustain the predominantly mature forest and maintain the large, older trees while reducing the risk of a catastrophic fire, pest or pathogen event. Stand treatments that improve forest regeneration would also be a priority to implement if determined feasible and practicable. In addition, monitoring and managing the effects of the deer herd and invasive plants on forest understory composition would be implemented as another means of protecting forest health. Understory vegetation, particularly native shrubs, is a critical component of the foraging and breeding habitat for a number of forest dependent birds. Ensuring these native shrubs are maintained and regenerating would be an important contribution to protecting forest dependent bird diversity and productivity.

Adverse Impacts

A review of potential impacts, regardless of alternative, is described above. We also described some mitigations measures we would implement to reduce those impacts. In general, management activities used to maintain or restore habitats, or prevent encroachment of invasive species, may affect individual birds by temporary displacing them or result in a short-term loss of a negligible amount of habitat. These effects would be very local, and we would not predict any long-term impact to the viability of regional species' populations. Measures to minimize risk to forest dependent birds includes avoiding activities during the nesting season when the majority of birds are building nests, incubating, eggs or feeding nestlings.

Visitor disturbance along roads and trails would also increase because of the projected 15 percent increase in visitation and because of the increased access from new and improved refuge visitor amenities. Unauthorized off-trail access could occur, which if excessive, might result directly affect birds that are nesting in shrubs or on the ground. Trampling of vegetation might also indirectly impact those shrub and ground nesting birds by affecting vegetation to the point it reduces protective cover or changes light and moisture regimes.

There would be some removal of vegetation to locate new trails or trail improvements, and build the new refuge housing, observation platforms or photo blinds under alternative B. Approximately 15 acres total would be impacted with respect to trails and associated developments. These activities would cause an increased degree of disturbance to birds and remove an additional 4 acres of natural habitat in trails as compared to alternative A. Placement of kiosks at trailheads and junctions may impact additional small areas of vegetation. Kiosks would be placed where minimal disturbance and vegetation removal would occur.

Under alternative B, we would also support a new youth turkey hunt in an effort to connect youth with nature and the outdoors. The hunt would be limited to approximately 10 youth hunters over a 3-day hunt season in designated areas. We anticipate an annual harvest of about 8-10 turkeys. The greater likelihood of disturbance to forest dependent birds would occur if we implement a spring turkey season; otherwise, a fall turkey season would occur when many forest dependent migrant birds have left the area. In either case, however, we predict only a negligible impact on other forest dependent birds and their habitat given the limited number of participants, and the fact the hunt would be monitored closely. With regards to the turkey population, we would work with VDGIF to insure the harvest would not reduce the Mason Neck Peninsula turkey population to a level below which it is not self-sustaining. Approximately one hundred years ago, wild turkeys had become a rarity in the State due to habitat loss and market hunting. Trapping and relocation of wild turkeys into the State has resulted in a successful reestablishment of a healthy wild turkey population. The VDGIF supports this proposed youth hunt and would help coordinate it, along with the National Wild Turkey Federation.

The management and mitigation measures we describe under “impacts that would not vary by alternative” would help reduce the long term affects of management on forest dependent birds under alternative B. Monitoring and evaluation of wildlife impacts would be a critical component of our adaptive management strategy. In the event monitoring results indicate a disturbance to habitat or wildlife, the activity would be restricted or discontinued. Finally, any of the impacts predicted above would be mostly offset by the overall protection afforded forest birds on refuge lands.

Alternative C. Management to Enhance Public Uses

Benefits

Benefits under alternative C would be the similar to those described for alternative B for forest-dependent birds.

Adverse Impacts

Adverse effects under alternative C would be similar to those described for alternative B for forest-dependent birds except that the predicted 20 percent increase in annual visitation, and the addition of a 1.0 mile trail along Little Marsh road (non-nesting season access only), would likely cause the magnitude of the impacts to increase over those identified under alternative B. However, as with alternative B, the monitoring and evaluation of wildlife impacts would be a critical component of our adaptive management strategy. In the event monitoring results indicate a disturbance to habitat or wildlife, the activity would be restricted or discontinued.

Waterbird, wading Bird, and Waterfowl Impacts

We evaluated the management actions under each alternative for their potential to benefit marsh birds, wading birds, and waterfowl or their habitat. Both Great Marsh and Little Marsh provide high quality habitat for a wide variety of these bird groups. The refuge also hosts one of the largest breeding colonies of great blue herons in the Atlantic Coast States on Little Marsh. The rookery grew as large as 1,400 nests, but has recently declined to less than 800 nests in 2008. Our objective is to manage the rookery to sustain and potentially expand the colony.

The benefits we considered included:

- Protection, maintenance, and improvements to Great Marsh or Little Marsh
- Protection, maintenance and improvement of the Little Marsh Road impoundment

- Prohibition on public access to refuge marshes and impoundments

Some impacts to marsh habitat and water birds were described previously in this chapter under the sections on “Water Quality” and “Soils.”

We evaluated the potential adverse effects on these birds from the management alternatives, including impacts from:

- Construction projects that might affect species habitats
- Public activities on the refuge that might damage habitat or disturb the species

Waterbird, wading Bird, and Waterfowl Impacts That Would Not Vary by Alternative

Benefits

Regardless of which alternative we select, our ongoing protection and management of the refuge marshes and uplands will continue to benefit marsh birds, wading birds and migratory and wintering waterfowl. These areas will remain protected and undeveloped in native vegetated cover, thereby sustaining the refuge’s important contribution to a reserve of migratory and wintering bird habitats in the Tidal Potomac River Basin that would otherwise almost certainly be intensively developed.

Adverse Impacts

Water quality affects the aquatic invertebrates, plants, and fish on which wintering and migrating waterfowl and water and wading birds depend. The water quality of the Tidal Potomac River Basin will continue to reflect the level of point and non-point source pollution and the effectiveness of pollution controls in the different communities of the watershed overall. We would continue to partner with agencies that are attempting to address water pollution, but we do not have jurisdiction to directly control any major upstream sources of pollution.

Under all alternatives, removal of invasive plants may cause minor, short-term water quality impacts such as increased turbidity and elevated nutrient levels. These effects would not likely add measurably to general turbidity and nutrient levels in the Potomac River Basin. Also, under all alternatives, some temporary disturbance to birds nesting in the Little Marsh heron rookery would continue to occur from the Service-managed surveys, but there has been no indication over the decade of survey work that survey activities are causing permanent abandonment or other long-term adverse effects to the birds’ productivity or breeding success.

Visitors to the refuge would continue to cause some minor level of disturbance to water and wading birds and waterfowl at locations on the refuge where trails, specifically the Woodmarsh and Great Marsh trails, are near habitats used by the birds. Potential impacts are described below.

The effects of human visitation on wading and waterbirds have been studied at J.N. “Ding” Darling National Wildlife Refuge in Florida. Klein (1989) found resident wading and waterbirds to be less sensitive to disturbance than migrant birds. Klein also found that sensitivity varied according to species, and would differ among individuals within species. Ardeids (herons, egrets and bitterns) as a family of birds were generally tolerant of people, although appeared less tolerant and were more likely to be disturbed when they were hunting prey. Within that family of birds, great blue herons, tricolored herons, great egrets, and little blue herons were observed to be disturbed to the point of flight more than other birds. Kushlan (1978) found that when these birds

move frequently while feeding, it is more likely to disrupt interspecific and intraspecific relationships. In addition, Batten (1977) and Burger (1981) found that wading birds were extremely sensitive to disturbance. Klein (1993), in studying waterbird response to human disturbance, found that as intensity of disturbance increased, avoidance response by the birds increased. He also found that out-of-vehicle activity is more disruptive than vehicular traffic. Freddy et al. (1986) and Vaske (1983) also found this to be true. Burger (1981) found various gull species to be apparently insensitive to human disturbance, while Klein (1989) also found this true of gulls, and found the same results with sandpipers.

McNeil et al. (1992) found that many waterfowl species avoid disturbance by feeding at night instead of during the day. Klein (1989) found migratory dabbling ducks to be the most sensitive to disturbance and migrant ducks to be more sensitive when they first arrived in the late fall, than later in winter. Disturbance may displace individual waterfowl to other parts of the refuge; however, this disturbance would be limited in scope due to the limited number of areas accessible to visitors.

Fishing and recreational boating cause disturbance to waterfowl and so would continue to be prohibited on the refuge. Recreational fishing opportunities along the shoreline may cause temporary disturbances such as the flushing of feeding, resting, or nesting birds, especially waterfowl, and other wildlife species.

Most visitors understand the protection afforded by the refuge, and the Service would continue to provide educational materials and adequate signage, these instances should remain rare. We have not observed that the level of visitor activity would to any degree constitute a substantive adverse impact to species survival or reproduction. Through refuge literature and signage, people are directed to stay on trails and to be sensitive to disturbing wildlife. Outreach, education, and if necessary, law enforcement, will continue to be tools to insure significant impacts do not occur.

Mute swans are invasive species that often out-compete native waterfowl for forage and nesting areas. Under all alternatives, mute swans would be controlled with a goal of zero productivity to reduce, if not eliminate, their threat to native waterfowl.

Alternative A. Current Management

Benefits

Continued protection of the 207-acre Great Marsh and 50-acre Little Marsh under alternative A would benefit marsh birds, wading and water birds, and waterfowl by ensuring these habitats exist for the long-term and are permanently protected from development. The great blue heron rookery would also benefit from our continued protection of the sites and from our partners who monitor and maintain the current breakwaters that are helping to stem the loss of trees along the forested bluff that include rookery nest trees. Our law enforcement officers would continue to conduct outreach and enforce the prohibition on public entry to the rookery site.

Adverse Impacts

An increase in refuge visitation would minimally elevate the potential for impacts to the refuge freshwater marsh and disturbance to marsh and wading birds and waterfowl. The potential for disturbance from refuge maintenance projects and staff using motor vehicles to monitor the marsh would be negligible.

Given our limited biological program staff, we would continue to be unable to effectively monitor wintering waterfowl and to study the rookery to determine what is causing the recent decline in nesting heron numbers. Our involvement with partners to develop and implement management plans to reverse the current trend would also be limited.

Alternative B. Improved Management for Federal Trust Resources (Service-preferred Alternative)

Benefits

In addition to alternative A benefits, the quality of habitat for water and wading birds and waterfowl should improve in the refuge's marshes and wetlands over the long term under alternative B. Increasing our monitoring of on-site and off-site threats to water quality and vegetation, coupled with invasive plant control and greater vigilance of visitor impacts (e.g. litter control) in the vicinity of the 207-acre Great Marsh and 50-acre Little Marsh, would increase protection of the health and integrity of these refuge wetlands. This, in turn, would directly benefit foraging, resting, breeding, and resting habitat for the many species of marsh, shore, and wading birds and waterfowl.

Under alternative B, we would continue to conduct our annual rookery surveys and track the numbers of great blue heron nests on the rookery site. Using GIS capabilities, we would also map and track the configuration of the rookery site over time, monitoring even subtle shifts in nest sites, in an attempt to identify the factors influencing the size and distribution of the rookery and the reasons for the apparent decline in the size of the colony over the last 10 years. In addition, we would work with partners to expand refuge shoreline and bluff protection to reduce the loss of future potential nesting trees.

Adverse Impacts

The common impacts described above for all alternatives, and those described under alternative A, would also apply under alternative B. In addition, the anticipated increase in refuge annual visitation by 15 percent due to expanded public use programs under this alternative would minimally elevate the potential for impacts to the refuge freshwater marsh and disturbance to marsh and wading birds and waterfowl. However, our proposed actions to minimize the loss and degradation of habitat, and maintaining the area closures, would help offset the potential impacts. We would also mitigate the elevated risk by increasing our outreach to the visiting public and our enforcement of unauthorized access and uses. Our ability to conduct those activities actions would be commensurate with the increased staffing proposed under alternative B. We expect violations would be kept to a minimum.

The potential for disturbance from refuge maintenance projects and staff use of motor vehicles to monitor the marsh would continue to be negligible.

Alternative C. Management to Enhance Public Uses

Benefits

Same as alternative B.

Adverse Impacts

The types of adverse impacts described under alternative B would be the same under alternative C. However, the predicted annual increase in visitors under alternative C (20 percent over existing levels) would pose a higher degree of risk of human disturbance to water and wading birds, and waterfowl than under alternatives A or B. In addition, the proposed seasonal access to Little Marsh via a trail along Little Marsh road would increase the likelihood of disturbing herons, other waterbirds, and waterfowl using the area. While trail use would not be allowed during the critical nesting season, we would predict that herons and other water birds and waterfowl that use the area year round, would still be disturbed by visitors outside of the nesting season. We would expect the birds to

be temporarily displaced and move out of the area to avoid human encounters. If monitoring results indicate disturbances are at unacceptable levels, we would implement restrictions on public access as warranted.

Similar to alternative B, outreach to the visiting public and enforcement of unauthorized access and uses would be increased commensurate with the increased staffing proposed under alternative C. We would work to keep violations to a minimum.

Impacts to Other Native Wildlife

Native mammals at the refuge—including white-tailed deer, beaver, muskrats, woodchucks, squirrels, bats, shrews, and mice—are an integral part of the natural ecosystems we work to sustain on the refuge, and their presence reflects the refuge's biological diversity, integrity and environmental health. Many of the small mammals are particularly important as they are the prey base for diurnal and nocturnal raptors. White-tailed deer is the only mammal hunted on the refuge.

Reptiles, amphibians, and invertebrates are also important components of diversity on the refuge. Amphibians known on the refuge are relatively common in the region; none are listed as species of greatest conservation need by the State of Virginia.

However, three reptiles that occur on the refuge are listed as species of global conservation need (GCN) by VDGIF: the spotted turtle (Tier III species), eastern box turtle (Tier III species), and eastern hognose snake (Tier IV species).



John Mosesso, Jr., NBII

Eastern box turtle

The refuge and adjacent tidally-influenced river and bay waters are also host to a wide variety of

invertebrate species, from the butterflies and spiders that populate our forested, grassland, and shrubby areas to the freshwater mussels and aquatic arthropods in the shallow waters of the marshes. Invertebrates are critical food items for insectivorous birds, bats, moles, shrews, raccoons, fish, and a number of other refuge wildlife species. This great diversity is a major portion of the food biomass on which refuge wildlife species depend. A number of invertebrate species are rare or declining and are of special management concern.

Pollinating insects are a group of particular and increasing concern by the Service. Insect pollinators support native plant food production, contribute to nutrient recycling, and serve as direct prey for migrating and breeding birds. They include butterflies and moths (*Lepidoptera*), bees and wasps (*Hymenoptera*), beetles, (*Coleoptera*) and flies (*Diptera*). Concern about the decline of pollinators, especially of wild native insect species, has prompted the Service to collaborate with the North America Pollinator Protection Campaign (NAPPC). The Refuge System is taking a lead in conserving pollinators, recognized as the guardians of biological integrity, diversity, and environmental health of natural ecosystems (Higgins & Adamcik 2006). We are including insect pollinator conservation in future refuge habitat management planning, strategies, and conservation actions.

We considered the benefits from:

- Protection of diverse refuge habitats
- Measures to improve water quality

We considered the potential for adverse effects from:

- Refuge habitat management activities
- Construction or maintenance projects
- Public use and access

Native Wildlife Impacts That Would Not Vary by Alternative

Benefits

Regardless of which alternative we select, we would continue to permanently protect a natural landscape with a diversity of uplands and wetlands habitats to support existing populations of native mammalian, amphibian, reptile, and insect species. The conservation of Federal trust species and species of conservation concern in Virginia would continue to be a priority for our management.

Monitoring infestations of pathogens and pests, such as gypsy moth, and controlling their spread, will continue to be important to sustaining quality forest habitat over the long term. Unchecked infestations could lead to catastrophic loss of forest habitat. For example, the threat from gypsy moth is well known in the area. Gypsy moths prefer oaks as a host but also feed on and defoliate many deciduous tree species found in Virginia. Once trees are defoliated multiple times during the growing season they become stressed. The stressed trees are then extremely prone to other stressors including diseases. Death of large numbers of oak trees can ultimately occur if left untreated. This would have a substantial impact to many species of wildlife; including deer, squirrels, and mice that rely heavily on these trees as a food source (USDA, 1995).

Adverse Impacts

Refuge management activities such as manual pulling, mechanical removal (e.g. mowing), and herbicide applications to control invasive plants, and mowing and brushhogging fields may potentially kill individual small mammals, such as mice, moles, and shrews, as well as amphibians, reptiles, and invertebrates that are not very mobile within a treated area. This may be especially true during the warmer months. Contaminants that might run-off into refuge vernal ponds or wetlands as a result of maintenance operations, or from visitor vehicles on roads and parking areas, could adversely affect amphibians and aquatic arthropods. However, spill plans, monitoring, and immediate corrective measures would continue to ensure contaminated run-off does not become a problem. While mortality is the worst case for some, lesser impacts could be temporary disturbance or displacement of others in treatment areas. In our professional judgment, there would be no significant mortality or loss of local populations from habitat management activities to jeopardize their viability over the long term because these actions would be done on a rotational basis, no major habitat alterations would occur in any given year, and individual treatment areas would be 15 acres or less. More mobile species would be expected to repopulate the area within days.

Impacts to native wildlife may also occur during the fall deer hunting season, which will continue under all alternatives. Shotgun noise from hunting may cause disturbance to some wildlife. Also, non-target species in the pathway of hunters tracking deer may be temporarily disturbed and frightened or forced to flee. We predict that rarely would mortality occur to non-target, less mobile species as a result of hunters walking through the woods. And, more often, mobile wildlife would just temporarily move from the path of hunters, but not permanently leave the area. Hibernation or torpor by reptiles and amphibians limits their

activity during the hunting season when temperatures are low, so risk to those individuals is predicted to be minimal. In our observations, hunters rarely encounter reptiles and amphibians during most of the hunting season. Insect populations are also diminished during the cooler fall temperatures and their populations would be at low risk. Some small mammals may be active depending on the weather conditions, but like reptiles and amphibians, many will be starting to hibernate in burrows, under logs, or in trees, during the fall.

Deer hunting would obviously result in deer mortality. However, deer are abundant across their range in the Mid-Atlantic States and in many areas, including portions of the Mason Neck Peninsula, deer populations exceed their ecological carrying capacity and are degrading habitat values for other native wildlife due to their overabundance. We will continue to adhere to State seasons which account for deer population dynamics and trends to minimize any possible long term threat to deer populations from hunting on the refuge. As such, deer populations would be reduced during the deer hunt, but the deer population on the refuge and across the peninsula would not be adversely affected permanently, or over the long-term, because we would continue to monitor the peninsula population in coordination with VDGIF, and modify our management actions as necessary to insure they are not reduced to the point that the population is decimated. In addition, we would adapt our hunt program when deer populations have been reduced to levels where maintenance of the existing population is the goal, rather than the current goal of herd reduction.

In addition to hunting, other refuge visitor activities and facilities to support them may cause minor temporary negative direct and indirect impacts on wildlife and their habitat. Wildlife disturbances from human presence from non-hunting visitor activities typically result in only temporary displacement without long term effects on individuals or populations. Some species will avoid the areas people frequent, such as developed trails and buildings, while others may be unaffected or even drawn to the presence of humans. Roads and trails can be barriers to movement for some species. For example, salamanders may not cross openings that are too wide or that consist of dry bare ground (Vinson 1998). Gravel roads or trails, even if permeable, may act as a barrier to salamander movement (Marsh et al 2005). Refuge trails are generally a gravel surface, except for the multi-purpose, asphalt High Point trail, and are laid out on level terrain with good drainage. Disturbance to basking turtles may also occur where trails come into proximity to ponded water or the marsh habitat. However, the locations of our trails are designed to minimize crossing wet areas and small ravines that would be favored by salamanders, and they minimize access to open water where basking turtles may be present. Vernal pools, which are important to many native amphibians and reptiles, would be avoided when maintaining or constructing trails and facilities.

Dogs may also cause disturbance to many wildlife, even when on a leash. We described some of the potential impact from dogs in the section above on ‘Forest birds.’ In addition to what is described there, studies have shown that ungulates, such as deer, respond to the presence of dogs by running, which can be very stressful and expend a lot of energy. Ungulates demonstrated more pronounced reactions to unanticipated disturbances, such as dogs off leash.

The parking lots that are illuminated may impact wildlife. Artificial illumination may have both positive and negative impacts depending on the species being considered. One study indicates that artificial illumination may enhance prey detection for some species, hurt predator avoidance, cause aggression between individuals for the same species, cause temporary blindness in frogs, disrupt or confuse migration to or from ponds for salamanders (Wise and Buchanan 2002), or inhibit reproduction by frogs adapted to low illumination (Buchanan 2002).

We would continue to illuminate the Great Marsh trailhead parking lot due to concerns with visitor safety and to enhance law enforcement of the area.

The majority of the disturbances noted above would occur in close proximity to trails and parking areas, and are thus confined in space. No loss of populations or major impacts on rare or sensitive species is predicted. Long term impacts are anticipated to be minimal and localized since the majority of the refuge is closed to the public and access is only on designated trails (except by hunters). The public is excluded from the most sensitive wildlife areas on the refuge.

Individual beavers may need to be occasionally removed if they are causing road flooding or other serious refuge management problems. Beaver are capable of girdling and felling large diameter trees and can decimate a small stand. This could have implications to important bird nesting areas, such as the heron rookery or bald eagle sites. We would remove problem animals through lethal means only when necessary. Removal would be conducted by Refuge personnel or their designated agent.

Outreach and education programs would continue to be used to inform the general public and nearby landowners of the need for, importance of, and ecological soundness of hunting and animal damage control measures. We will also continue to emphasize in our education and outreach programs the importance that refuge wetlands, vernal pools, and contiguous habitat are to many species of wildlife.

Alternative A. Current Management

Benefits

Mammals, reptiles, amphibians, and invertebrate species would benefit as we continue to permanently protect a diversity of upland and wetland refuge habitats under alternative A. Continuing to allow public access on only the designated Great Marsh and Woodmarsh Trails, except during the deer hunt, maintains over 2,000 acres on the refuge free from human disturbance.

We predict that maintaining 15 total acres of grass/shrub lands under alternative A, including the 5-acre environmental education site, would help maintain a diversity of native wildlife species since the refuge is otherwise predominantly forested. However, the particular species using the grass/shrub area is not well-documented through systematic inventories. We also predict that maintenance of refuge impoundments and tidal marsh would continue to be a major benefit to a wide diversity of dragonflies and damselflies and other aquatic-dependent native wildlife species.

Adverse Impacts

The potential adverse impacts noted above for all alternatives summarize those we would expect under alternative A. Manual, mechanical, and herbicide methods for invasive plant control or habitat management would cause short term impacts, killing some slow moving wildlife in treatment areas, but we would expect these areas to be repopulated within weeks as source populations for these mostly common species are nearby. No long-term effects on the viability of any local populations are predicted.

Alternative B. Improved Management for Federal Trust Resources (Service-Preferred Alternative)

Benefits

Mammals, reptiles, amphibians, and insects would benefit to a greater degree from refuge management under alternative B than under the other alternatives. This is primarily due to increased effort in inventorying and monitoring wildlife and habitats, managing to improve forest health, and proposing only a moderate increase of visitors in designated areas. We would identify, map, and digitally

track important habitat features including vernal pools and den trees, mast trees, snags, and downed logs that provide breeding or escape cover, food, or other survival requirements.

Maintenance of the 15 acres of grassland/shrub areas would provide the same benefits predicted under alternative A. Increased protection and management of the health and integrity of wetlands and forest on the refuge would commensurately increase the habitat quality benefits to native aquatic and forested wildlife.

Adverse Impacts

The potential adverse impacts noted above for all alternatives would pertain to alternative B. Manual pulling, mechanical, and herbicide methods for invasive plant control, fuels management and maintenance of the grassland area near the outdoor education site would cause similar short term impacts, to native wildlife that are not mobile on treatment areas, similar to alternative A. However, over the long term, controlling invasive plant species benefits native wildlife by maintaining the balance of food resources and native vegetative communities with which they evolved or adapted for cover, nesting, and quality food resources. Those invasive species that pose the biggest threats to native wildlife are those that quickly colonize an area and form dense, monotypic stands.

Under alternative B, there is a potential to increase the impacts noted above from deer hunting if the hunt program is modified to extend the season or allow additional hunters. However, this increase in hunting pressure would only result after an evaluation that declining forest health and vegetations conditions caused by deer warrant an increased deer harvest. The alteration and degradation of habitat from deer over-browsing can have detrimental impacts on other native wildlife communities that depend on understory vegetation for breeding, nesting, cover, or forage (VDGIF 1999). Waller and Alverson (1997) found that by competing with squirrels and other fruit eating animals for oak mast, there is a likelihood that deer may further affect many other species of animals and insects that rely on the same food resources.

Compared to alternative A, there is an increased potential to impact native wildlife, primarily in the form of disturbance and displacement, as a result of new and enhanced trail projects and from the new, proposed 3-day youth turkey hunt. Some impacts from trail use are described above under the section "impacts that would not vary by alternative." The proposed new trails would introduce these impacts to new areas on the refuge.

In particular, the trail improvements and additions proposed under alternative B have the potential to impact amphibians and reptiles more than would occur under alternative A. Mowing and brushing of access roads and public use trails occasionally kills turtles, snakes or frogs if conducted during times of movement (warm months). We attempt to minimize this direct type of negative impact by keeping these pathways mowed short so that they do not become attractive habitat. However, in many cases it will be impossible to find a perfect time to carry out maintenance actions that will completely avoid conflict for wildlife. Enhancement and expansion of the trail systems for public use also poses the potential threat of blocking access between different habitat types. Some salamander species will not cross openings that are too wide or that consist of dry, bare ground (Vinson 1998); thus earthen trails, if exposed to sunlight could become dry enough to form a barrier. Gravel roads or trails, even though thought to be permeable, may also act as a barrier to salamander movement (Marsh et al. 2005). Consideration will be given during the development and construction of new trails to avoid disruption to movements of amphibians and reptiles.

Disturbance to basking or nesting turtles may occur where public use is concentrated at points where land and water interface. Basking turtles can

usually find alternate resting surfaces. Nesting turtles, once engaged in the act of digging usually will not allow their attention to be drawn to anything else, and at such time are vulnerable to predators. A turtle wishing to make landfall to attempt egg-laying, however, may be dissuaded by the presence of humans at the site.

We would plan to mitigate all of the potential trail impacts by continuing to require that visitors stay on designated trails (except during hunting season), and through increased monitoring, outreach and enforcement to insure the scope and scale of those impacts does not reach unacceptable levels.

The proposed new hunt would be tightly monitored with the help of VDGIF and the National Wild Turkey Federation, allowing up to 10 hunters access at any one time during state seasons, and distributing those hunters to minimize impacts on natural resources and on other public use programs.

Alternative C. Management to Enhance Public Uses

Benefits

Benefits to other native wildlife under alternative C would be the same as those predicted above for alternative A because our habitat and species management programs would be the same under both alternatives. Our emphasis on forest and wetland protection and maintenance of diversity and health would benefit native over the long term.

Adverse Impacts

Similar to alternative B, manual pulling, mechanical, and herbicide treatments for invasive plant control or other habitat objectives would cause short term impacts, potentially killing or displacing numbers of slow moving wildlife species in treatment areas. However, we predict that these areas would begin to recover rapidly and no long term effects to the viability of populations of local native wildlife would occur.

Under alternative C, annual deer mortality would increase from implementing a new muzzle-loader hunt. This increase in annual mortality would have a short term effect on the local deer population, in particular. We predict that any short term increase in mortality would be offset in subsequent years, perhaps in 5-10 years, when the Mason Neck Peninsula deer herd would then become somewhat stabilized and annual hunter harvest would stabilize commensurately. If this occurs, we may directly reduce the hunt mortality by reducing the parameters of the muzzleloader hunt or shotgun hunt if we determine, in coordination with the Mason Neck Refuge management group and VDGIF, that such a reduction in hunting pressure is warranted. There may be some minimal effects to other native wildlife, including disturbance and displacement, by additional deer hunters walking through the refuge and firing their weapons. However, over the long term, with the goal to bring deer populations to within the ecological carrying capacity and to improve forest diversity, structure and regeneration, other native forest wildlife would directly benefit. .

Under alternative C, the potential impacts to native wildlife from public use on trails would increase over those proposed under alternative B because refuge annual visitation would be 5 percent higher and an additional 1.0 mile of trail is planned. Therefore, while the types of impacts would be the same as in alternative B, their scope would reach to new areas on the refuge, including along Little Marsh Road.

The Service recognizes the importance of continued compliance with the National Historic Preservation Act, and other Federal laws and mandates protecting

Archaeological and Historic Resources Impacts

archaeological, historical and cultural resources, to ensure that known sites are protected and that any sites found in the course of refuge management and public use are properly addressed.

Archaeological and Historic Resources Impacts That Would Not Vary by Alternative

Benefits

Areas that are likely to contain cultural, archaeological, or historic resources would be protected regardless of which alternative we select. We would continue to conduct outreach and education, and use law enforcement if necessary, to protect against loss or damage to these resources.

Adverse Impacts

Increased visitation and 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 all public uses except hunting would occur in designated areas on the refuge, such as refuge trails. Hunting would not involve ground disturbance. We would take all necessary precautions to identify and preserve properties that are eligible for listing on National Register of Historic Places. This EA will be sent to the Virginia SHPO for review of NHPA Section 106 compliance, and we will also continue to do Section 106 compliance for all individual projects.

Alternative A. Current Management

Benefits

Continued Service protection of refuge lands would benefit cultural resources by ensuring that none of the substantial impacts related to development for other uses would affect known or unrecorded cultural, archaeological, and historic resources on those lands.

Adverse Impacts

There is some risk that refuge visitors may inadvertently or intentionally damage or disturb known or unrecorded cultural artifacts or historic properties on the refuge. We would manage these resources to protect sites and objects of importance for scientific study, public appreciation and socio-cultural use by complying with Section 106 of the NHPA, as amended, promoting academic research on, or relating to, refuge lands, adding Archaeological Resource Protection Act (ARPA) language to appropriate public use materials to warn visitors that looting is unlawful and by maintaining law enforcement personnel trained in ARPA enforcement.

Alternative B. Improved Management for Federal Trust Resources (Service-Preferred Alternative)

Benefits

There would be increased benefits to archaeological and historic resources under alternative B because we plan to complete a refuge-wide inventory of all our archaeological and historic sites and resources. We plan to work with State, County and professional archaeological societies willing to assist in performing surface surveys of selected refuge sites and the shoreline to locate archaeological resources at risk. We plan to ensure that archaeological and historic resources are protected from looting, and we would develop site management and protection plans as warranted. At least one law enforcement staff person would receive ARPA training. We would also use the proposed new Sycamore Road Trail as an opportunity to interpret archaeological sites.

Adverse Impacts

We would perform archaeological reviews, surveys, or studies of trail construction and improvement projects and other proposed projects as needed or recommended by the Service's Regional Archeologist and consult with the Virginia SHPO regarding refuge undertakings that have potential to affect archaeological resources. Increased visitation and increased opportunities for consumptive and non-consumptive uses would combine to increase the likelihood

of damage or disturbance of cultural and historic resources on the refuge. We would monitor known archaeological and historic sites on the refuge to protect from looting and other ARPA violations.

Alternative C. Management to Enhance Public Uses

Benefits and adverse effects to cultural and historic resources would be similar to alternative B. Benefits would increase as we develop a prioritized program to perform additional surveys and research as funding allows, including a systematic program to monitor erosion impacts on resources. We would perform archaeological reviews, surveys, or studies of project areas as needed or as recommended by the Service's Regional Archeologist and consult with the Virginia SHPO regarding refuge undertakings that have potential to affect archaeological resources. Increased visitation would increase the potential for impacts to cultural resources.

Impacts on or Between Refuge Users

Providing opportunities for compatible public uses, including hunting, environmental education, interpretation, wildlife observation and photography is integral to our overall management of this refuge. These uses are priority uses of the Refuge System under 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 (Public Law 105-57). Fishing is a sixth priority public use for the Refuge System. However, we do not offer a fishing program on this refuge because there is no safe public access to the shoreline outside of closed, sensitive areas.

In this section we evaluate the differences in visitor opportunities between the alternatives, including predicting the interaction among and between visitors engaged in proposed refuge programs. The potential impacts that visitors would have on natural and physical resources from proposed visitor programs are described under respective headings for those natural and physical resources. We evaluate the alternatives by considering the extent to which refuge access for pursuing priority uses would stay the same, improve, or diminish under each alternative, as well as the opportunities for appropriate and compatible non-priority uses. Given regional recreational trend information, and our expectations of what would result based on current and proposed visitor services, we predict that over the next 15 years annual visitation to the refuge would increase by 10 percent, 15 percent and 20 percent under alternatives A, B, and C, respectively.

Other uses that have frequently been requested by individuals have been determined not appropriate. Appendix B—Findings of Appropriateness and Compatibility Determinations provides rationales for denying the use. Activities not allowed include horseback riding, berry picking, mushroom harvesting, flower picking, and medicinal harvesting, bicycling off designated trails, jogging, non-wildlife dependent group gatherings group activities, organized or facility-supported picnicking, swimming and sunbathing.

Wildlife Observation & Photography

Wildlife Observation & Photography Impacts That Would Not Vary by Alternative

Benefits

Regardless of the alternative, we would continue to provide safe public access and infrastructure for wildlife observation and photography opportunities. Public involvement in these priority public uses will result in a better appreciation and more complete understanding of refuge wildlife and habitats, which in turn, translates into more widespread, stronger support for the Refuge Complex, the Refuge System, and the Service. There is no substitute for visitors to be able to observe and experience wildlife in their natural habitats in person, and to learn about wildlife and wild lands at their own pace in an unstructured environment. We would continue to maintain existing refuge facilities so they are safe and



Bill Wallen

Northern flicker

aesthetically pleasing, including the foot trails and parking areas, observation platforms, and kiosks. We believe, despite predicted increases in annual visitation over the next 15 years, that we can accommodate those increases without impacting natural resources or diminishing the quality of experience for other visitors. This is based on our current monitoring and observations of visitor behavior on the refuge. It is rare for visitors to go off designated trails during much of the year, in part because of concerns with ticks and poison ivy. We would continue to manage increased visitation by encouraging group activities and programs, attempting to distribute and schedule those activities throughout the year, and continuing our outreach, education, and law enforcement activities.

Adverse Impacts

We do not predict any major conflicts between or among visitors engaged in various activities on the refuge regardless of alternative. This is based on our observations that few conflicts have been documented to date under our current programs and we are not proposing to appreciably change existing programs to the extent we would predict a new conflict. Seasonal area closures to protect wildlife from disturbance during sensitive times of the year may result in some complaints by those visitors who want access during that time, but most people understand the need and value of this inconvenience and respect our decision. Refuge closures during deer hunting would continue to occur for approximately 3 to 5 days a year at most, but these closures have not resulted in any complaints over the last few years. Other short, temporary closures have occurred at other times to clean up, repair, or maintain trails and parking areas, but this inconvenience has not been raised by the public as a significant concern.

Alternative A—Current Management

Benefits

There would be no changes to public use as it is currently conducted under alternative A. The same benefits noted above would continue.

Adverse Impacts

There continues to be increasing development pressure resulting in increased demand for outdoor recreational opportunities in Fairfax County and other parts of northern Virginia. These could possibly lead to an increase in user conflicts and enforcement issues on the refuge if no improvements or additional opportunities are provided.

Alternative B. Improved Management for Federal Trust Resources (Service-Preferred Alternative)

Benefits

Benefits to public users would increase under alternative B. We plan to increase public use opportunities by providing access to new areas and improving the quality of existing programs. The quality of interpretive materials would improve at existing trails.

In alternative B, new trails would expand opportunities for the public to participate in wildlife observation and photography. The new trails would help satisfy demand for wildlife observation and photography and provide access

that is regularly requested by the public. We would hire visitor services and maintenance staff to support improved refuge facilities, increased and enhanced visitor and outreach programs, and other expanded public uses and outreach.

Adverse Impacts

Increased refuge visitation, and increased compatible wildlife-oriented opportunities for non-consumptive uses would combine to increase the risk of human-wildlife conflicts. There would likely be more instances of trespassing in unauthorized areas of the refuge. There would be a greater likelihood of minor injuries or accidents by trail users. There may be associated parking issues during times of heavy use when parking areas fill and people attempt to park in unauthorized locations. The refuge would continue to be closed during the current deer shotgun hunting season which inconveniences some visitors who do not hunt. To mitigate those concerns we make sure advance notification of the upcoming deer hunt is well advertised and distributed so people can plan ahead of time.

We do not predict that the new deer archery hunt would affect visitors engaged in wildlife observation and photography since hunters would be distributed into areas not otherwise open to the public. Buffer zones would occur between roads and trails during the hunt for safety as well as to avoid or minimize hunter encounters with other visiting public. This would avoid the concern that some non-hunting people have with viewing hunting gear or harvested game. Our increased staff capability over time should help us conduct more effective outreach and education to better explain the purpose of the closed areas, the impacts refuge users have on wildlife, and the importance of protecting and conserving natural resources on refuge lands.

Alternative C. Management to Enhance Public Uses

Benefits

There would be additional benefits in terms of increased public use opportunities under alternative C similar to, but slightly higher than, alternative B. We would create an additional trail on Little Marsh Road that would afford visitors new opportunities for wildlife observation and photography and provide additional accessible locations for interpretation and education.

Adverse Impacts

Adverse impacts would be similar to, but slightly higher than, those identified for alternative B due to the increase in numbers of visitors.

Environmental Education and Interpretation

Environmental Education and Interpretation Impacts that would not Vary by Alternative

Regardless of the alternative we select, we would continue to provide opportunities for environmental education and interpretation on the refuge. We anticipate that the Friends of Potomac River Refuges, volunteers, regional educational institutions, and researchers will continue to help us support these activities on the refuge because of the importance of the resources on the refuge and the proximity of the major Washington, DC metropolitan area. We expect that continuing to educate the public and interpret the wildlife resources of Mason Neck Refuge under all alternatives will promote long term stewardship of the refuge.

Alternative A. Current Management

We would be able to provide only a minor increase in efforts to support environmental education and interpretation opportunities under alternative A.

Alternative B. Improved Management for Federal Trust Resources (Service-Preferred Alternative)

Benefits

With the hiring of visitor services and maintenance staff and additional volunteer involvement, we would be able to provide substantially increase our efforts to support environmental education and interpretation opportunities on the refuge under alternative B. These activities are in huge demand in our area, based on the number of requests we get each year, and we have been unable to even closely meet demand. Implementing alternative B would help us better meet this demand with the increased staff planned. These activities are important to our goal of working with the public to provide outdoor nature-based experiences that promote understanding of the natural features and processes at work on the refuge. In turn, our ability to offer more and higher quality opportunities would benefit the refuge and the Service over the long term by engendering an increased understanding and support for the priority work of the refuge and the mission of the Refuge System.

Adverse Impacts

Our increased efforts to support environmental education and interpretation opportunities on the refuge would likely increase visitation on the refuge and result in a minor increase in human-wildlife conflicts. We would plan to continue to manage increased visitation by encouraging group activities and programs, attempting to distribute and schedule those activities throughout the year. Group activities would be led by our staff, educators or other partners in order to minimize conflicts with wildlife and other users.

Alternative C. Management to Enhance Public Uses

Alternative C would result in the same type of impacts as alternative B. The level of impact would be slightly higher due to our prediction that approximately 1,250 more visitors would come to the refuge each year. However, given the access restrictions we would continue to implement to protect natural resources and minimize inter-user conflicts, the increase in visitation is not considered significantly different from alternative B.

Hunting

Hunting Impacts That Would Not Vary by Alternative

Under all alternatives, we would continue to provide deer hunting opportunities in designated areas for the public in a program coordinated with Mason Neck State Park. The Little Marsh area and areas around refuge facilities would continue to be closed to hunting. The refuge would continue to be closed to other public uses during the deer hunt.

Deer hunting is currently the most effective tool we have to manage the health of the deer population, and sustain the integrity, diversity and health of forest habitats on the refuge. We implement a hunt program as part of a larger partnership of land management agencies on Mason Neck Peninsula; agencies which also have goals to sustain healthy deer populations and forest habitat conditions. VDGIF surveys have documented that deer herd composition and health does not currently meet their goals. Our own observations on the refuge of the impacts of deer overbrowsing on forest composition and structure supports the need for continued deer management.

Deer hunting also provides a wildlife-dependent recreational opportunity that is in decline within the urban setting of Northern Virginia. Providing this opportunity helps preserve the cultural heritage of the refuge area, where people have hunted for generations, and allows people to connect with nature in an

outdoor natural setting where it is becoming increasingly difficult to find access to undeveloped lands. We would continue to use this program to inform hunters about the value of our inter-agency partnership in managing deer populations and the direct benefit to refuge habitats and other native species.

Alternative A. Current Management

Benefits

Approximately 90 hunters (about 370 total hunter visits) would continue to benefit each year by participating in the annual deer hunt enjoying an outdoor recreational opportunity in an area where such opportunities are diminishing on other public lands. We are meeting a need and at least partially satisfying a demand because all available permits are issued each year and there is often a waiting list.

Adverse Effects

The existing program provides an opportunity for a public hunt with minimal impacts on other refuge visitors. We have not received any complaints over the last few years from users unable to access the refuge on the days the hunt is underway. We do, however, recognize there is a segment of the public that does not support hunting for ethical reasons. Maintaining our hunt program would continue to disturb people who have this opinion.

Based on our observations of habitat condition and VDGIF's evaluation of deer health from deer harvested on the refuge, our current hunt program is only minimally sustaining existing habitat and deer health conditions from further decline; it is not markedly improving conditions. A more flexible and expanded hunt program, as proposed under alternatives B and C, would be more effective, provide more opportunities for hunters, and improve habitat conditions and aesthetics for other refuges.

Alternative B. Improved Management for Federal Trust Resources (Service-preferred Alternative)

Benefits

We predict that deer hunters would directly benefit from the proposed deer hunt program changes under alternative B which are designed to increase the overall effectiveness of our deer management. We would strive to meet and sustain VDGIF herd health and deer population goals, and our refuge goals and objectives for quality forested habitat, by using a variety of new strategies, including diversifying the hunting season. Archery hunting, which is not currently allowed on the refuge, but has been offered in the past on the refuge, would be allowed under alternative B once staffing, partners, and support resources are in place. This would open up a new opportunity for many hunters and one that has been regularly requested over the years. Furthermore, we believe our enhanced hunt program, with improved outreach and communications, would result in greater hunter satisfaction. Our discussions over the years with hunters indicate that when they understand the hunt contributes to larger ecological and conservation goals, their experience is enhanced and their overall satisfaction increases. Hunters would also directly benefit in the long-term from harvesting healthier more robust deer.

Alternative B also includes a new youth turkey hunt. This program facilitates an important Service initiative to get youth outdoors and involved with nature. It also promotes an activity of historical and traditional values. A turkey hunt would further increase the diversity of hunting opportunity on the refuge compared to what is allowed today under current management. During the turkey hunt, refuge trails would remain open because hunters would be distributed away in areas normally closed to the non-hunting public.

Adverse Effects

The adverse impacts described under alternative A related to inter-user conflicts and on people opposed to hunting, would increase under alternative B since the hunt program would be expanded. The refuge is closed to other visitors during the existing deer hunt, and we would attempt to implement expanded deer hunting programs to avoid additional refuge closures; however, there is the potential that there may be up to 3 more days when the refuge is closed to other activities. As we mentioned above, trails would remain open to the non-hunting public during the turkey hunt. We would distribute turkey hunters so as to avoid or minimize contact with the non-hunting public. This would avoid the concern that some people have with viewing hunting gear and seeing harvested game. However, we can not guarantee however, that chance encounters might not occur.

The addition of an archery deer hunt and youth turkey hunt would likely offend those members of the public opposed to hunting regardless of whether or not they visit the refuge.

Alternative C. Management to Enhance Public Uses*Benefits*

Benefits would be similar to alternative B except the addition of a muzzleloader deer hunt would provide additional flexibility to meet VDGIF herd and population goals, as well as our habitat goals and objectives, and would further diversify the hunting opportunity.

Adverse Effects

Adverse effects would be the same as described for alternative B except for the possibility that the refuge may be closed up to 3 more days to accommodate the new hunt, and thus, creating that many more days of potential conflict with other refuge visitors and members of the public opposed to hunting.

Cumulative Impacts

According to the Council on Environmental Quality NEPA implementing regulations at 40 CFR 1508.7, “cumulative impact” is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

This cumulative impacts assessment includes other agencies’ or organizations’ actions if they are interrelated and influence the same environment. Thus, this analysis considers the interaction of activities at Mason Neck Refuge with other actions occurring over a larger spatial and temporal frame of reference.

Air Quality

Short-term, negligible, localized air quality effects would be expected from air emissions of motor vehicles used by staff and refuge visitors and from equipment such as mowers used by refuge staff in maintenance and habitat management projects. However, none of the activities on the refuge is expected to contribute to any measurable incremental increase in air pollutant levels. None of the alternatives are expected to cause any greater than negligible cumulative adverse impacts on air quality locally in the vicinity of Mason Neck Refuge or regionally.

We predict no cumulative impacts to Class I airsheds from our actions. Visibility concerns due to emission-caused haze, at the nearest Class I airshed, would not be affected by any of the proposed management alternatives. Although prevailing

weather patterns are from the west, air emissions from Fairfax County would be completely dispersed before reaching that Class I area.

The combined natural areas on the Mason Neck Peninsula in Federal and State ownership, and along this section of the Potomac River, will continue to contribute to improving air quality through management of native upland and wetland vegetation which assures these areas will continue to filter out many air pollutants harmful to humans and the environment.

Water Quality

There would be no significant adverse cumulative impacts to water quality under any of the alternatives. Best management practices and erosion and sediment control measures would be used during project work to minimize or avoid soil disturbance and the potential to create erosion and run off. All Federal and State permits required of national wildlife refuges would be secured before activities are initiated.

Similar to the discussion above under air quality, the combined natural areas on the Mason Neck Peninsula in Federal and State ownership, and along this section of the Potomac River will continue to contribute to improving water quality through management of native upland and wetland vegetation which assures these areas will continue to filter out water pollutants harmful to humans and the environment.

Socioeconomic Resources

We expect none of the alternatives to have a significant adverse cumulative impact on the economy of the Mason Neck community or of Fairfax County, Virginia. None of the three proposed alternatives would be expected to substantially alter the local community's demographic characteristics. As a result, no impacts would be associated with changes in the community character or demographic composition.

Implementation of any of the alternatives would result in several minor beneficial impacts for the communities near the refuge and in the region as a whole. Public use of the refuge would be expected to increase, thereby increasing the number of visitor days spent in the area and correspondingly the level of visitor spending in the local community. Fully funding the additional staffing under alternatives B and C would also make a small, incremental contribution to employment and income in the local community.

The refuge makes an important local and regional contribution to recreation and outdoor activities which would continue under all alternatives. In comparison to the other public lands on Mason Neck peninsula, the refuge is more conservative in terms of what recreational opportunities are offered. People primarily come to the refuge specifically to observe or photograph wildlife in natural surroundings and a quiet setting. This is a particular, unique niche of recreational opportunity that the refuge provides in high quality on the Peninsula compared to the other ownerships. This niche complements the full range of opportunities, including those that require more development or support larger groups, offered elsewhere across the other public ownerships. When considered together, this diversity of recreational types across all public ownerships reflects a significant recreational resource for the region.

Soils

Refuge lands, in combination with other public ownerships and protected, undeveloped lands, significantly contribute to long-term protection of soil productivity in the region. Refuge soils are in good condition with minimal impacts from historic land uses in the area. We will continue to use best management practices to minimize impacts from our management program under all alternatives while keeping the remainder of the refuge in native plant communities that would otherwise have been under development if the refuge

had not been created. On the refuge, before any ground disturbance occurs, all Federal and State permits required of national wildlife refuges would be secured before activities are initiated.

Protected Habitats and Species

The amount and distribution of undeveloped public lands on Mason Neck peninsula significantly contributes to high quality habitats for a wide range of native species in the region. The cumulative effects of land protection and management include benefits to uplands, shoreline and wetlands habitats and associated species along this section of the Tidal Potomac River. The refuge would continue to lead by example among public land agencies in the protection and maintenance of the integrity, diversity and health of those areas that would potentially be lost or severely degraded over the long term given the level of urban development and pressures in the area.

Biological resources that we would manage to control, prevent, or eliminate, such as invasive plants or mute swans, are not natural components of the Refuge's wetlands or upland ecosystems, so losses of those biotic components where they occur would not be considered adverse under any of the alternatives.

The habitats that we would protect on the refuge and maintain under the different alternatives would all contribute at least minimally to sustaining those habitats in the tidal Potomac River watershed and Chesapeake Bay region and would be a long-term beneficial cumulative impact.

Our observations of declining forest health on the refuge and elsewhere from deer overbrowsing, and VDGIF's evaluation of deer herd health, reveals that deer populations in the recent past have exceeded the carrying capacity of the habitat to support them in the region. Active management of deer on the refuge through a new archery hunt, cooperatively managed with VDGIF, would help contribute to maintaining the biological diversity, integrity and health of forest habitats and native wildlife on the refuge, and provide a priority wildlife-dependent recreational opportunity that is becoming increasingly limited in this urban landscape. We would work with VDGIF and other adjacent landowners to evaluate the effectiveness of our hunt program. We will employ an adaptive management decision and implementation process to take advantage of, and respond to, what we learn.

Our efforts to effectively reduce the impacts of the deer population on the refuge and across the Mason Neck Peninsula are hampered by the fact that not all public ownerships have a hunt or are otherwise undertaking aggressive deer control action. Our hunt, which is administered with and includes the State Park, only temporarily reduces the local herd and offers short term relief, but within 1-3 years, the herd builds back up. The population has never been suppressed to the point it stays low. Under Alternatives B and C we would have the potential for a greater cumulative beneficial impact from reduced deer numbers through an expanded hunt program on refuge and State Park lands, and by offering assistance to other public lands in pursuing similar hunt programs across the Peninsula.

Public activities on the refuge associated with trail use and primarily wildlife observation and photography, and fishing may cause local cumulative impacts on natural resources. Although the impacts could be minor when considered alone, they may be potentially important when considered collectively. Our principal concern is repeated disruptions of nesting, resting, or foraging birds such as bald eagles, wading and waterbirds, and wintering waterfowl. We would implement monitoring strategies to observe the impact those activities have on wildlife and adjust management to eliminate or minimize them. We have not observed significant resource degradation, long-term consequences, or cumulative effects

on any of these programs where they occur elsewhere in the Refuge Complex. However, we would remain vigilant to any indication those impacts are occurring. We plan to increase monitoring, outreach, enforcement and education on the refuge, and if concerns are documented, we would respond as necessary. Our response may include permanently or temporarily closing additional areas. We will also utilize volunteers, partners, and researchers to help monitor and evaluate the impacts of our on wildlife and habitats.

Cultural, Archaeological, and Historic Resources

We expect none of the alternatives to have significant adverse cumulative impact on cultural resources on the refuge. Beneficial impacts would occur at various levels, depending on the alternative, because of proposed shoreline erosion monitoring and control efforts, environmental education and interpretation programs, and increased field surveys to identify and protect any discovered sites.

Climate Change

Department of the Interior Secretarial Order 3226 states that “there is a consensus in the international community that global climate change is occurring and that it should be addressed in governmental decision making. This Order ensures that climate change impacts are taken into account in connection with Departmental planning and decision making.” Additionally, it calls for the incorporation of climate change into long-term planning documents such as refuge CCPs:

“Each bureau and office of the Department will consider and analyze potential climate change impacts when undertaking long-range planning exercises, when setting priorities for research and investigations, when developing multi-year management plans, and /or when making major decisions regarding the potential utilization of resources under the Department’s purview. Departmental activities covered by this Order include, but are not limited to, programmatic and long-term environmental reviews undertaken by the Department, management plans and activities developed for public lands, planning and management activities associated with oil, gas and mineral development of public lands, and planning and management activities of water projects and water resources (USFWS, 2009).”

We will continue to monitor and analyze the available information about sea-level rise and potential effects in the tidal Potomac River Basin recognizing that rising tidal levels over the long term would incrementally jeopardize current refuge habitats, particularly wetlands, and we would have to prepare to address that eventuality.

We predict that the refuge would be a net carbon sink over the 15 year CCP period, with the high sequestration capacity of its mature forest habitat; the most dominant habitat type on the refuge. The amount of carbon that would potentially be released by the refuge as a result of associated energy use was not estimated for this EA. However, under each alternative, we would continue to lower our carbon emissions and footprint through the use of energy efficient practices. We will work to implement many of the strategies for achieving Service-wide carbon-neutrality by 2020 as per the Service’s Draft Strategic Plan for Climate Change (USFWS 2009). We plan to replace our fleet with hybrid vehicles to the extent possible, upgrade our appliances, equipment, and facilities to more energy efficient models, conduct video-conferencing to the extent possible, and purchase recycled products. These actions, combined with those of other Service offices would likely result in a beneficial reduction in the rate of greenhouse gas emissions from Service sources.

In terms of preparing for the predicted impacts of climate change, we would manage Refuge Complex lands to increase resiliency and redundancy, and improve the diversity, integrity and health of its habitats. These objectives incorporate strategies that improve the ability of the land to adapt to more extreme weather events and shifting climate zones which are important components of the Service's response to predicted impacts, as recommended in various regional, national, and international reports:

- Draft Strategic Plan for Climate Change (USFWS 2009)
- Preliminary review of adaptation options for climate-sensitive ecosystems and resources (U.S. Climate Change Science 2008)
- Climate Change 2007: Impacts, Adaptation and Vulnerability (International Panel on Climate Change 2007)

Our CCP strategies include maintaining a strong, cooperative working relationship with VDGIF and our conservation partners. As we develop plans to improve forest health on the Refuge Complex we will share what we learn, and offer assistance, to the other public ownerships on the Peninsula, and adjacent to the other refuges in the hopes of benefiting adjacent forests in the region. These relationships will increase the connections within this geographic area and our capability to identify and address issues related to natural resources.

Relationship Between Short-term Uses of the Human Environment and Enhancement of Long-term Productivity

In this section we consider the relationship between local, short-term uses of the human environment and maintaining long-term productivity of the environment. By long-term we mean that the impact would extend beyond the 15-year planning horizon of this draft CCP/EA.

Under all of the alternatives, our primary aim is to maintain or enhance the long-term productivity and sustainability of natural resources on the refuge, in the Tidal Potomac River Basin, and for migratory birds and interjurisdictional fish and other far ranging species, across the whole range of each species. Short term human uses of the refuge are of far lower, secondary importance. We allow those uses only if they are compatible with the resource protection goals. The Service strives to protect Federal trust species and the habitats they depend on, as evidenced by the public use restrictions on access and prohibition of types of use other than foot traffic. Outreach and education programs would encourage visitors to be better stewards of our environment.

The dedication of certain areas for new trails and parking areas on the refuge represents a loss of long-term productivity in a few localized areas, most of which do not fully support natural habitats, but this is not considered significant given the comparative refuge size.

In summary, we predict that all of the alternatives would contribute positively to maintaining or enhancing the long-term productivity of the environment.

Unavoidable Adverse Impacts

Unavoidable adverse effects are the effects of those actions that could cause harm to the human environment and that cannot be avoided, even with mitigation measures. There would be some minor, localized unavoidable adverse effects under all the alternatives. For example, there would be minor, short term, localized adverse effects of site clearing and constructing the new refuge staff quarters, driveway, and septic field. The minor localized effects of fuels management activities, grassland maintenance and invasive plant control would be unavoidable. There would continue to be property tax losses to the local community under all alternatives and increased visitation under all alternatives that could have unavoidable effects.

Potential Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those which cannot be reversed, except perhaps in the extreme long term or under unpredictable circumstances. An example of an irreversible commitment is an action which contributes to a species' extinction. Once extinct, it can never be replaced.

In comparison, irretrievable commitments of resources are those which can be reversed, given sufficient time and resources, but represent a loss in production or use for a period of time.

No irreversible commitments of resources are predicted as a result of management activities on Mason Neck Refuge.

Environmental Justice

President Clinton signed into Executive Order No. 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low income populations, with the goal of achieving environmental protection for all communities.

The order directs federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high, adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income community's access to public information and participation in matters relating to human health or the environment.

The United States EPA Office of Environmental Justice defines it as follows:

"Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental law, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work." (<http://www.epa.gov/environmentaljustice>)

We believe, based on our socioeconomic and environmental consequences analysis, that none of our proposed alternatives would place a disproportionately high, adverse environmental, economic, social, or health effects on minority or low-income persons. Fairfax County has a substantial minority population (38.0%), as well as a small percentage (5.6%) of residents living below the poverty line. However, all identified socioeconomic and environmental impacts would not be localized nor be placed primarily or unequally on minority and low-income populations. Persons who reside near Mason Neck Refuge and in Fairfax County would bear very minor adverse effects and some beneficial effects if the refuge is managed under any of the three proposed alternatives. Adverse impacts, such as anticipated minor increases in traffic and related emissions due to visitation if the refuge is opened to the public as proposed under alternatives B and C, negligible contributions to local mobile source air emissions from refuge equipment and vehicles, would not disproportionately affect minority and low-income populations compared to other segments of the general population. Beneficial impacts include maintaining natural vegetation that improves air and water quality through filtering, paying refuge-revenue sharing payments to the County to offset property tax loses, and providing desired public uses under alternative B and C.

Before we make any decisions to make major changes in habitat management or the environment we always inform all of our publics, equally, and our programs and facilities are open to all who are willing to adhere to the established Refuge rules and regulations. We do not discriminate in our responses for technical or practical information on conservation issues or when providing technical assistance in managing private lands. Additionally, all refuge uses proposed under alternatives B and C would be open to all members of the public and the refuge does not charge any fees to visitors. The Service is also an equal opportunity employer.

Summary of the Impacts of the Alternatives

The following table 4.2 summarizes the benefits and adverse impacts we described above in chapter 4 for specific resources or programs proposed for Elizabeth Hartwell Mason Neck Refuge under each of the alternatives. For our discussion on cumulative impacts, the relationship between short-term uses of the human environment and enhancement of long-term productivity, unavoidable adverse impacts, potential irreversible and irretrievable commitments of resources, and environmental justice, please refer to the chapter 4 narratives above.



USFWS

Habitat diversity on Mason Neck refuge

Table 4.2. Summary impact comparison of Mason Neck Refuge CCP Alternatives

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Regional Air Quality	<p>Continuing benefits to air quality from maintaining natural vegetation on more than 1,900 acres of refuge uplands and 297 acres of marsh. Major benefit from protecting most of the 1,900 acres in mature forest which enhances carbon sequestration and reduce greenhouse gases.</p> <p>Localized increases in vehicle and equipment emissions from staff and visitor activities would be negligible compared to current off-refuge contributions to pollutant levels. Significance of air emissions in the Fairfax County created from land development and urban population centers far outweighs refuge impact. Negligible adverse effects contributed by refuge activities are more than offset by benefits of maintaining the refuge in natural vegetation.</p>	<p>Continuing benefits to air quality similar to alternative A</p> <p>Minimal increase in vehicle and equipment emissions compared to alternative A due to predicted 15 percent increase in visitation; however, contribution would still be negligible given regional urban sources.</p>	<p>Same continuing benefits to air quality as alternative A</p> <p>Greatest increase in vehicle and equipment emissions compared to alternative B due to predicted 20 percent increase in visitation; however, similar to alternative B, contribution would still be negligible given regional urban sources.</p>
----- Air Quality Impacts That Would Not Vary By Alternative -----			
<p>Adverse impacts to regional air quality would be negligible from current and proposed refuge management activities. None of the alternatives would violate EPA standards for criteria air pollutants; all three alternatives would be in compliance with the Clean Air Act. Administrative and visitor vehicle use at the refuge would contribute a negligible increment to overall Fairfax County emissions. Visibility concerns due to emission-caused haze at the nearest Class I airsheds, Brigantine Wilderness Area (New Jersey) or Shenandoah National Park (Virginia), would not be affected. Use of energy efficient practices would continue at the refuge to support the Service's 2020 goal of becoming carbon neutral.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Regional Water Quality, Wetlands, and Aquatic Biota	<p>Continued benefit to water quality, wetlands, and aquatic biota in Basin by excluding development and sustaining natural water filtering vegetation, maintaining forest buffers, and partnering for water quality improvements and tidal marsh protection.</p> <p>Negligible risk to water quality and aquatic biota from petroleum products used in staff or visitor vehicles, and or from other chemicals used in daily operations at the refuge, including selected low-toxicity, approved chemical herbicides for invasive plant control. Risk is further minimized, however, with precautions against spills and against impacting non-target species in place.</p> <p>Additional potential risk from predicted 10% increase in annual visitation, especially if visitors go off trail near water or litter. Impacts are expected to be negligible based on current management, including requirement to stay on trails, as well as current outreach and enforcement programs.</p> <p>Any research studies in aquatic habitats include stipulations to minimize impacts.</p>	<p>Benefits to water quality, wetlands, and aquatic species increased from alternative A due to systematic monitoring of diversity, integrity, and health of wetlands allowing quicker response to concerns. Shoreline protection would become a higher priority, with additional shoreline protection measures pursued with partners. More active in efforts with refuge partners to address water quality issues in Tidal Potomac River Basin.</p> <p>Some negligible risk to water quality, wetlands, and aquatic biota from trail improvements and kiosk construction. Activities have potential to increase sedimentation and turbidity in marsh and shallow waters. However, activities not planned immediately adjacent to marsh or shoreline, so impacts unlikely. Site prep and mitigation practices, such as silt fences, would further reduce risk.</p> <p>Increase in acreages treated with herbicides for invasive plant control may result in slight increase in risk from herbicides.</p> <p>Predicted 15% increase in annual visitors may result in increased potential for impact to water through runoff of petroleum products from roads and parking areas. Similar to alternative A, refuge staff would monitor, conduct outreach, and actively enforce against littering and off trail use.</p>	<p>Same long term benefits to water quality, wetlands, and aquatic species as alternative A.</p> <p>Same adverse impacts as described under alternative A, except increased potential risk from visitors since the predicted annual increase in visitors would be 20%. This increased risk would be mitigated by increased outreach and enforcement programs.</p>
-----Water Quality, Wetlands, and Aquatic Biota Impacts That Would Not Vary By Alternative-----			
<p>Protecting or improving water quality is a priority under all alternatives. Refuge actions are at extremely low risk of contributing to existing point and non-point pollutant sources elsewhere in the Tidal Potomac River Basin. Refuge lands would continue to benefit water quality in the Basin by excluding development in this area of the watershed and protecting native forest and wetlands vegetation, including riparian and shoreline buffers, which sustains natural water filtering properties. Also, refuge staff would work in partnership with others to promote additional land conservation and long-term beneficial water quality improvements.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Socio-economic	<p>Minor incremental benefits to local economy from visitor expenditures on auto fuel, meals, hunting gear, binoculars and other wildlife equipment purchases. However, some visitors may purchase expensive equipment outside of local area.</p> <p>Refuge would continue to contribute to the local economy in terms of jobs, income, and expenditures.</p> <p>Presence of refuge and activities allowed contribute positively to local quality of life and that of other visitors and wildlife enthusiasts in the region. Outreach by refuge staff would continue to promote values of the refuge, recreational opportunities, and garner support for the Refuge System, but on a limited basis due to staffing and funding constraints.</p> <p>Some public demands for access and opportunities unmet due to limited staff, funding, and decisions on compatibility. In particular, increased demands for compatible environmental education, interpretation, and photography would not be met. There would also not be an expansion in hunting opportunities to offset the diminishing availability of those opportunities elsewhere in the area.</p>	<p>Contributions to the local economy from refuge and visitor expenditures would increase over alternative A, but would still be a negligible contribution due to the size of the economy. Refuge revenue sharing payments would be the same as alternative A.</p> <p>Expanding refuge programs and infrastructure would support predicted 15% annual increase in visitation and better meet current demand. Enhanced habitat management and new and enhanced trails would increase wildlife viewing and photography opportunities compared to alternative A.</p> <p>Improved programs would increase the appeal of the refuge to many and positively reflect on the Refuge System. Additional staffing and funding, and commensurate increase in outreach and education would also raise the visibility of the Service and the importance of the Refuge Complex to conserving natural resources in the region.</p> <p>Additional refuge hunting opportunities under alternative B would help offset the loss of those opportunities elsewhere in the region.</p>	<p>Impacts to the local economy are similar to alternative B, with slight increases in benefits from accommodating the predicted 20% increase in annual visitation.</p> <p>One new trail and a potential new muzzleloader deer hunt are opportunities only provided under alternative C. These activities further expand the opportunities provided by the refuge and help satisfy demand. Other benefits to visitors from increased staffing, funding, outreach and education are the same as alternative B.</p>
----- Socio-economic Impacts That Would Not Vary By Alternative -----			
<p>Refuge revenue sharing payments to Fairfax County would continue. Refuge management jobs, income, and purchase of goods and services would continue to contribute negligibly to local economy. Direct benefits from refuge visitor expenditures in the local community would occur, but would also be only a negligible contribution given the urban context and diversity of the local setting.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Soils	<p>Working with partners to maintain existing shoreline breakwater would continue to prevent soils adjacent to that portion of the shoreline from being exposed and eroded away by wave and wind action. Maintaining the vegetated portions of the refuge would continue to protect the soils in those areas.</p> <p>Negligible impacts might occur from routine maintenance (e.g. mowing, trail and road work), but no major activities planned to affect soils under alternative A.</p> <p>Soils adjacent to unprotected sections of the shoreline would continue to be at risk of being exposed and eroded away due to wave and wind action.</p> <p>Annual visitation increase predicted to be 10%, so slight potential for increased risk if visitors walk off designated trails or violate other closures. However, we would continue to monitor public use areas at present levels, and take steps to mitigate problems when they occur.</p>	<p>Working with partners to expand shoreline protection measures would increase those benefits over alternative A.</p> <p>New construction activities associated with trails and refuge quarters pose a greater risk than alternative A, but would be mitigated by strictly adhering to soil protection BMPs to ensure that no long term, major soil problems such as unchecked erosion, would result. New refuge quarters would result in up to 1 acre of additional impermeable surface.</p> <p>The 15% increase in annual visitation under alternative B enhances the risk of soil disturbance and compaction caused by visitors. It also increases the likelihood of unauthorized entry to closed areas, including along refuge shoreline. However, this increased risk would be mitigated by plans to increase staff and raise their visibility by conducting more outreach, education, and enforcement, especially in high probability areas.</p>	<p>The same benefits to soils from protecting the shoreline and maintaining native habitats would result as described under alternative A.</p> <p>Predicted annual visitation would increase by 20%, so associated visitor impacts from increased numbers would be commensurately higher than under alternative B. Measures to mitigate these impacts would be the same as those under alternative B.</p> <p>The potential for impacts from new construction is higher than alternative B because of the addition of a new trail. As such, there would be increased risk along the new trail area (e.g. Little Marsh road). Design, monitoring, outreach, education and enforcement would help mitigate the potential for long-term soil impacts.</p>
----- Soil Impacts That Would Not Vary By Alternative -----			
<p>Soils on the refuge are in good condition and would remain so under all alternatives. Protective vegetative cover that minimizes soil losses through erosion would rarely be disturbed. We would continue to prohibit recreational activities such as ATVs, horses, or off trail biking or walking that would damage soils on the refuge. Hiking trails, wildlife observation areas, parking areas and other high-use areas would continue to be well maintained to keep soil effects to a minimum. Any erosion problems will be noted during routine refuge monitoring and corrected as soon as feasible.</p> <p>Regardless of which CCP alternative we select, we would continue to use best management practices in all management activities that might affect refuge soils to ensure that we maintain soil productivity. Site conditions including soil composition, condition and hydrology will be the ultimate determinant of the management potential for any particular site on the refuge. No site would be managed in a manner inconsistent with its recognized potential. No soil from off-site will be brought onto the refuge unless bringing in clean soil is determined to be less disturbing to refuge resources than using onsite soils.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Forest Habitat	<p>Except for routine maintenance, no alteration of forest habitat is planned. Protection of the existing 1,883 acres of forested habitat would continue.</p> <p>Invasive plant control, deer hunting to reduce overbrowsing from excessive deer populations, and monitoring for pests and pathogens would continue to be primary management strategies to protect the forest.</p> <p>There would continue to be some minimal level of risk of loss or damage to forest vegetation from wildfire due to high forest fuel loads.</p> <p>Routine maintenance of roads and trails may result in the loss of individual trees, but the number of trees felled would not affect the quality or diversity of forest habitat present.</p>	<p>Increased monitoring of forest health, and developing management plans to sustain it over the long term, would provide quicker responses to concerns with greater benefits to forest habitat compared to alternative A. Stand treatments, adhering to best management forest practices, fuel reductions, and invasive plant control, would be planned to enhance the health and vigor of the forest over the long term and reduce the risk from catastrophic events (e.g. wildfire or pest or pathogen epidemic).</p> <p>Additional deer hunting would be pursued as an additional strategy to improve forest health and condition.</p> <p>Routine maintenance of roads and trails would result in similar losses as described under alternative A. In addition, up to 1 acre of forest would be impacted from the proposed new refuge quarters. Some further loss may occur with clearing for new trails on existing old roadbeds. However, in total, we do not expect the number of trees felled would affect the quality or diversity of forest habitat present.</p>	<p>Alternative C would provide similar benefits to the refuge's forest habitats as alternative A, except for it provides the greatest potential among all the alternatives to affect deer numbers by offering the most expansive hunting program.</p> <p>Alternative C would provide slightly increased adverse impacts to the refuge's forest habitats compared to those discussed under alternative B since one additional trail (e.g. Little Marsh road) would be maintained open for public use.</p>
-----Forest Habitat Impacts That Would Not Vary By Alternative-----			
<p>Protecting and maintaining forest diversity, integrity and health is a priority under all alternatives. Activities to control invasive plants, manage overabundant deer populations via hunting, and monitor for pest and pathogen outbreaks would continue to be implemented to support this goal.</p> <p>Some minor tree loss would occur during refuge infrastructure maintenance and improvements (e.g. roads and trails)</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Shoreline	<p>We would continue to work with partners to monitor and maintain the existing breakwater to insure their effectiveness in protecting the shoreline.</p> <p>We would continue to conduct outreach, education, and enforce against access to the refuge shoreline from boat or land to minimize additional shoreline erosion and trampling vegetation. Signs posting the closure on Little Marsh dike would continue to be maintained</p>	<p>Under alternative B we would pursue additional shoreline protection with partners by seeking funding and assistance to protect high risk areas. This is especially problematic along the refuge southwestern corner, where tree loss threatens the heron nesting area. We would explore and evaluate stabilization techniques to determine which is most effective and practical for refuge lands. Measures to protect shoreline and tidal marsh are identified in alternative B as the highest management priorities to implement.</p> <p>We would increase monitoring, outreach, education and enforcement of refuge shoreline and other closures and trail restrictions to minimize additional shoreline erosion and trampling vegetation. This would be necessary as the predicted increase in visitation raises the risk of visitors violating closures.</p>	<p>The same benefits would accrue under this alternative from the Army Corps of Engineers maintaining our current breakwaters as described for alternative A.</p> <p>Because refuge public use would likely increase under alternative C, there would be an increased potential for members of the public gaining unauthorized access to unprotected sections of shoreline either from the land side or in watercraft. Impacts would be similar to alternative B.</p>
-----Shoreline Impacts That Would Not Vary By Alternative -----			
<p>Under all alternatives we would continue to work with partners to maintain the off-shore breakwaters that were installed by the Army Corps of Engineers as part of the Wilson Bridge project mitigation. These breakwaters currently protect a portion of the refuge’s western shoreline.</p> <p>We would continue to enforce against unauthorized refuge access and off-trail use.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Freshwater Marsh	<p>Management would continue to focus on protecting Great Marsh and Little Marsh from unauthorized public access. Visitors could disturb bald eagles and herons or otherwise degrade these areas, through fishing and other litter, or by trampling shoreline areas</p> <p>Outreach and enforcement would continue at present levels. Refuge signage, flyers, and other public information materials are provided at public entry points to the Great Marsh, the Woodmarsh and Great Marsh Trails, to ensure that the public remains out of these areas.</p> <p>We would continue to maintain the dike to ensure the continued integrity of Little Marsh and we would continue to conduct periodic trash removal in the Great Marsh.</p> <p>Some minimal risk of being impacted by Service activities associated with invasive plant control or use of equipment in adjacent upland areas.</p> <p>We would continue to use only herbicides approved for wetlands and target invasive plants that pose a threat to native marsh vegetation. These herbicides are generally non-toxic to fish and other aquatic species and would be used only with strict precautions taken to minimize the potential to affect non-target native plants. Maintenance activities in adjacent uplands would be implemented with oil and spill prevention plans in place and BMP practices to reduce erosion and runoff.</p>	<p>Increased monitoring of freshwater marsh integrity and health, and developing plans to sustain it over the long term, would allow a quicker response to concerns and provide greater benefits to freshwater marsh habitat compared to alternative A.</p> <p>Greater benefits to waterfowl would accrue from determining the presence and extent of native marsh and aquatic vegetation, such as spatterdock and wild rice, which are important waterfowl foods.</p> <p>We would implement a more comprehensive program of cleaning up trash that accumulates in Great Marsh and increase treatments on invasive plants and nuisance wildlife affecting the marsh and other natural areas. Prioritizing treatments and target areas would make management more effective compared to alternative A. Precautions followed and the types of herbicides used would be the same as alternative A.</p> <p>As under alternative A, there would be some minimal risk from Service activities associated with the use of equipment in adjacent uplands. However, the same mitigation measures would apply.</p> <p>Predicted 15% increase in annual visitors poses greater risk of impact than expected under alternative A. However, proposed increases in staffing and funding, and enhance outreach, education, and enforcement would mitigate that risk from visitors conducting unauthorized activities.</p> <p>We would continue to maintain signage and monitor impacts in restored areas to insure adverse impacts are kept to a minimum area.</p>	<p>Alternative C would lead to the same benefits to the refuge freshwater marshes as alternative A.</p> <p>The impacts described under alternative B would be the same for alternative C except they may be slightly higher than alternative B because refuge visitation would be expected to be highest under this alternative.</p>
-----Freshwater Marsh Impacts That Would Not Vary By Alternative-----			
<p>We would continue to conserve the Great Marsh and Little Marsh wetlands and the wildlife they support as one of our highest priorities under all alternatives. We would maintain the Little Marsh dike, including addressing beaver or other animal damage as needed, to protect its integrity. We would continue to prohibit fishing and boating in Great Marsh and Little Marsh because of the potential to adversely affect these sensitive areas. People wishing to engage in those activities would be directed to other public facilities on the peninsula, in Occoquan and Pohick Bay, and on the Potomac River.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Birds—Bald Eagle	<p>Continued protection of the nearly 1,900 acres of forest habitat and 297 acres of freshwater marsh benefits bald eagles over the long term. Shoreline protection measures, monitoring of nesting activity and the prohibition of public access to nesting areas also provide long term benefits.</p> <p>Routine maintenance would continue to be scheduled to minimize impacts to bald eagles although negligible short-term, localized effects from disturbance may occur.</p> <p>Despite outreach and enforcement, some impacts from visitor disturbance may increase minimally due to a predicted 10% increase in refuge visitation.</p>	<p>Measures identified above under forest habitat would also result in increased benefits to bald eagles over alternative A. In addition, we would work with VDGIF to identify measures to enhance current and potential nest tree and roost stands.</p> <p>The potential for disturbance to bald eagles would be slightly higher than those under alternative A because annual visitation is expected to increase by 15%. However, increased staffing to conducting monitoring, outreach, education and enforcement would help offset the increased risk.</p>	<p>Benefits under alternative C would be the same as those described for alternative B.</p> <p>Increased public use under alternative C would pose a slightly higher degree of risk of human disturbance to bald eagles than under alternative B. However, measures identified under alternative B to mitigate that risk would also be implemented under alternative C.</p>
----- Bald Eagle Impacts That Would Not Vary By Alternative -----			
<p>We would continue to protect nesting, roosting, and wintering bald eagles and their habitat on the refuge under all alternatives. There are currently three nesting pairs and we would continue working with VDGIF to monitor nest activities to insure no avoidable human-induced threats occur, and to act quickly should enforcement against disturbing activities be needed. Also, continuing to prohibit public access near bald eagle nests to avoid disturbance would continue under all alternatives.</p> <p>Routine maintenance activities involving Service equipment or staff presence may disturb bald eagles foraging or resting since they could be anywhere on refuge; however, no Service activities intentionally occur near bald eagle activity during the nesting season.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Birds–Forest Dependent	<p>Under alternative A, we would continue to benefit forest dependent birds on the refuge over the long term by permanently protecting nearly 1,900 acres of forest habitat.</p> <p>There would be short-term localized impacts to bird habitat and temporary displacement of birds from management activities such as mowing or herbicide treatments for invasive plant control. Trail maintenance activities would also cause negligible short-term, localized effects from disturbance.</p> <p>Impacts from visitor disturbance may increase minimally due to the predicted 10% increase in annual refuge visitation.</p>	<p>Similar to alternative A, benefits to forest dependent birds would occur from permanently protecting forest habitats. Under alternative B, those benefits would be further enhanced by the additional steps to manage forest health and to maintain or restore forest diversity and structure. This, in turn, would increase the potential diversity of breeding forest birds. See discussion under forest habitat above.</p> <p>Some forest dependent bird habitat may be impacted by the minor tree removal that would occur with construction and maintenance of trails and roads, and due to the new refuge quarters planned on less than 1 acre. In addition to some negligible habitat loss, these activities may cause disturbance to birds while they are underway. As predicted under alternative A the disturbance from maintenance work is expected to be negligible short-term, and localized.</p> <p>Under alternative B, there will also be an increased potential impact from visitors since there is a predicted 15% annual increase likely.</p>	<p>Benefits to forest dependent birds under alternative C would be the similar to those described for alternative A.</p> <p>Adverse effects to forest dependent birds under alternative C would be the higher than alternative B due to the greatest predicted increase in visitation and the greater potential for visitors to disturb birds especially along roads and trails and in areas not previously open to refuge visitors.</p>
----- Forest Dependent Bird Impacts That Would Not Vary By Alternative -----			
<p>Continued protection of the 1,883 acres of refuge forest habitat under all alternatives would benefit forest birds that use the refuge to breed, winter, or migrate through.</p> <p>Routine maintenance activities involving Service equipment or staff presence may disturb forest dependent birds since they could be anywhere on refuge; however, no Service activities intentionally occur near nesting sites where birds or young could be less mobile or nests could be damaged or destroyed. Generally, we predict these impacts would temporarily displace birds from treated locations and would be minor, highly localized and short-term with no threats to bird populations in terms of adult mortality or breeding success.</p> <p>Visitor activities may cause minor negative impacts by disturbing birds along trails and roads or by trampling vegetation used by birds. These disturbances typically result in 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. Long term impacts to forest dependent birds on the refuge are anticipated to be minimal since the majority of the refuge would remain closed to public access.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Birds–Wading, Waterbirds, and Waterfowl	<p>Continued permanent protection of the 207-acre Great Marsh and 50-acre Little Marsh would provide long term benefits to wading birds, waterbirds, and waterfowl throughout the year.</p> <p>We would continue to monitor the heron rookery and maintain the Little Marsh water control structure to insure no human-induced disturbances occur to nesting birds. We would also continue to monitor for causes of decreased productivity to improve our knowledge base about their nesting requirements.</p> <p>Some potential for increased disturbance from predicted 10% increase in annual visitors if off trail use near water occurs. We would continue to monitor, conduct outreach and enforcement at current levels.</p> <p>The potential for disturbance from refuge maintenance projects and staff using motor vehicles to monitor the marsh would be negligible.</p>	<p>Similar to alternative A, permanent protection of the 207-acre Great Marsh and 50-acre Little would provide long term benefits to wading, waterbirds and waterfowl. Increased monitoring and protection of the integrity of marsh habitat, and management to improve native aquatic vegetation proposed under alternative B, would further enhance habitat quality for these species over the long term.</p> <p>Under alternative B we would enhance our monitoring of the heron rookery to improve our knowledge base about their requirements and allow us to make more informed decisions on what to do to enhance habitat conditions to sustain them. We would continue to track nesting birds, but would also improve data gathering of site conditions, shifts in use, and analyze factors influencing the size and distribution of the rookery and the reasons for their decline over the last 10 years. We would expand shoreline and bluff protection to reduce the loss of nesting trees. Collectively, the results could help us take action to minimize future losses in the number of nest sites and nesting productivity.</p> <p>The predicted 15% increase in annual refuge visitors has the potential to elevate impacts to the refuge freshwater marsh and disturbance to marsh and wading birds and waterfowl. However, the increased staff and funding would enhance outreach, education, and enforcement to help mitigate impacts.</p>	<p>Benefits from protecting Great Marsh and Little Marsh would be the same as alternative A.</p> <p>The potential negative impacts from visitor use and access would be the highest under alternative C because of the predicted 20% increase in annual visitors, and the expanded public use programs. In particular opening Little Marsh Road as a trail for access to Little Marsh and the dike area would result in a much greater potential to affect wading birds, waterbirds and waterfowl compared to alternatives B and C. However, similar to alternative B, increased staff and funding would enhance outreach, education, and enforcement to help mitigate impacts.</p>
----- Impacts That Would Not Vary By Alternative -----			
<p>Protecting the regionally significant heron rookery in Little Marsh would continue to be a management priority under all alternatives. Ongoing protection and management of refuge marshes and adjacent uplands would continue to benefit wading birds, waterbirds and migratory and wintering waterfowl. These areas will remain undeveloped thereby sustaining a reserve of migratory and wintering bird habitats in the Tidal Potomac River Basin that would otherwise almost certainly be intensively developed. Refuge lands would also remain a waterfowl no-hunting zone to provide a sanctuary in an area that is otherwise heavily hunted.</p> <p>Visitors would continue to have the potential to disturb birds along refuge trails, specifically the Woodmarsh and Great Marsh Trails, which are near habitats used by the birds.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Other Native Wildlife	<p>Protecting refuge habitats from development benefits all native wildlife on the refuge. In addition, continuing to restrict public access on the refuge to the Great Marsh and Woodmarsh Trails, except for the 3 days of the deer hunt assures over 2,000 acres of habitat where wildlife are undisturbed by human intrusion.</p> <p>The potential adverse impacts from refuge management activities are described below for all alternatives.</p> <p>Deer populations would be reduced during the deer hunt but the deer population on the refuge and across the peninsula would not be adversely affected because we would continue to monitor the status of the peninsula population in coordination with VDGIF and would reduce or eliminate the hunt if it appeared warranted to allow the herd to rebuild.</p> <p>Human disturbance to native wildlife would slightly increase due to the predicted 10% increase in annual refuge visitors. These impacts would be expected to primarily occur along roads and trails and be short term and result in only temporary displacement of animals.</p> <p>Individual beaver may need to be removed if they are causing road flooding or other serious refuge management problems. We would remove problem animals through lethal means only when necessary.</p>	<p>In addition to alternative A benefits, mammals, reptiles, amphibians, and invertebrates would benefit to a greater degree under alternative B because substantial effort would be devoted to monitoring, inventories, and mapping to improve future management. Habitat features important to many wildlife would be a focus of protection, including vernal pools, den trees, mast trees, snags, and downed logs that provide breeding or escape cover, food, or other survival requirements.</p> <p>Similar to alternative A, mowing, road and trail maintenance, and invasive plant control treatments may continue to disturb, displace, and occasionally injure or kill individual animals, but would not result in a loss of viability or persistence of any regional population.</p> <p>Deer hunting and associated impacts would increase under alternative B, however, we would continue to work with VDGIF to monitor deer populations to insure over-hunting does not occur. A new turkey hunt is also proposed with a maximum predicted turkey harvest of 10 birds per year.</p> <p>Other visitor impacts would also increase under alternative B with a predicted 15% increase in annual visitors. The types of impacts are similar to alternative A and would primarily occur along roads and trails.</p>	<p>Benefits to native wildlife under alternative C would generally be the same as those predicted for alternative A. An incremental benefit may result for those wildlife that would respond to a more healthy, diverse understory since more deer would be harvested and less overbrowsing damage would occur; however, the full extent of this benefit is not predictable.</p> <p>Alternative C, in offering the most expansive deer hunt, would result in the greatest impact to deer and, indirectly to other wildlife, from hunter access and activity. We would predict increased deer mortality in the short term from implementing the new muzzle-loader hunt. However, any short-term increase in harvest may be potentially offset in subsequent years, either directly or indirectly, as herd size is reduced.</p> <p>Other visitor impacts would be similar to those described under alternative B, however, given the predicted 20% increase in annual visitors and the new trail in an area previously closed to public access, the impacts are likely to increase in magnitude.</p>

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Other Native Wildlife (cont.)	----- Other Native Wildlife Impacts That Would Not Vary By Alternative -----		
	<p>We would continue to provide a natural landscape with habitats to support a wide diversity of mammalian, amphibian, reptile and invertebrate species native to the area. Protecting the integrity of those habitats would provide long term benefits to all taxa. Continued monitoring and research by partners would improve our knowledge of the array of species present, including those of conservation concern. For example, the refuge provides year-round habitat for at least three State-listed reptile species: the eastern hog-nosed snake, spotted turtle, and eastern box turtle.</p> <p>Refuge habitat management activities such as mowing, road and trail maintenance, and invasive plant control work, may kill individual native wildlife that are less mobile, or may cause temporary disturbance or displacement of others, but there would be no significant mortality or loss of local populations because these actions would be done on a rotational basis, no habitat conversions would occur, and less than 5% of the refuge would be affected in any given year.</p> <p>Wildlife would continue to experience some minimal level of human disturbance from refuge staff and from visitors, regardless of alternative, especially along roads and trails. Those impacts are likely to be temporary displacement that is short term and localized. Deer hunting, which would continue under all alternatives, also could impact wildlife across a wider area during the deer hunting season, if wildlife occur in the pathway of hunters tracking prey. Shotgun noise from hunting may also cause wildlife disturbance. Deer mortality would necessarily occur as a result of hunting. However, deer are overabundant in the area as evidenced by overbrowsing and vegetation impacts. We would continue to partner with VDGIF to develop our hunt program in response to deer populations and trends to minimize any possible long term threat to deer populations from hunting on the refuge.</p>		

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Archaeological and Historic Resources	<p>Continued protection of refuge lands against digging, looting, or unauthorized surveys would benefit cultural resources by ensuring that no substantial impacts on known, or as yet undiscovered, cultural, archaeological, and historic resources occurs.</p> <p>There is some increased risk that refuge visitors may inadvertently or intentionally damage or disturb cultural artifacts or historic properties on the refuge given the projected 10% increase in visitation. However, continued outreach and enforcement would help minimize those risks.</p>	<p>In addition to the protection and enforcement measures under alternative A, alternative B would result in increased benefits to archaeological and historic resources because of plans for a refuge-wide inventory of all archaeological and historic sites and resources.</p> <p>We would work with State, County and professional archaeological societies willing to assist in performing surface surveys of selected refuge sites and the shoreline to locate archaeological resources at risk. We would develop site management and protection plans as warranted to insure protection into the future.</p> <p>At least one law enforcement staff person would receive ARPA training to enhance our ability to protect and enforce sensitive sites. We would also use the proposed new Sycamore Road trail as an opportunity to interpret archaeological sites with the intent that a more informed public would assist in protection of resources.</p>	<p>Benefits and adverse effects to cultural and historic resources would be similar to alternative B, with slightly increased risk given the predicted 20% annual increase in visitation.</p> <p>Additional benefits would be derived with plans to develop a prioritized program to perform additional surveys and research as funding allows; including a systematic program to monitor erosion impacts on resources.</p>
----- Archeological and Historic Resource Impacts That Would Not Vary By Alternative -----			
<p>Areas with potential to contain cultural, archaeological, or historic resources would be protected under all alternatives. We would take all necessary precautions to ensure that no properties considered eligible for listing on National Register of Historic Places would be affected. Planned ground disturbing activities would undergo a review from the Service’s Regional Archeologist or state historic preservation office as warranted prior to implementation. We would continue to conduct outreach and education, and use law enforcement if necessary, to protect against loss or damage to these resources.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Refuge Users—Wildlife Observation and Photography	<p>There would be no changes in management to these activities, nor any changes in infrastructure under alternative A, and demand would mostly be met given the predicted 10% increase in annual visitation.</p> <p>There is a negligible potential for increased user conflicts and enforcement issues on the refuge if we underestimated demand.</p>	<p>Benefits to visitors engaged in these activities would increase under alternative B. New trails would be opened to facilitate the predicted 15% increase in annual visitation and improvements to observation and photography structures would occur.</p> <p>Increased number of visitors also increases the potential for user conflicts and enforcement issues, but we predict these would be minimal and infrequent.</p>	<p>Benefits would be slightly higher than alternative B with the addition of another new trail along Little Marsh road.</p> <p>Adverse impacts would be similar to but slightly higher than those identified for alternative B due to the predicted 20% increase in annual visitors and due to the extra 3-5 days the refuge may be closed to an expanded deer hunting season.</p>
----- Wildlife Observation and Photography Impacts That Would Not Vary By Alternative -----			
<p>Wildlife observation and photography opportunities would continue to be one of the primary reasons visitors come to the refuge year round with concentrations during the spring, summer and early fall. We would continue to maintain existing refuge facilities including foot trails and parking areas, observation platforms, and kiosks. We believe, despite predicted increases in annual visitation over the next 15 years under all alternatives, that we can accommodate those increases without impacting natural resources or diminishing the quality of experience for other visitors. This would be managed by encouraging group activities and programs, attempting to distribute those activities throughout the year, and increased outreach and education.</p> <p>We do not predict any major conflicts between or among visitors engaged in these and other various activities on the refuge regardless of alternative. One potential conflict could arise during hunting season when the refuge is closed to all non-hunting visitors. However, wildlife viewing and photography are most popular outside of hunting season.</p> <p>Area closures to protect wildlife from disturbance during sensitive times of the year may result in a few complaints by some visitors who want access, but most people understand the need for this inconvenience.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Refuge Users— Environmental Education and Interpretation	<p>We would maintain existing interpretive facilities along trails and in parking areas. Annual maintenance would continue to insure quality is sustained.</p> <p>Demand for environmental education opportunities is high in the area and it is not being met on the refuge to any appreciable degree. Educator-led programs with limited refuge staff involvement are the most frequent programs offered.</p>	<p>Increased benefits would occur under alternative B with the proposed increased staff that would focus on improving the quality of programs and existing infrastructure, and more strategically manage partnerships and volunteer support.</p> <p>Improved programs would reach more people, a greater diversity of audiences, and increase participants understanding of the natural resources and ecosystems on the refuge. Better programming would also encourage more support for refuge goals and objectives and the mission of the Refuge System.</p> <p>Increased efforts to support environmental education and interpretation opportunities would help accommodate the predicted 15% annual increase in visitation and better meet demand for these activities in the area.</p>	Benefits and impacts would be the same as alternative B.
-----Environmental Education and Interpretation Impacts That Would Not Vary By Alternative-----			
<p>We would continue to provide opportunities for environmental education and interpretation on the refuge. We anticipate that the Friends of Mason Neck Refuge, volunteers, regional educational institutions, and researchers would continue to help us support these activities on the refuge to promote conservation in an urban setting and take advantage of the refuge’s proximity in the populated Washington DC metropolitan area.</p> <p>We expect that offering environmental education opportunities and interpreting wildlife resources on Mason Neck Refuge will promote long term stewardship of natural resources, and increase support for the refuge that will more than offset any disturbance these programs might cause and any staff and resource commitments we must make.</p>			

	Alternative A Current Management	Alternative B Improved Management for Federal Trust Resources (Service-Preferred Alternative)	Alternative C Management to Enhance Public Uses
Refuge Users— Hunting	<p>Existing deer shotgun hunting opportunities would continue to be offered in partnership with VDGIF and Mason Neck State Park.</p> <p>Deer hunting helps control the local deer population which is overbrowsing forest habitat and adversely affecting regeneration and forest health. Hunters would continue to benefit from this outdoor recreational opportunity in an area where such opportunities are diminishing on other public lands.</p> <p>Some conflicts would occur with non-hunting visitors wishing to use the area or with people opposed to hunting at any time.</p>	<p>There would be increased benefits to the hunting public because we would expand hunting opportunities under alternative B. In addition to potentially extending the length of the existing deer shotgun hunt, we would evaluate an archery hunt. We would also offer a new youth turkey hunt. This new opportunity would help connect youth with nature and the outdoors which is a major initiative of the Service.</p> <p>Increased deer hunting would help improve forest health over the long term, which would enhance the experience for many visitors knowledgeable about ecology.</p> <p>Conflicts with the non-hunting public would potentially increase. The refuge would be closed up to 3 additional days to accommodate an expanded deer hunting program. Non-hunting visitors would not be impacted by the proposed youth turkey hunt as hunt units would be in areas otherwise closed to visitors. Increased concern from people opposed to hunting would be expected.</p>	<p>The hunting public would benefit the most under alternative C since, in addition to the new and expanded hunts under alternative B, a deer muzzleloader hunt would be offered.</p> <p>Other benefits to hunters and habitat would be similar to those described under alternative B, but slightly increased.</p> <p>Adverse effects would be the same as though described for alternative B.</p>
-----Hunting Impacts That Would Not Vary By Alternative-----			
<p>Deer hunting would continue under all alternatives in cooperation with Mason Neck State Park and VDGIF. Hunting is a wildlife-dependent recreational opportunity that helps preserve the cultural heritage of the refuge area, where people have hunted for generations, and where hunting opportunities on other public lands are diminishing. It is a priority public use for the Refuge System and helps meet a Director’s Order on Hunting Heritage to offer compatible hunting opportunities where possible.</p> <p>The refuge would continue to be closed to non-hunting visitors during the hunting season. Some complaints from non-hunters wishing to access the refuge would continue, as would comments from people opposed to hunting at all times for ethical reasons. A few areas would remain closed to hunters, including areas around refuge facilities, and in sensitive wildlife areas.</p>			

Part 2—Environmental Consequences of Featherstone Refuge CCP Alternatives



Steve Maslowski/USFWS

Bald Eagle

Impacts in the Refuge Vicinity

Air Quality Impacts

Chapter 2—Affected Environment, discusses the status of air quality in the landscape around Featherstone Refuge. We evaluated the management actions each alternative proposes for their potential positive or negative effects on air quality, including:

- The potential of refuge land conservation to limit the growth of development, thereby limiting sources of emissions and reducing losses of forest vegetation
- The potential of refuge forest management to enhance carbon sequestration and reduce greenhouse gases
- The potential for management activities, vehicles and equipment to increase emissions

Air Quality Impacts that would not vary by Alternative

Our analysis of air quality impacts considered how Refuge activities might affect criteria air pollutants, visibility, and global climate change, focusing on the potential for localized air quality adverse impacts or improvements. Management activities are not predicted to result in a measurable negative contribution to regional air quality. None of the alternatives would violate EPA standards; both would comply with the Clean Air Act. There would be no new major sources of air pollutants at the refuge created under any of the refuge management

alternatives. The alternatives would either continue to prohibit public access or strictly limit public uses of the refuge to compatible wildlife-oriented activities. Given the low level of activity coupled with the fact that more than 92 percent of 325-acre refuge area is in a natural vegetative cover, any additional adverse affects to short term or long term air quality conditions from refuge management would be negligible under any alternative.

Visibility concerns due to emission-caused haze at the nearest Class I airsheds—Shenandoah National Park in Virginia and Brigantine Wilderness Area in New Jersey—would not be affected by any of the proposed management alternatives.

Featherstone Refuge does not pose any substantive risk of catastrophic wildfire due to its relatively small size, proximity to the river, and adjacency to development. However, a drought year or excessive fuel loading over time could dramatically increase that risk. Nevertheless, we would seek to minimize the possibility of serious fires and their associated health and safety concerns. We would continue to assess the hazards associated with the wildland-urban interface along the refuge boundaries to ensure that our management practices are not creating excessive fuel loading that could lead to severe fires.

We do not expect that Refuge Complex staff or refuge visitors traveling in motor vehicles would add measurably to current emissions. Under both alternatives, we would continue to keep vehicle use on the refuge to a minimum. Vehicular access to the refuge is limited to authorized personnel only. Presently, there are no developed facilities and no public access or parking, nor is there boat access. Opportunities are being pursued for parking, however, and include the possibility of off-refuge parking. If secured, only non-motorized access would occur on refuge trails. Boat access would potentially be allowed for fishing and hunting.

There is a minimal risk that Service activities will indirectly affect air quality through leak or spill accidents involving chemicals or petroleum products used in refuge management operations. However, we would assiduously follow our leak and spill prevention and emergency clean-up procedures to ensure that such occurrences are rare, addressed immediately, and that short-term effects are limited to the immediate location.

Alternative A. Current Management

Benefits

There would be continuing benefits to air quality under alternative A from maintaining natural vegetation on 80 acres of forested upland and 220 acres of forested and emergent wetlands. These benefits are twofold; first, natural vegetation serves to filter air pollutants and, second, the presence of the refuge precludes development and the introduction of attendant sources of pollutant emissions on refuge lands. Continuing to protect forest habitats would also provide some additional benefit due to the ability of forests to sequester carbon. Trees serve as long-term carbon “sinks” reducing the amount of atmospheric carbon (i.e. CO₂), which contributes to global climate change (EPA, 2010).

Under alternative A energy efficient practices for vehicles, equipment and facilities would continue to be implemented across the Refuge Complex and additional practices would be pursued in the future as feasible.

Adverse Impacts

Vehicles and equipment used by staff would contribute a negligible amount to local mobile source air emissions and particulates. These localized increases from refuge activities would be undetectable over the next 15 years compared to current off-refuge contributions to pollutant air emissions from transportation sources and land development in the highly urbanized and developed Woodbridge

area, as well as overall Prince William County. Any adverse air quality effects from refuge activities would be offset by the benefits of maintaining the refuge in natural vegetation.

Alternative B. Enhanced Management

Benefits

As in alternative A, there would be continuing benefits to air quality under alternative B from maintaining the natural vegetation on 80 acres of refuge forested uplands and 220 acres of forested and emergent wetland. Maintaining the vegetation would continue to serve to filter air pollutants, preclude human development and attendant sources of pollutant emissions, and contribute to carbon sequestration. Under alternative B, Refuge staff would continue energy efficient practices and additional practices would be pursued in the future.

Adverse Impacts

Trail construction and maintenance activities on approximately 1.85 mile of trail would cause negligible short-term, localized effects from dust and vehicle and equipment exhausts. Vehicles and increased equipment use by staff under alternative B would negligibly increase local mobile source air emissions.

Water Quality, Wetlands, and Aquatic Biota Impacts

Good water quality is essential to sustaining healthy ecosystems on the refuge and within the Occoquan Bay and larger Tidal Potomac River Basin. Water quality problems in the Basin caused by nutrient and sediment loading and chemical pollutants are a concern. These impacts, in turn, may contribute to a decline or loss of aquatic species on the refuge and in the Basin.

We evaluated the benefits of actions that would protect or restore forested buffers, maintain or restore tidal wetlands and their role in filtering water pollutants, and otherwise maintain or improve water quality including:

- Shoreline protection projects that would reduce the rate of erosion
- Retention of riverside buffers
- Improved water quality monitoring for early problem identification

We evaluated and compared the impacts of the refuge's management actions with the potential to cause adverse effects to water quality and aquatic species including:

- Use of herbicides to manage invasive species
- Runoff and sedimentation from refuge construction projects
- Mortality to fish from recreational fishing
- Changes in recreational use that might lead to contamination with petroleum products

Water Quality, Wetlands, and Aquatic Biota Impacts that Would Not Vary by Alternative

Clean water is a critical and essential resource value on the refuge and its protection would be given full consideration in management planning and operations. Regardless of alternative implemented, none of the proposed actions would cause direct, long term adverse impacts to water quality or aquatic species in the vicinity of the refuge or elsewhere in the Potomac River. Rather, our management practices on the refuge and our partnering with local communities, Federal and State agencies, and conservation organizations would continue to benefit water quality over the next 15 years and beyond. We would adhere to all Federal and State regulations, and obtain all permits required for refuge lands, before implanting activities in order to insure compliance Sections 305(b) and 319 of the Clean Water Act, 33 U.S.C. § 1251 *et seq.* as amended.

All of the alternatives propose protection measures to insure management activities would not cause a decline in water quality, either on refuge lands or in the Tidal Potomac River Basin.

Benefits

Refuge lands would continue to benefit water quality in the Tidal Potomac River Basin by excluding development in this portion of the watershed, sustaining natural water filtering vegetation, and maintaining a forested buffer between Farm Creek and Occoquan Bay and developed areas upslope from the refuge.

Adverse Impacts

Because Refuge staff entry by vehicle would be limited to the single, existing upland access road, there is a negligible risk to water quality and aquatic biota from leaking petroleum products which could adversely affect water quality or harm aquatic species in the refuge tidal marsh. Risks from the use of selected low-toxicity chemical herbicides for aquatic weed control are also low as are risks from the use of other herbicides for control of terrestrial invasive plants. In addition, we would keep current our leak and spill prevention plans.

Wetland invasive plant control with herbicides: Regardless of the alternative selected, the herbicide active ingredient glyphosate, used in a formulation such as Rodeo® and the herbicide active ingredient imazapyr, used in the brand-name formulation Habitat®, would be used as one method to control aquatic invasive plants such as *Phragmites* in the tidal marsh. Both active ingredients are known to have low aquatic toxicity (see discussion below). Herbicides that would be used to control other invasive plant species on the refuge would not be used for aquatic weed control and do not pose a direct risk to water quality or aquatic species. Those terrestrial plant herbicides are reviewed in the Soils section of this chapter. The Regional Contaminants Specialist, who is responsible for upholding Federal standards for water quality and soil protection, must review proposals and approve all use of chemical herbicides on refuge lands.

Glyphosate Effects on Aquatic Species: In some formulations, such as the one in the brand name formula Rodeo®, glyphosate is not a problem aquatic contaminant because it does not contain the toxic adjuvant that is found in other formulations, such as in the brand name formula Roundup®. It is also quickly adsorbed to suspended soil particles in water, rapidly making it biologically unavailable. There would be some potential for herbicide concentrations in sediments and backwaters to build up over time. The potential depends on the balance of herbicide input and removal from the aquatic system. Herbicide inputs may occur either through direct application, water inflow, or through resuspension and diffusion from the sediment layer. Herbicide removal from the system may occur through outflow, degradation, volatilization, and settling or diffusion into the underlying sediment (Neitsch et al., 2001).

The rate of herbicide degradation is an important consideration for assessing the effects of a given herbicide on aquatic systems. Glyphosate degrades with a reported half-life in water that ranges from 3.5 to 70 days depending on the rate of transfer to the sediment layer and testing source (USDA-FS 1996). Based on the relatively short half-life and the large flux in water volume of the tidal marshes, it is not expected that any greater than negligible effects would occur as a result of herbicide treatments.

According to a Forest Service risk assessment glyphosate in less toxic formulations appears to have a very low potential to cause any adverse effects in aquatic animals (USDA-FS, 2003). The use of less toxic formulations results in hazard quotients that do not approach a level of concern for any species.

Nevertheless, use of glyphosate near bodies of water where sensitive species of fish may be found should be conducted with substantial care to avoid contamination of surface water. The likelihood of direct acute toxic effects on aquatic invertebrates or longer term direct effects on any fish species seems extremely remote based on central estimates of the hazard quotient and unlikely based on upper ranges of the hazard quotient (USDA-FS, 2003).

Aquatic plants appear to be somewhat less sensitive to glyphosate than the most sensitive aquatic animals. There is no indication that adverse effects on aquatic plants are likely (USDA-FS, 2003).

Imazapyr Effects on Aquatic Species: According to the Forest Service risk assessment, imazapyr appears to have a very low potential to cause any adverse effects in aquatic animals (USDA-FS, 2004b). Modeled concentrations of imazapyr in ambient water over prolonged periods of time are estimated to be no greater than 0.00045 milligrams/liter and peak concentration of imazapyr associated with runoff or percolation are estimated to be no more than 0.036 milligrams/liters. Monitoring data from a field application similar to those that may be used in Forest Service programs was used as the basis for the peak concentrations that might be expected. All of the hazard quotients for aquatic animals are extremely low. Thus, there is no basis for asserting that effects on nontarget aquatic species are plausible. The highest hazard quotient of 0.01 is below the level of concern at the typical application rate (LOC=1.0) by a factor of 100 and below the level of concern at the highest application rate (LOC=0.36) by a factor of 36. In the case of an accidental spill of a large amount of imazapyr into a relatively small body of water, mortality in sensitive species of fish is plausible. Actual concentrations in the water after a spill would depend on the amount of compound spilled and the size of the water body into which it is spilled (USDA-FS, 2004b).

Aquatic plants, particularly macrophytes, are much more sensitive than aquatic animals to imazapyr exposure. For aquatic macrophytes, the upper range of the hazard quotient for peak concentrations (HQ=3) is above the level of concern by a factor of 3 at the typical application rate (LOC=1) and a factor of about 8 at the highest application rate (LOC=0.36, $3 \div 0.36 = 8.3$). Thus, under foreseeable worst case conditions, acute effects could be seen in aquatic macrophytes. Longer term concentrations of imazapyr, however, result in hazard quotients for macrophytes that are well below a level of concern. Hazard quotients for sensitive species of unicellular algae are below a level of concern based either on peak concentration of imazapyr in water (a hazard quotient of 0.02 at the upper range of exposure) as well as longer term concentrations that might be expected (hazard quotient of 0.003 at the upper range of exposure). Thus, at both the typical application rate (LOC=1) and the maximum application rate (LOC=0.36), the upper ranges of the hazard quotients for sensitive species of algae are substantially below the LOC. Accidental spills of large quantities of imazapyr into relatively small bodies of water could lead to much higher concentrations—i.e., 3 milligrams/liters to 4 milligrams/liters. After spills of this magnitude, adverse effects on aquatic plants could be anticipated from imazapyr in both macrophytes and sensitive species of algae.

Terrestrial invasive plant control with herbicides: There is some slight risk that herbicides used for terrestrial invasive plant control may reach the tidal marsh and affect water quality or harm aquatic species. The two herbicides proposed for use in uplands are non-toxic or of low toxicity to aquatic species.

Imazapic Effects on Aquatic Species (Trade Names: Journey®, Plateau®): This herbicide is applied in broadcast and spot treatments with backpack and

skid sprayers. Aquatic animals appear to be relatively insensitive to imazapic exposures, with LC values of >100 milligrams/liters for both acute toxicity and reproductive effects. Aquatic macrophytes may be much more sensitive, with an acute EC of 6.1grams/liters in duck weed (*Lemna gibba*). Aquatic algae appear to be much less sensitive, with EC values of greater than 45 grams/liters. Imazapic does not appear to be very toxic to aquatic fish or invertebrates. The weight of evidence suggests that no adverse effects in fish or aquatic invertebrates are plausible using typical or worst-case exposure assumptions at the typical application rate of 0.1 pounds/acre or the maximum application rate of 0.1875 pounds/acre (USDA-FS, 2004a).

Triclopyr Effects on Aquatic Species (Trade Name: Garlon®): This herbicide is applied in broadcast, spot treatment, cut stump and basal treatments with backpack and skid sprayers. It cannot be applied to open water or where runoff may occur. It is relatively non-toxic to terrestrial vertebrates and invertebrates, but can be extremely toxic to fish and aquatic invertebrates. For this reason, we use it only as a basal or cut stump application directly on the base of trees and do not use it as a broadcast spray. In soils, it is degraded by photolysis, microbial metabolism, and hydrolysis to the parent compound, triclopyr acid. Triclopyr acid has an intermediate adsorption potential, limiting movement of the acid in the environment. The acid degrades with an average half-life of 30 days. The ester formulation is not water-soluble and can take significantly longer to degrade in water (Tu et al., 2007).

Research: Aquatic habitats and biota may also be impacted by research. Sampling activities may cause soil compaction, erosion, and the trampling of vegetation where runoff can affect waterways. The creation of temporary foot trails and boat trails through aquatic vegetation beds, disruption of bottom sediments, and minor vegetation damage when equipment is temporarily placed is possible. 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. To minimize the potential for impacts, all research projects will operate under a special use permit, with stipulations as warranted to insure planned activities would not impact aquatic resources. As new and innovative techniques become available, we would encourage researchers to use the least intrusive research methodologies and techniques.

Alternative A. Current Management

Benefits

There would be continued benefits to water quality and aquatic biota from protection of the native plant communities on the refuge uplands which filter runoff from adjacent land uses, roadways, and residential areas. The restrictions on public access to the refuge shoreline would continue to directly benefit water quality and aquatic biota over the long term.

Adverse Impacts

Unauthorized shoreline access for wildlife viewing and fishing has the highest likelihood of impacting water quality and aquatic biota over the long-term, so our outreach and enforcement programs are focused here. Under alternative A, we would continue to only allow limited, infrequent group outings under a special use permit with stipulations to protect resources. Permits allowing research studies in aquatic habitats would also include stipulations to minimize impacts to these resources.

Although we do not propose expanded shoreline protection projects under this alternative, we would continue to raise awareness about shoreline protection to the media, our partners and the public at every opportunity. We would also respond to partner efforts to implement shoreline protection as funding and material sources become available to them.

Shoreline erosion caused by wind and wave action would continue to contribute to the river's sediment load and thereby negatively affect riverine aquatic resources and the habitats they depend upon. Over the long term, as the refuge shoreline remains unprotected and continues to erode, there would likely be the loss of substantial portions of the refuge tidal marsh and its value in the Potomac River basin.

Under alternative A, there would be a minimal level of risk of contaminating water quality and aquatic biota from herbicides used in invasive plant control. Any potential risk would be mitigated through a leak and spill prevention plan, proper application procedures, and from using only certified herbicides approved by the Regional Contaminants Coordinator for use in aquatic habitats.

Alternative B. Enhanced Management

Benefits

Compared to alternative A, there would be increased benefits to water quality and aquatic biota from enhanced protection and monitoring of refuge habitats, and working with partners to collectively address water quality issues in the Tidal Potomac River Basin. The number of unauthorized persons entering the refuge and the accompanying trash and makeshift temporary structures that have been problematic on the refuge for some time would be virtually eliminated with increased enforcement and management for authorized public uses. Construction of designated trails and the installation of signage cautioning refuge users to stay on the trails would substantially reduce the use of unauthorized "social" trails that are sources of soil erosion, especially along the refuge shoreline.

Adverse Impacts

Shoreline protection measures, if developed, funded, and implemented, may result in additional sedimentation and turbidity while construction is occurring. Depending on the type of construction and its resulting disturbance, there may also be a temporary displacement of aquatic resources and the permanent loss of habitat to some species within the footprint of fill material and structures. However, without a specific proposal, detailed impacts can not be described. Additional analysis would occur once a specific proposal for shoreline protection is in place.

Trails planned for the refuge under this alternative include an approximately 1.1mile segment of the PHNS Trail, 3 spur trails off the PHNS Trail to overlooks on the Potomac River and Farm Creek, and a trail that leads to Neabsco Creek. We estimate approximately 1.85 miles of trail (approximately 2.2. acres) would be maintained. We would also plan to construct up to four observation/photography platforms (approx 900 sq ft, or .02 acres, each) as indicated on map 3.3. Trail and platform building and kiosk trailhead construction activities would increase the temporary, short term potential for sedimentation and turbidity in adjacent waters from erosion of exposed soils. Proper site preparation and use of standard best management and mitigation practices would limit the potential for impacts.

Under alternative B there would be direct effects to fish populations from a new public recreational fishing program. While the day-to-day activity of fishing would result in harvest of individual fish, we predict it would not affect the viability of local fish populations as numbers harvested from the refuge would not

be expected to affect future productivity. We would adhere to state regulations in developing the program. There would also be a negligible direct impact on wading birds, water birds and other birds that eat fish due to loss of prey and from anglers disturbing birds. However, due to the limited extent of shoreline that could be accessed by anglers, this is expected to be of minimal impact.

Under alternative B, increased herbicide treatment for invasive plants would occur so there would be a slightly increased risk for herbicides to contaminate water quality and aquatic biota. However, all the provisions for using best management practices (e.g. application rates and spill prevention) would be in place. All proposals for using herbicides would be annually reviewed and approved by the Regional Contaminants Coordinator before implementation. Herbicide use elsewhere on the Refuge Complex has occurred for many years with no spills and no detections of adverse effects on non-target species.

Under alternative B, if a hunt program is implemented upon further analysis and approval, some hunters may present a slightly increased potential above alternative A for affecting the surrounding shallow water from off-trail soil compaction and erosion. Other refuge visitors would be restricted to trail access only; however, there would still be some potential for unauthorized off-trail entry, soil compaction, and possibly littering. Similar to alternative A, but at a higher level with advantage of additional staff, increased outreach, education, and enforcement would minimize threats to water quality and aquatic biota from all unauthorized activities.

Socioeconomic Impacts

We evaluated the socioeconomic impacts of each alternative proposed for Featherstone Refuge might affect the local economy, social structures, or quality of life of the local community area within Woodbridge and the surrounding area.

To evaluate potential benefits or adverse effects to the local economy from each alternative, we considered how the alternatives might contribute:

- Jobs and income to the local community from differences in refuge staffing
- Jobs and income from expenditures for temporary construction work on the refuge
- Expenditures into the local economy from public uses of the refuge
- Expenditures into the economy from hunting and fishing
- The availability of opportunities for recreational activities that are in high demand by the public

Socioeconomic Impacts that would not vary by Alternative

Benefits

Regardless of which alternative we select, we would continue to make Refuge Revenue Sharing Payments to Prince William County. The amount of payment is determined by Congress each year; however, these revenue sharing payments would have a negligible effect on the County budget, which totals \$1.7 billion (PWC, 2007). We would also continue to contribute marginally to the local economy of Woodbridge and other communities near Featherstone Refuge in terms of Potomac Refuge Complex staff jobs, income, and expenditures because the current refuge Headquarters is located in Woodbridge, as is the new planned facility on Occoquan Bay Refuge. There would be little change in job related expenditures in the Woodbridge area under any of the alternatives.

Adverse Impacts

The presence of the refuge prevents the local community from developing refuge lands in ways that could be more economically advantageous. This impact is what the Revenue Sharing Payments are meant to mitigate. Because its location is physically separated from the local community by the railroad line and because it is predominantly wetland, its value in terms of development potential is lower than any comparable parcel of riverside upland which is readily accessible. Therefore, the adverse effects to the community of not being able to develop refuge lands site are minimal compared to other comparable locations in the local city and county area.

Alternative A. Current Management

Benefits

Prince William County would continue to benefit minimally from Refuge Revenue Sharing payments. A small portion of the annual hours spent by Refuge Complex staff would continue to be devoted to monitoring existing conditions and enforcement actions at Featherstone Refuge.

Adverse Impacts

Public access to the refuge would continue to be prohibited. Therefore, there would be no economic benefits to the local community in terms of visitor expenditures for auto fuel, meals, hunting gear, and other wildlife equipment purchases. There would likely continue to be unauthorized uses of Featherstone Refuge which would continue to incur costs for other local area enforcement agencies that might otherwise be reduced under the other alternatives.

Apart from purely economic considerations, the public would also have to continue to experience ongoing dissatisfaction with unmet demand for wildlife-dependent recreation opportunities literally within walking distance of an otherwise highly developed landscape. These opportunities would enhance the public quality of life and highlight and reinforce the environmental values of the refuge to the broader Woodbridge and Prince William County community that is known now to only a few members of that community. Opportunities for hunting, an activity with diminishing opportunity on lands elsewhere in the area, would remain unavailable here as well.

Alternative B. Enhanced Management

Benefits

Because Featherstone Refuge does not currently allow public access, we do not have a baseline to compare alternative B against. We have no estimates in terms of new visitors generating employment, income, tax revenue, and final demand in the analysis area defined by the local economy. Combined, these factors would represent the full “multiplier” effect of initial spending on recreation-related goods and services plus succeeding rounds of spending internal to the local economy.

However, it is reasonable to assume that the demand for wildlife dependant recreation will remain high in the local area and translate to a substantial number of visitors to the Refuge once public access is made available. If we assume that, at a minimum, the visitation would be one-tenth that of Mason Neck Refuge, and that the resident/non-resident split would be the same, an estimate of economic effects could be extrapolated from the Mason Neck Refuge analysis presented earlier in this chapter. Featherstone Refuge is approximately 14% the size of Mason Neck Refuge in terms of land area. A direct 10-percent extrapolation would translate to a minimum estimated refuge recreational use of 7,041 annual visits comprised of 4,517 local area resident visits and 2,254 non-resident visits. Those visits would generate \$82,460 in expenditures with an economic effect of generating \$108,514 of final demand (through the multiplier

effect) in the County economy, with \$27,910 in job income based on 1 direct and induced job. In strict economic terms, this effect would be negligible.

Designing, construction, and maintaining new refuge infrastructure would minimally increase benefits to the local economy in terms of expenditures for labor, materials, and services.

Providing public access to the refuge would be an important gain to the local community quality of life because it would enhance the attractiveness of the neighborhood, help engender a spirit of public stewardship of the refuge which is not now possible, and provide a venue to promote increased understanding and concern for the Refuge System.

Adverse Impacts

We would expect that refuge visitation under alternative B would constitute a negligible, but additional burden in terms of local expenditures for road maintenance, traffic enforcement, and related infrastructure maintenance and law enforcement expenditures from County tax revenues. These minimal incremental expenditures would be offset, in part, by Refuge Revenue sharing payments and the local economic benefits described above.

Refuge-Specific Impacts

Soil Impacts

Soils are the structural matrix and nutrient source for plant productivity and must be protected to sustain the variety of upland and wetland habitats that would meet refuge habitat and species management goals. Soil biotic communities consume waste and the remains of dead organisms and recycle their constituent materials that are incorporated into the soil into forms usable by plants. In the process, soil organisms regulate the fluxes of carbon dioxide, methane, and nitrogen oxides in the atmosphere (Daily et al 1997). Productive and healthy soils also regulate groundwater quantity and quality by filtering excess nutrients and contaminants.

Overall, the soils of the refuge are productive and in good condition with no noticeable permanent compaction or contaminants problems. However, the creek banks and shoreline are experiencing some erosion; a result of wind and wave action and from unauthorized access. We would continue under both alternatives to manage these areas to minimize human disturbance and to mitigate for natural processes that result in loss of valuable habitats.

We evaluated and compared the management actions proposed for each of the refuge CCP alternatives on the basis of their potential to benefit or adversely affect refuge soils.

We considered the benefits from:

- Protection of soils from conversion to impervious surfaces or restoration of disturbed sites
- Reduction of erosion along interior water courses and refuge shoreline

We considered the potential adverse impacts to soils from:

- Habitat management activities

- Construction of trails, platforms and kiosks
- Refuge visitor activities

Soils Impacts that would not vary by Alternative

Benefits

The soils of the refuge are in good condition and would remain so under all management alternatives. We would continue to maintain the refuge protective vegetative cover that minimizes soil losses through erosion. Native vegetation supports natural functioning and production of the ecological services that improve soil fertility and sustain soil health. For example, healthy soils would also potentially dampen pest and disease outbreaks (Lavelle et al 1997), improve the growth of trees and other plants without additional need for nitrogen input, improve water quality, regulate greenhouse gas emissions, increase carbon sequestration, and increase carbon stock equilibrium of soil vegetation.

We would continue to prohibit recreational activities such as ATV use or motorized access that would damage soils on the refuge. Under alternative B, all newly constructed trails, viewing platforms, parking areas, and other high-use areas would be well maintained to keep soil effects to a minimum. Any erosion problems will be noted during routine refuge monitoring and corrected as soon as feasible.

Regardless of which CCP alternative we select, we would continue to use best management practices in all our activities that might affect refuge soils to ensure that we maintain soil productivity and health. Site conditions, including soil composition, condition, and hydrology would continue to influence where and how management activities should occur. No site would be managed in a manner inconsistent with its recognized potential.

In general, no soil from off-site will be brought onto the refuge unless bringing in clean soil is determined to be less disturbing to refuge resources than using soil from on site.

Adverse Impacts

There is a potential under both alternatives for adverse impacts from invasive plant control techniques including manual, mechanical, and herbicide treatments. Some additional disturbance may occur in treated areas where we are restoring them by replanting with native species.

Herbicides: All chemical use on the refuge must first be approved through the Pesticide Use Proposal process. The Refuge Manager submits proposals to the Regional Contaminants Coordinator, who must approve the chemical, application procedure, and location of all treatments. The following list of herbicides and their potential effects on soils and water is derived mainly from the products' labels and material safety data sheets, except where noted:

Glyphosate Effects on Soils and Soil Organisms: This herbicide is applied in broadcast or spot treatment with backpacks or skid sprayer. It is degraded by microbial action in both soil and water, and degrades in soil with an estimated half-life of 30 days. It is highly soluble, but adsorbs rapidly and tightly to soil (USDA-FS, 2003). Numerous soil bacteria, fungi, invertebrates, and other microorganisms have been studied for effects of glyphosate application. There is nothing to suggest glyphosate would adversely affect soil organisms. Glyphosate is readily metabolized by soil microorganisms and some species can use glyphosate as a sole source of carbon (USDA-FS, 2003). Sylvia and Jarstfer (1997) found that after 3 years, pine trees in plots with grassy weeds had 75 percent fewer mycorrhizal root tips than plots that had been treated three times per year with a mixture of glyphosate and metsulfuron methyl to remove weeds.

Glyphosate degrades in soil, with an estimated half-life of 30 days. Glyphosate is highly soluble, but adsorbs rapidly and tightly to soil. Glyphosate has low leaching potential because it binds so tightly to soil. Modeling results indicate glyphosate runoff is highest in loam soils with peaks after the first rainfall (USDA-FS, 2003; WSSA, 2002).

Imazapic Effects on Soils and Soil Organisms: This herbicide is a relatively new herbicide, and there are no studies on the effects of imazapic on either soil invertebrates or soil microorganisms. If imazapic was extremely toxic to soil microorganisms, it is reasonable to assume that secondary signs of injury to microbial populations would have been reported (USDA-FS, 2004a). Imazapic degrades in soil, with a half-life of about 113 days. Half-life is decreased by the presence of microflora. Imazapic is primarily degraded by microbes and it does not degrade appreciably under anaerobic conditions. Imazapic is weakly adsorbed in high soil pH, but adsorption increases with lower pH (acidic soils) and increasing clay and organic matter content. Field studies indicate that imazapic remains in the top 12 to 18 inches of soil and do not indicate any potential for imazapic to move with surface water. Modeling results indicate imazapic runoff is highest in clay and loam soils with peaks after the first rainfall. Imazapic percolation is highest in sandy soils (USDA-FS, 2004a; WSSA, 2002).

Imazapyr Effects on Soils and Soil Organisms: This herbicide has not been studied as to its effects on soil invertebrates, and there is incomplete information on the effects on soil microorganisms. One study indicates cellulose decomposition, a function of soil microorganisms, can be decreased by soil concentrations higher than concentrations expected from Forest Service applications.

There is no basis for asserting adverse effects to soil microorganisms (USDA-FS, 2004b). Degradation rates are highly dependent on microbial action. Anaerobic conditions slow degradation. Imazapyr is weakly bound to soil, but adsorption increases with lower pH and increasing clay and organic matter content. Adsorption increases with time as soil dries and is reversible. Field studies indicate that imazapyr remains in the top 20 inches of soil and do not indicate any potential for imazapyr to move with surface water. In forest field studies, imazapyr did not run off and there was no evidence of lateral movement. Modeling results indicate imazapyr runoff is highest in clay and loam soils with peaks after the first rainfall. Imazapyr *percolation* is highest in sandy soils (USDA-FS, 2004b; WSSA, 2002).

Triclopyr Effects on Soils and Soil Organisms: The five commercial formulations of triclopyr contain one of two forms of triclopyr, BEE (butoxyethyl ester) or TEA (triethylamine). Triclopyr BEE is much more toxic to aquatic organisms than triclopyr TEA. A breakdown product, TCP (3,5,6-trichloro-2-pyridinol), is more toxic than either form of triclopyr. Site-specific cumulative effects analysis buffer determinations need to consider the form of triclopyr used and the proximity of any aquatic triclopyr applications, as well as toxicity to aquatic organisms (USDA-FS, 2004c). Triclopyr has not been studied on soil invertebrates. Soil fungi growth was inhibited at concentrations 2 to 5 times higher than concentrations expected from Forest Service application rates. Triclopyr has an average half-life in soil of 46 days, while TCP has an average half-life in soil of 70 days. Warmer temperatures decrease the time to degrade triclopyr. Soil adsorption is increased as organic material increases and decreased as pH increases. Triclopyr is weakly adsorbed to soil, though adsorption varies with organic matter and clay content. Both light and microbes degrade triclopyr (USDA-FS, 2004c; WSSA, 2002).

Alternative A. Current Management

Benefits

There would be minimal to no loss or damage to soils on the upland portions of the refuge under alternative A since very little management activity is occurring. Maintaining the naturally vegetated portions of the refuge would continue to protect the soils in those areas.

Continued prohibition of public access and continued enforcement actions against unauthorized refuge users would help protect the refuge creek banks and river shoreline and prevent soils adjacent to those areas from being exposed and eroded away by runoff and tidal action.

Adverse Impacts

Soils adjacent to unprotected shoreline would continue to be at risk of being exposed and eroded away. We would continue to monitor erosion and when possible through partnering establish shoreline protection in areas at high erosion risk.

Refuge staff may employ herbicides to control invasive plants but those would be selected, pre-approved, and applied at rates to ensure negligible adverse effects to soil productivity or soil organisms.

Some level of unauthorized visitation is expected to occur under alternative A, so activities that might impact soils, such as use of unauthorized, undesignated trails, unauthorized camping and illegal use of the shoreline for fishing would continue to be a concern. We would continue to monitor refuge conditions particularly in areas frequented by unauthorized users in the past to determine if soil erosion may be a problem and would take steps to mitigate the problem if it occurs.

Alternative B. Enhanced Management

Benefits

Similar to alternative A, maintaining the naturally vegetated portions of the refuge, particularly along the shoreline, would continue to protect the soils in those areas. Continued enforcement actions against unauthorized refuge users along the refuge creek banks and river shoreline would prevent soils adjacent to those areas from being exposed and eroded away by runoff and tidal action.

Adverse Impacts

Refuge visitor activities under alternative B would increase the likelihood of disturbance and compaction of soils in areas of the refuge where visitors are allowed. It may also increase the likelihood of unauthorized entry to areas where visitation is not allowed, off trails and along the shoreline where soils might be affected. People walking off-trail have the potential over the short term to damage vegetation. Over the long term, if the area is repeatedly trampled on and enough compaction occurs, soil productivity could be directly affected by exposing roots, and reducing soil porosity, aeration, and nutrient availability (Kuss 1986, Roovers, et al 2004). Soil compaction can, in turn, affect plant regeneration and revegetation, especially in rare or sensitive plant populations (Hammit and Cole 1998). Kuss (1986) found that plant species adapted to wet or moist habitats was the most sensitive and increased moisture content reduces the availability of the soil to support recreational traffic.

A summary of what is proposed under alternative B for public use infrastructure follows:

- 1.1 mile of PHNS Trail (approx 1.6 acres); would likely be an impermeable surface with access for pedestrians and bicycles

- 0.75 mile of new trail (approx 0.6 acres) in 2 spur trails to Potomac River, one spur trail to Farm Creek, and a short trail to Neabsco Creek. All spur trails would be dirt or stone dust
- Up to 4 platforms for observation/photography/fishing (approx 900 sq ft, or .02 acres, each)

Trails would be designed to minimize adverse soils effects, although some compaction or soil loss would occur, especially with development of the estimated 1.1 mile segment of the PHNS Trail. That trail segment is proposed along an existing old road bed, and adjacent to an active railroad line, and would likely be developed with an impermeable surface to accommodate all forms of pedestrian and bicycle access. Monitoring of these more intensive public use areas, and effective signage and brochures to reduce entry to unauthorized areas, would mitigate against any potential for long-term off trail impacts. Nevertheless, there would be long term localized impacts to soils in the footprint of the PHNS Trail and other proposed new refuge foot trails and platforms. The total footprint area to be impacted by new trails and platforms is estimated to be less than 3 acres (or <0.1% of refuge).

As mentioned, the hunt programs, if implemented upon further analysis and approval, would lead to off-trail effects. However, given the limited number of hunters that would be accommodated and well-dispersed across the refuge during the hunting season, the impacts would be minimal based on our monitoring and field observations of hunting impacts on other refuge units. Monitoring of these uses would identify where there might be problems with soil erosion and corrective measures would be taken.

The fishing program would be allowed only at designated locations. Unauthorized fishing along the creek banks and river shoreline might cause erosion, but instances should diminish compared to the current situation because of the increased presence of VDGIF and Service staff, warning signage, and members of the public who are likely to warn the offenders or report their presence to staff.

Administrative access and maintenance equipment may lead to localized soil compaction and short term soil losses from erosion, but we would employ best management practices, such as not operating in saturated soil conditions, to ensure that no long term, major soil problems—such as unchecked erosion—result. All Federal, State, and local permits applicable to constructing trails on refuge lands would be obtained before activities begin.

Forest Habitat Impacts

The forest habitats of the refuge provide a diversity of habitat components to support breeding birds and other wildlife. We evaluated the benefits and adverse impacts of the management actions under the three alternatives on forest habitats.

We considered the benefits from:

- Controlling invasive plants
- Fuels management

We considered the potential for adverse impacts from:

- Unhealthy forest conditions
- Facilities construction and maintenance

Forest Habitat Impacts That Would Not Vary by Alternative

Benefits

Regardless of alternative selected, forest habitat would continue to be protected on the refuge to contribute to what remains of intact native riverine forest habitat along the Potomac River. Thus, the refuge would retain its value to migratory birds and other native forest wildlife, while elsewhere in rapidly developing northern Virginia; those values are being lost or degraded. Wherever practicable, we would control non-native plant species and encourage native forest species capable of growing under the current site conditions in an effort to restore the ecological integrity and diversity of the refuge.

Adverse Impacts

Regardless of which alternative we select to manage the refuge, certain activities may affect forest habitat at various levels depending on the alternative:

- Use of mechanical and herbicide treatments to control invasive plants
- Refuge infrastructure maintenance and improvements (e.g. roads and trails)

The impacts of controlling invasive plants were discussed previously in the section on Soils. Our long-term concern with invasive plants is that once established, they can out-compete native plants, thereby altering habitats and impacting wildlife. We would continue work on controlling invasive plants and establishing native forest species capable of growing under the current site conditions in an effort to restore the ecological integrity and diversity of the refuge. Control measures would be implemented using strict procedures and protocols so as not to affect non-target resources or otherwise degrade wildlife habitat. The alternatives would vary in terms of the extent and frequency of using control practices

Alternative A. Current Management

Benefits

Under alternative A, benefits would be limited to protection of refuge lands. Priorities would continue to be maintaining forest cover. Protection of the existing forested upland and wetlands under this alternative is assured through Service management and conservation.

Adverse Impacts

There would continue to be some minimal level of risk of loss or damage to forest vegetation from invasive plant control as described above. Because of its toxicity to trees, imazapyr would not be used to control *Phragmites* or other invasive plant species where there is a risk of trees being inadvertently sprayed. Herbicides would be used only under strict application precautions to ensure that only the targeted plants are affected.

Routine maintenance of the administrative access road may result in the loss of individual trees, but we do not expect the number of trees felled would affect the quality or diversity of forest habitat present.

Since no public access would be allowed, there would be no impacts from visitor activities. Impacts to forest regeneration from deer overbrowsing would continue, and hunting would not be an option for their control.

Alternative B. Enhanced Management

Benefits

Forested upland and wetland habitats would be better protected under alternative B because of the increased presence of staff required to implement public access and maintain refuge habitat and visitor programs. Should a hunt program be pursued after further analysis and approval, forest health would also benefit from implementation of a deer hunt because deer in the area are known to be an important factor in suppressing forest regeneration. A deer hunt would

allow for direct control of deer should forest regeneration become problematic for maintaining forest health.

Adverse Impacts

Providing public access and establishing public infrastructure on the refuge may involve cutting of individual trees. This effect would be minimal because we plan to use the old railroad roadbed as part of the new PHNS Trail footprint and we would otherwise orient other new sections of trail to avoid having to cut trees. The loss of trees predicted would not affect the quality or diversity of forest habitat present. At the most, 3 acres would be impacted (0.1% of refuge acres).

A long-term concern with allowing public access is the potential for refuge visitors to unintentionally introduce and/or spread invasive species. Once established, invasive plants can out-compete native plants, thereby altering habitats and impacting wildlife. This is especially a concern with hunters because they move through portions of the refuge not generally accessible to other visitors. The threat of invasive plant establishment will likely continue to be an issue over the long term and will require annual monitoring, treatment and hunter and visitor education.

Wetland Impacts

The Service currently manages about 220 acres of forested and emergent wetlands and 25 acres of open water on the refuge. The refuge wetlands and open water habitats support reproductive habitat for fish and other aquatic species, wading and waterbirds foraging areas, and resting and foraging areas for waterfowl. Protection of the refuge wetlands is also very important to maintaining the integrity of the refuge shoreline because they buffer the erosive effects of the river and Farm Creek. We evaluated the benefits and adverse impacts of the management actions under the three CCP alternatives on these wetlands.

We considered the benefits from:

- Protecting wetland habitat
- Maintaining a forested upland buffer
- Treating invasive species

We considered the potential adverse impacts of:

- Wetlands habitat management activities
- Adjacent upland habitat management activities
- Trail and platform construction and maintenance
- Unauthorized public access to wetlands

Wetland Impacts That Would Not Vary by Alternative

Benefits

Regardless of the management alternative we select, we would continue to conserve these wetlands and the wildlife they support as one of our highest priorities. We would also continue to monitor the area for external threats and conduct periodic trash removal using volunteers.

Adverse Impacts

The refuge would continue to address potential harm from unauthorized refuge uses. In particular, unauthorized fishing may adversely affect the wetlands and associated species. Law enforcement issues related to fishing include littering, illegal trespass and fires. Discarded fishing line and other fishing litter can entangle migratory birds and mammals and cause injury and death (Gregory, 1991). Additionally, litter affects water quality which may harm aquatic plants,

invertebrates, and fish. Litter may also affect the visual experience of refuge visitors (Marion and Lime, 1986).

Alternative A. Current Management

Benefits

Management of the refuge wetlands under alternative A would continue to conserve the values discussed above, though improvements in management and protection of these wetland areas would be limited. Management would include treating invasive *Phragmites*, and working with volunteers and partners to restore the marsh to native species to the extent feasible based on staff and funding.

Adverse Impacts

There would be negligible direct impacts to refuge wetlands under alternative A. The current acreage of wetlands would be maintained. There would be no alteration of these habitats by cutting, filling, or other means to achieve any other Service goals and objectives.

The refuge wetlands may be at some negligible risk of being indirectly affected by Service activities in upland areas; however, given the limited activities occurring, and the fact we have a leak and spill prevention and emergency procedures in place, should insure that such occurrences are rare and are addressed immediately, with short-term effects limited to the immediate location.

Alternative B. Enhanced Management

Benefits

Benefits to wetland habitat and wetland-dependant wildlife species would increase under alternative B as compared to alternative A. First, both the Service and VDGIF, through their cooperative management of hunting and fishing programs, would provide a greater management presence on the refuge thereby reducing incidents of unauthorized uses, particularly unauthorized fishing, that are likely to harm the wetlands. Second, projects to protect refuge shorelines and creek banks would be more actively pursued with partners under alternative B, which in turn, would further enhance wetlands habitat.

Adverse Impacts

The impacts to the emergent wetlands and forested wetlands currently managed on the refuge would be predicted to be negligible under alternative B. The impacts of installing trails and platforms near the water would be temporary and short-term, with some localized turbidity and some minimal loss of wetlands plants, but no substantive habitat alteration or degradation would occur.

Authorized visitation on designated trails has the potential to create additional impact from unauthorized off-trail movement, but we would be vigilant in monitoring that use to insure this is kept to a minimum. Should a hunt program be implemented after further analysis and approval, some impacts from hunting would likely occur, but with establishing designated hunting areas and clear regulations on low impact hunting in sensitive wetland areas (e.g. boat and blind anchoring and shoreline access), those impacts should be kept to a minimum. Impacts to wildlife from discarded fishing line and litter would still occur to some degree, even under an authorized fishing program, but would be mitigated under this alternative with implementation of a Monofilament Recovery and Recycling Program at refuge designated fishing areas.

As with alternative A, chemical or oil leak and spill prevention and emergency clean-up procedures should ensure that such occurrences are rare and are addressed immediately, with effects limited to the immediate location.

Impacts to Birds

Featherstone Refuge supports breeding forest dependent birds as well as wetland dependent species. Bald eagles are known to have nested in the vicinity in recent years. The refuge also provides habitat for other breeding and wintering raptors, neo-tropical migrants, waterbirds, and migrating waterfowl.

Bird Impacts That Would Not Vary by Alternative

Benefits

Continued protection of refuge lands under both alternatives would generally benefit birds that use the refuge to breed or winter or migrate through. The bald eagle, which is documented nesting in the vicinity of the refuge and may forage and roost on the refuge, was recently removed from the Federal list of threatened and endangered species. Nevertheless, we would protect nesting and foraging bald eagles should they establish on the refuge under both alternatives.

Adverse Impacts

Regardless of alternative selected, breeding, wintering, and migrating birds may be adversely affected by management methods, such as mowing and the use of herbicides to control invasive plants. These methods would displace birds from treated locations and if any active nests are present they could be damaged or destroyed. The impacts would be minor, highly localized and short-term with no threats to bird populations in terms of adult mortality or breeding success. Treated habitats would be improved over the long term and this would benefit bird populations.

Special use permits would continue to be issued on a limited basis to organizations conducting environmental education or interpretive and/or wildlife observation and photography tours or activities on the refuge. The areas used by such tours will be closely monitored to evaluate the impacts on the resource; if adverse impacts appear, the activity would be moved to secondary locations or curtailed or discontinued. Specific conditions may apply depending upon the requested activity and would be addressed through the special use permit.

Research activities that would be supported under all the alternatives 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 in-trap predation, and indirectly through capture injury or stress caused to the organism. Stipulations in Refuge special use permits issued for these activities would include a provision that mortality due to research activities would not exceed that allowed in the required Federal take permit issued by the Migratory Bird program.



Bill Wallen

Water pipit

Alternative A. Current Management

Benefits

Under alternative A, we would continue to benefit refuge bird species by managing for and permanently protecting 80 acres of upland forest, 220 acres of forested and emergent wetland, and 25 acres of open water habitat over the long term.

Adverse Impacts

There would be short-term localized impacts to bird habitat and temporary displacement of birds from management practices such as mowing or herbicide treatments for invasive plant control.

Alternative B. Enhanced Management

Benefits

Benefits to birds would increase under this alternative compared to alternative A. We would continue to protect the 80 acres of upland forest, 220 acres of forested and emergent wetlands, and 25 acres of open water habitat over the long term. And, through VDGIF and our presence combined, we would better address the issues of illegal trespass, vandalism, and deposition of trash that damage bird habitat and disturb nesting and foraging birds.

If a deer hunt is pursued after further analysis and approval, it would help reduce deer overbrowsing of forest regeneration and other understory vegetation to the benefit of forest birds. Overbrowsing reduces the forest physical structure and diversity. Casey and Hein (1983) have found greatly reduced bird species diversity in areas with long term, high density populations of deer. These changes were mainly attributed to habitual landscape alteration with pronounced browse line and sparse cover caused by overbrowsing.

DeCalesta (1997) also found that deer browsing affects vegetation that songbirds need for foraging surfaces, escape cover, and nesting. DeCalesta noted that species richness and abundance of intermediate canopy nesting songbirds was reduced in areas with higher deer density. Intermediate canopy-nesting birds declined 37 percent in abundance and 27 percent in species diversity at higher deer densities. Five species of birds were found to disappear at densities of 38.1 deer per square mile and another two disappeared at 63.7 deer per square mile. Casey and Hein (1983) found that three species of birds were lost in a research preserve stocked with high densities of ungulates and that the densities of several other species of birds were lower than in an adjacent areas with lower deer density.

Adverse Impacts

Habitat management methods used to maintain or restore habitats or prevent encroachment of invasive species may affect individual birds. These activities would at least temporarily disturb or displace birds from treatment areas, because of the disturbance from human activity and equipment. Also, if any nests are present near treatment areas, they might be damaged or destroyed by equipment. However, given that mowing and brush cutting occur on a rotational basis, would not result in a habitat type conversion, and avoids sensitive areas during the bird nesting season, the impacts are predicted to be minor, highly localized and short-term with no long-term threats to the long-term viability of bird populations due to adult bird mortality or breeding failure. No significant loss of habitat would occur from management, and we predict that birds would come back to the area within days of management activities.

Trail and platform construction and maintenance projects proposed under alternative B, would cause disturbance to birds, but affect less than 3 acres of natural habitat. There would be some removal of vegetation to place any new trails, kiosk, and observation platforms; however, all would sited where minimal disturbance to vegetation and loss of bird habitat would occur.

Refuge visitor activities may disturb birds, occasionally to the point of abandonment, along roads and trails, especially where there is concentrated human activity. However, not all bird species are impacted similarly, and documented sensitivity to human presence ranges widely.

Gutzwiller et al. (1994) found that singing behavior of some songbird species was altered by low levels of human intrusion. Some studies have found that some bird species habituate to repeated intrusion; frequently disturbed individuals of some species have been found to vocalize more aggressively, have higher body masses,

or tend to remain in place longer (Cairns and McLaren, 1980). Disturbance may affect the reproductive fitness of males by hampering territory defense, male attraction and other reproductive functions of song (Arrese, 1987). Disturbance, which leads to reduced singing activity, would make males rely more heavily on physical deterrents in defending territories which are time and energy consuming (Ewald and Carpenter, 1978).

Travel routes can disturb wildlife outside the immediate trail corridor (Miller et al., 2001). Miller et al. (1998) found bird abundance and nesting activities (including nest success) increased as distance from a recreational trail increased in both grassland and forested habitats. Bird communities in this study were apparently affected by the presence of recreational trails, where “generalists” (American robins) were found near trails and “specialist” species (grasshopper sparrows) were found farther from trails. Nest predation was also found to be greater near trails (Miller et al., 1998).

Disturbance can cause shifts in habitat use, abandonment of habitat and increase energy demands on affected wildlife (Knight and Cole, 1991). Flight in response to disturbance can lower nesting productivity and cause disease and death. Hammitt and Cole (1998) conclude that the frequent presence of humans in “wildland” areas can dramatically change the normal behavior of wildlife mostly through “unintentional harassment.”

Seasonal sensitivities can compound the effect of disturbance on wildlife. Examples include regularly flushing birds during nesting. The Delaware Natural Heritage Program, Division of Fish & Wildlife and the Department of Natural Resources and Environmental Control prepared a document on the “The Effects of Recreation on Birds: A Literature Review” which was completed in April of 1999. The following information was obtained from that document:

Several studies have examined the effects of recreationists on birds using shallow-water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger, 1981; Klein 1993; Burger et al., 1995; Klein et al., 1995; Rodgers & Smith, 1995, 1997; Burger & Gochfeld, 1998). Overall, the existing research clearly demonstrates that disturbance from recreation activities always has at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger, 1981, 1986; Klein, 1993; Burger et al., 1995; Klein et al., 1995; Rodgers & Smith, 1997; Burger & Gochfeld, 1998). The findings that were reported in these studies are summarized below in terms of visitor activity and avian response to disturbance.

- Presence: Birds avoided places where people were present and when visitor activity was high (Burger, 1981; Klein et al., 1995; Burger & Gochfeld, 1998).
- Distance: Disturbance increased with decreased distance between visitors and (Burger, 1986), though exact measurements were not reported.
- Approach Angle: Visitors directly approaching birds on foot caused more disturbance than visitors driving by in vehicles, stopping vehicles near birds, and stopping vehicles and getting out without approaching birds (Klein, 1993). Direct approaches may also cause greater disturbance than tangential approaches to birds (Burger & Gochfeld, 1981; Burger et al., 1995; Knight & Cole, 1995; Rodgers & Smith, 1995, 1997).
- Type and Speed of Activity: Joggers and landscapers caused birds to flush more than fishermen, clambers, sunbathers, and some pedestrians, possibly because the former groups move quickly (joggers) or create more noise

(landscapers). The latter groups tend to move more slowly or stay in one place for longer periods, and thus birds likely perceive these activities as less threatening (Burger, 1981, 1986; Burger et al., 1995; Knight and Cole, 1995). Alternatively, birds may tolerate passing by with unabated speed whereas if the activity stops or slacks birds may flush (Burger et al., 1995).

- **Noise:** Noise caused by visitors resulted in increased levels of disturbance (Burger, 1986; Klein 1993; Burger & Gochfeld, 1998), though noise was not correlated with visitor group size (Burger & Gochfeld, 1998).

Dogs on-leash on designated trails would be allowed. Even if dogs do not give chase to wildlife, studies show that dog presence can cause disturbance to wildlife species in the form of disruption, harassment, and displacement (Sime 1999). Dogs extend the zone of impact from an individual visitor, especially if the dogs are off leash or running, barking, or jumping. Dogs alone may be less of a threat to songbirds than dogs with people, as indicated in two studies, as the authors surmised that songbirds viewed the dogs as a coyote or fox (Leach and Frazier 1953, Andelt et al 1987). Leashed or not, disturbance from dogs was noted to be greater off trail than on trail.

The effects of human visitation on wading and waterbirds have been studied at J.N. "Ding" Darling National Wildlife Refuge in Florida. Klein (1989) found resident wading and waterbirds to be less sensitive to disturbance than migrant birds. Klein also found that sensitivity varied according to species, and would differ among individuals within species. Ardeids (herons, egrets and bitterns) as a family of birds were generally tolerant of people, although appeared less tolerant and were more likely to be disturbed when they were hunting prey. Within that family of birds, great blue herons, tricolored herons, great egrets, and little blue herons were observed to be disturbed to the point of flight more than other birds. Kushlan (1978) found that when these birds move frequently while feeding, it is more likely to disrupt interspecific and intraspecific relationships. In addition, Batten (1977) and Burger (1981) found that wading birds were extremely sensitive to disturbance. Klein (1993), in studying waterbird response to human disturbance, found that as intensity of disturbance increased, avoidance response by the birds increased. He also found that out-of-vehicle activity is more disruptive than vehicular traffic. Freddy et al. (1986) and Vaske (1983) also found this to be true. Burger (1981) found various gull species to be apparently insensitive to human disturbance, while Klein (1989) also found this true of gulls, and found the same results with sandpipers.

McNeil et al. (1992) found that many waterfowl species avoid disturbance by feeding at night instead of during the day. Klein (1989) found migratory dabbling ducks to be the most sensitive to disturbance and migrant ducks to be more sensitive when they first arrived in the late fall, than later in winter. Disturbance may displace individual waterfowl to other parts of the refuge; however, this disturbance would be limited in scope due to the limited number of areas accessible to visitors.

Should waterfowl hunting be approved in the future, associated boat activity could cause disturbance to wading and water birds and waterfowl. Recreational fishing opportunities along the shoreline may also cause temporary disturbances such as the flushing of feeding, resting, or nesting birds, wintering waterfowl, and other wildlife species.

While all of the above impacts are well-documented, the scope and scale of activities on this refuge are important to keep in mind. Of the 325 acres, less than 3 acres would be exposed to authorized public access on land, including fishing from designated areas on the shore. The only exception is additional areas

that would be open to hunting during fall if a hunt program is implemented in the future upon further analysis and approval. Deer hunting, however, would occur after bird nesting season and when many migratory birds have already left the area. If waterfowl hunting is approved in the future, Farm Creek could be accessed by waterfowl hunters in boats or blinds. This would likely cause additional impact to birds on or near the water, but the extent of that impact would be described in the separate NEPA analysis planned for evaluating a hunt program.

We would take all necessary measures to mitigate these effects and avoid or minimize long-term impacts. Sensitive bird areas, such as bald eagle nesting sites and wintering waterfowl concentration areas, would continue to be closed to public access when necessary for their protection. When group activities are planned, they would be held in areas and during seasons where minimal impact would occur. Periodic evaluation of sites and programs will be conducted to assess if objectives are being met and to prevent site degradation. If evidence of unacceptable adverse impacts appears, the location(s) of activities would be rotated with secondary sites, curtailed or discontinued. Refuge regulations will be posted and enforced. Closed areas will be established, posted and enforced. The known presence of a threatened or endangered species would preclude the use of an area until the Refuge Manager determines otherwise.

Special use permits would continue to be issued to organizations conducting environmental education or interpretive and/or wildlife observation and photography tours or activities on the refuge. The areas used by such tours would continue to be closely monitored to evaluate the impacts on the resource. If adverse impacts appear, the activity would be moved to secondary locations, curtailed or discontinued. Specific conditions may apply depending upon the requested activity and would be addressed through the special use permit.

All photographers would continue to be required to follow refuge regulations. Photographers allowed via special use permit into closed areas must follow the conditions outlined in the permit which normally includes notification of refuge personnel each time any activities occur in closed areas. No baits, calls, or scents would be allowed. All litter would have to be removed daily. Law enforcement patrol of public use areas would continue to minimize the above-mentioned types of violations.

Allowing public access would raise awareness of the refuge, its resources and the Refuge System mission. This awareness and knowledge may improve the willingness of the public to support refuge programs, resources, and compliance with regulations. In the event of persistent disturbance to habitat or to wildlife the activity would be restricted or discontinued. Disturbance of birds would also increase because of the newly authorized visitation. However, these effects would be more than offset by the overall protection afforded these birds on refuge lands.

Impacts to Other Native Wildlife

Native mammals at the refuge—including white-tailed deer, beaver, muskrats, woodchucks, squirrels, bats, shrews, and mice—are an integral part of the natural ecosystems we work to sustain on the refuge, and their presence reflects the refuge's biological diversity, integrity and environmental health. Many of the small mammals are particularly important as they are the prey base for diurnal and nocturnal raptors.

Reptiles and amphibians are also important components of diversity on the refuge. Amphibians documented or suspected on the refuge are relatively common in the region; none are listed as species of greatest conservation need by

the State of Virginia. However, three reptiles that may occur on the refuge are listed as species of global conservation need (GCN) by VDGIF: the spotted turtle (Tier III species), eastern box turtle (Tier III species), and eastern hognose snake (Tier IV species).

The refuge and adjacent riverine habitat are also host to a wide variety of invertebrate species, from the butterflies and spiders that populate our forested, grassland, and shrubby areas to the freshwater mussels and aquatic arthropods in the shallow waters of the marshes. Invertebrates are critical food items for insectivorous birds, bats, moles, shrews, raccoons, fish, and a number of other refuge wildlife species. This great diversity of species provides a major portion of the food biomass on which other native wildlife species depend. While a number of invertebrate species are rare or declining in Virginia, none are known on the refuge. One species, the dwarf wedgemussel (*Alasmodonta heterodon*), is Federal-listed as an endangered invertebrate species and is documented in Prince William County. We would continue to be on the lookout for its presence.

Pollinating insects are a group of particular and increasing concern by the Service. Insect pollinators support native plant food production, contribute to nutrient recycling, and serve as direct prey for migrating and breeding birds. They include butterflies and moths (*Lepidoptera*), bees and wasps (*Hymenoptera*), beetles, (*Coleoptera*) and flies (*Diptera*). Concern about the decline of pollinators, especially of wild native insect species, has prompted the Service to collaborate with the North America Pollinator Protection Campaign (NAPPC). The Refuge System is taking a lead in conserving pollinators, recognized as the guardians of biological integrity, diversity, and environmental health of natural ecosystems (Higgins & Adamcik 2006). We are including insect pollinator conservation in future refuge habitat management planning, strategies, and conservation actions.

We considered the benefits from:

- Protection of diverse refuge habitats
- Measures to improve water quality
- We considered the potential for adverse effects from:
 - Refuge habitat management activities
 - Construction or maintenance projects
 - Public use and access

**Native Wildlife Impacts
That Would Not Vary by
Alternative**

Benefits

Regardless of which alternative we select, we would continue to provide a natural landscape with required habitats to support the mammalian, amphibian, reptile and invertebrate species found here. Vernal pools, wildlife cavity trees, snags and downed logs are important stand-level features that would be protected to the benefit of many species. The conservation of Federal trust species and species of conservation concern in Virginia would continue to be a priority for our management.

Adverse Impacts

Refuge habitat management activities using mechanical equipment may kill individual small mammals, such as mice, moles, and shrews, as well as any amphibians, reptiles, or invertebrates using those locations and would cause temporary disturbance or displacement of others, but there would be no significant mortality or loss of local populations because these actions would be done on a rotational basis meaning, no major habitat components would occur, and we would attempt to avoid animals to the extent possible.

Contaminants that might run-off into refuge wetlands from herbicide-treated areas could adversely affect amphibians and invertebrates. Monitoring and corrective measures would continue to be taken to ensure contaminated run-off does not become a problem.

Alternative A. Current Management

Benefits

Mammalian, reptile, amphibian, and invertebrate species would continue to benefit as we continue to manage a diversity of refuge habitats for the benefit of wildlife under alternative A.

Adverse Impacts

The potential adverse impacts noted above for both alternatives would pertain to alternative A.

Mowing or herbicide use would occasionally injure or kill individual animals less mobile in treatment areas.

We would remove problem animals, such as beaver, through lethal means only when necessary. Outreach and education programs would continue to be used to inform the general public and nearby landowners of the need for and ecological soundness of animal damage control measures.

Alternative B. Enhanced Management

Benefits

Mammals, reptiles, amphibians, and invertebrate species would continue to benefit from the permanent protection of a diversity of habitats afforded under alternative B.

Adverse Impacts

Refuge visitors may impose minor negative impacts on vegetation and wildlife as previously described affecting wildlife habitat. Visitors on designated trails also could disturb wildlife that are sensitive to human presence. Those wildlife disturbances typically result in a temporary displacement without long-term effects on individuals or populations. Some species would avoid the areas people frequent, such as the developed trails, while others may be unaffected by or even drawn to the presence of humans. Roads and trails can be barriers to movement for some species. For example, salamanders may not cross openings that are too wide or that consist of dry bare ground (Vinson 1998). Gravel roads or trails, even if permeable, may act as a barrier to salamander movement (Marsh et al 2005). Refuge trails would likely be surfaced with dirt or stone dust, except for the possibility of the PHNS Trail which may be a more hardened surface such as asphalt. Disturbance to basking turtles may also occur where trails come into proximity to ponded water or the marsh habitat. However, trail locations would be designed to minimize crossing wet areas and small ravines that would be favored by salamanders, and minimize access to open water where basking turtles may be present. Vernal pools, which are important to many native amphibians and reptiles, would be avoided when maintaining or constructing trails and facilities.

Dogs may also cause disturbance to many wildlife, even when on a leash. We described some of the potential impact from dogs in the section above on ‘Forest birds.’ In addition to what is described there, studies have shown that ungulates, such as deer, respond to the presence of dogs by running, which can be very stressful and expend a lot of energy. Ungulates demonstrated more pronounced reactions to unanticipated disturbances, such as dogs off leash.

Long term impacts would primarily be confined to trail footprints and their immediate vicinity, which would comprise approximately 3 acres. The remainder of the refuge would be closed, unless our separate NEPA analysis for a hunt

program results in its approval, and we implement a deer hunting season that allows hunters to traverse the majority of the refuge. Impacts to native wildlife could occur during a fall deer hunting season. Non-target species in the pathway of hunters tracking deer may be temporarily disturbed and frightened or forced to flee. We predict that rarely would mortality occur to non-target, less mobile species as a result of hunters walking through the woods. And, more often, mobile wildlife would just temporarily move from the path of hunters, but not permanently leave the area. Hibernation or torpor by reptiles and amphibians limits their activity during the hunting season when temperatures are low, so risk to those individuals is predicted to be minimal. In our observations, hunters rarely encounter reptiles and amphibians during most of the hunting season. Insect populations are also diminished during the cooler fall temperatures and their populations would be at low risk. Some small mammals may be active depending on the weather conditions, but like reptiles and amphibians, many will be starting to hibernate in burrows, under logs, or in trees, during the fall.

Deer hunting would necessarily result in deer mortality. However, deer are abundant across their range and in many areas, including northern Virginia, deer degrade habitat values due to their overabundance, and the limited deer hunting that might occur on the refuge would not affect their overall population. We would adhere to State seasons which account for species populations and trends so there would be no long term threat to deer populations from hunting on the refuge.

An indirect long term impact is the potential for all visitors to unintentionally introduce and/or spread invasive species. Once established, invasive plants can out-compete native plants, thereby altering habitats and adversely affecting wildlife. Those invasive species that pose the biggest threats to native wildlife are those that quickly colonize an area and form dense, monotypic stands. However, over the long term, we would try to mitigate these impacts through regular treatment of invasive plants. In that way we hope to benefit native wildlife by maintaining the balance of food resources and native vegetative communities with which they evolved or adapted for cover, nesting, and quality food resources. The threat of invasive plant establishment will likely continue to be an issue over the long term and will require annual monitoring, treatment and public education.

Archaeological and Historic Resources Impacts

Archaeological and Historic Resources Impacts That Would Not Vary by Alternative

The Service recognizes the importance of continued compliance with the National Historic Preservation Act, and other Federal laws and mandates protecting these resources, to ensure that known sites are protected and that any sites found in the course of refuge management and public use are properly addressed.

Benefits

Areas that are likely to contain archaeological or historic resources would be protected regardless of which alternative we select. We would continue to conduct outreach and education, and use law enforcement if necessary, to protect against loss or damage to these resources.

Adverse Impacts

Increased visitation and 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 all public uses except hunting would occur in designated areas on the refuge, such as refuge trails. Hunting would not involve ground disturbance. We would take all necessary precautions to identify and preserve properties that are eligible for listing on National Register of Historic Places. This EA will be sent to the Virginia SHPO for review of NHPA Section 106 compliance, and we will also continue to do Section 106 compliance for all individual projects.

Alternative A. Current Management**Benefits**

Continued Service protection of refuge lands would benefit cultural resources by ensuring that none of the substantial impacts related to development for other uses would affect known or unrecorded archaeological or historic resources on those lands.

Adverse Impacts

Unauthorized entry and use of the refuge under current management would continue to occur. With a reduced Service and public presence, the risk of impacts to archaeological and historic resources is potentially greater than under the other alternatives.

Alternative B. Enhanced Management**Benefits**

There would be increased benefits to archaeological and historic resources under alternative B because of our increased partnering efforts to locate and protect those resources, particularly those at high risk of damage along the refuge shoreline, and because we would seek to foster greater appreciation of their value by the general public. Under alternative B, we would plan to work with State, County and professional archaeological societies willing to assist in performing surface surveys of selected refuge sites and the shoreline to locate archaeological resources at risk. We plan to ensure that archaeological and historic resources are protected from looting, and we would develop site management and protection plans as warranted. At least one law enforcement staff person would receive ARPA training.

Adverse Impacts

Increased visitation with its opportunities for consumptive and non-consumptive uses would also increase the likelihood of damage or disturbance of archaeological and historic resources on the refuge. However, those effects should not be significant, since almost all public uses would occur in specific footprints on the refuge, such as refuge trails. We would perform archaeological reviews, surveys, or studies of project areas as needed or recommended by the Service's Regional Archeologist and consult with the Virginia SHPO regarding refuge undertakings that have potential to affect archaeological resources. We would monitor known sites on the refuge to protect from looting and other ARPA violations.

Impacts On or Between Refuge Users

The alternatives differ greatly in providing opportunities for compatible public uses, in particular, those that are considered priority uses of the Refuge System under 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 (Public Law 105-57).

In this section we evaluate this difference in visitor opportunity between the alternatives, including predicting the interaction among and between visitors engaged in proposed refuge programs. The potential impacts that visitors would have on natural and physical resources from proposed visitor programs are described under respective headings for those natural and physical resources.

There are some other refuge uses that have frequently been requested by individuals have been determined not appropriate and are not analyzed further. Appendix B—Findings of Appropriateness and Compatibility Determinations provides documentation for uses allowed and denied. Activities not allowed include horseback riding, berry picking, mushroom harvesting, flower picking, and medicinal harvesting, bicycling off designated trails, jogging, non-wildlife dependent group gatherings group activities, organized or facility-supported picnicking, swimming and sunbathing.

Use Impacts that would not vary by Alternative

Benefits

Regardless of the alternative, we would continue to allow partner led, organized group wildlife observation and photography opportunities on a limited basis under special use permit.

Adverse Impacts

Some local residents, especially refuge neighbors, would continue to be frustrated by restricted or limited access. Some residents view the refuge as a public space that should be used and open to all for a wide range of activities, similar to a town or State park.

Alternative A—Current Management

Benefits

Public benefits would continue to be limited to those few members of the public who visit as part of an organized group under special use permit to observe and photograph wildlife.

Adverse Impacts

This alternative would continue to prohibit access to the general public, except as noted above for organized groups under a special use permit. This closure, which has been in place since the refuge was established, has caused frustration to many, especially neighbors, who would like to opportunistically walk the old road to observe and photograph wildlife or access the shoreline for fishing. Fishing access, in particular, is the most desired activity as evidenced by reports or observations by law enforcement. Demand for this activity is high and this alternative would not meet that demand in any way. In addition, the lack of access, outreach, or information exchange on site misses an opportunity to raise awareness and interest in the Refuge System or the important natural resources conserved by this refuge.

Alternative B. Enhanced Management

Benefits

Benefits to the public would greatly increase under alternative B with our proposal to provide trail access for wildlife observation and nature photography, and to allow fishing at up to four designated sites. Limited interpretation and environmental education programs would also occur. These activities on public lands are highly sought after in the highly developed setting of Northern Virginia. With increased Service and authorized public access, we predict there would be fewer incidences of trespassing and unauthorized activities, such as dumping waste, on refuge lands. We also propose to evaluate, within 5 years, a proposal to open the refuge to hunting consistent with state seasons in partnership with VDGIF. Hunting opportunities are widely sought after in this area since so few public opportunities exist.

Another benefit is that increasing public involvement on the refuge would result in a better appreciation and more complete understanding of refuge wildlife and habitats, which in turn, translates into more widespread, stronger support for the Refuge Complex, the Refuge System, and the Service. There is no substitute for visitors to be able to observe and experience wildlife in their natural habitats in person, and to learn about wildlife and wild lands at their own pace in an unstructured environment. We would develop refuge facilities so they are safe and aesthetically pleasing, including foot trails and platforms for observation, photography and fishing.

Adverse Impacts

While public access to new programs would occur, seasonal area closures to protect wildlife from disturbance during sensitive times of the year may be necessary. Some people may be frustrated by this limited access, but we would expect most people to understand the need and value of this inconvenience.

Establishing visitor programs on a refuge that is only 325 acres may require partitioning of uses to certain areas, times of day, day of week, or season to accommodate safety and minimize inter-user conflicts. Other short, temporary closures may need to occur at other times to clean up, repair, or maintain trails and infrastructure. In our experience with managing a refuge, this latter inconvenience is not likely to be a significant concern as long as it is not a prolonged closure with no outreach or explanation given. Hunting is the activity most likely to impact other refuge visitors, especially if a deer hunt is pursued. Those user groups that are not accommodated at any given time would likely become frustrated if they are not alerted to restrictions in advance, or do not support the activity causing the closure.

Cumulative Impacts

According to the Council on Environmental Quality NEPA implementing regulations at 40 CFR 1508.7, a “cumulative impact” is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

This cumulative impacts assessment includes other agencies’ or organizations’ actions if they are interrelated and influence the same environment. Thus, this analysis considers the interaction of activities at Featherstone Refuge with other actions occurring over a larger spatial and temporal frame of reference.

Air Quality

Short-term, negligible, localized air quality effects would be expected from air emissions of motor vehicles used by staff and refuge visitors. However, none of the activities on the refuge is expected to contribute to any measurable incremental increase in air pollutant levels. None of the alternatives are expected to cause any greater than negligible cumulative adverse impacts on air quality locally in the vicinity of Featherstone Refuge or regionally.

We predict no cumulative impacts to Class I airsheds from our actions. Visibility concerns due to emission-caused haze, at the nearest Class I airsheds, Shenandoah National Park (Virginia) and Brigantine Wilderness (New Jersey) would not be affected by any of the proposed management alternatives. Prevailing weather patterns from the west would tend to carry air emissions from the refuge and other sources in Prince William County toward Brigantine Wilderness but the distance is so great and the emissions sufficiently limited that they would be completely dispersed before reaching that Class I area.

The combined natural areas along this section of the Potomac River in Federal and State ownership, including the other refuges in the Refuge Complex, and other public lands on Mason Neck peninsula, make important contributions to improving air quality in the region. Maintaining undeveloped lands with native upland and wetland vegetation assures these areas will continue to filter out many other air pollutants harmful to humans and the environment.

Water Quality

There would be no significant adverse cumulative impacts to water quality under any of the alternatives. Best management practices and erosion and sediment control measures would continue to be used in refuge operations and on construction sites to ensure impacts are minimized or avoid soil disturbance and the potential to create erosion and run off. All Federal and State permits required of national wildlife refuges would be secured before activities are initiated.

Similar to our discussion above under air quality, the combined natural areas along this section of the Potomac River in Federal and State ownership make important contributions to improving water quality in the region. Maintaining undeveloped lands with native upland and wetland vegetation assures these areas will continue to filter out many other water pollutants harmful to humans and the environment.

Socioeconomic Resources

Given that there is very little open space or natural lands in the surrounding community, the refuge contributes positively to the quality of life in the area. This contribution would be further enhanced under alternative B if public access occurs. In comparison to other public lands in the region, the refuge would offer opportunities for wildlife observation, nature photography, interpretation, and fishing in natural surroundings and a quiet setting. This is a particular, unique niche of recreational opportunity that the refuge could provide in high quality compared to other ownerships. This niche complements the full range of opportunities, including those that require more development or support larger groups, offered elsewhere on other public ownerships. When considered together, this diversity of recreational types across all public ownerships reflects a significant recreational resource for the region.

Implementation of alternative B would result in other minor beneficial impacts for the local communities near the refuge and in the region as a whole. Public use of the refuge would be expected to result in visitor spending in the local community. Fully funding the additional staffing under alternative B would also make a small, incremental contribution to employment and income in the local community. Construction activities associated with alternative B would contribute to local expenditures for supplies, and possibly labor, but these benefits would likely be insignificant given the local economy. Neither alternative would alter the local or regional demographic characteristics.

Soils

Refuge lands, in combination with other public ownerships and protected, undeveloped lands, significantly contribute to long-term protection of soil productivity in this area of the Tidal Potomac River. Refuge soils are generally in good condition based on field observations, although there are concerns with impacts from adjacent land uses in the area. The refuge is surrounded by a highly urbanized and developed area. We will continue to use best management practices to minimize impacts from our management programs while keeping the remainder of the refuge in native plant communities that may otherwise have been under development if the refuge had not been created. On the refuge, before any ground disturbance occurs, all Federal and State permits required of national wildlife refuges would be secured before activities are initiated.

Protected Habitats and Species

The uplands and wetlands that we would maintain under both alternatives would contribute at least minimally to sustaining important habitats along this section of the Potomac River. When evaluated independently, this 325-acre refuge surrounded by development may not appear to play an important role. However, when considered together with other undeveloped public lands in the area, its contribution to high quality habitats for a wide range of native species in the region increases in importance. The refuge would continue to lead by example among public land agencies in the protection and maintenance of the integrity, diversity and health of habitats that would potentially be lost or severely degraded over the long term given the level of urban development and pressures in the area.

Under alternative B, increased activity would occur on the refuge, including those from an enhanced research and monitoring program, and public recreation. Cumulative impacts from research 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

Complex Project Leader 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.

Under alternative B, public activities on the refuge associated with wildlife observation, nature photography, interpretation, environmental education, and fishing may cause cumulative impacts: minor when considered alone, but important when considered collectively. Our principal concern is repeated disruptions of nesting, resting, or foraging birds. We have not observed significant resource degradation, long-term consequences, or cumulative effects on any of the other refuges with established programs. However, opening refuge lands to public use can often result in littering, vandalism, or other illegal activities on the refuges. In this instance though, opening the refuge to the public is more likely to result in a decrease in damaging impacts because unauthorized uses that are an ongoing problem now would likely decrease under management of public use programs.

Although we do not expect substantial cumulative resource impacts on refuge lands from these five 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.

Archaeological and Historic Resources

We expect none of the alternatives to have significant adverse cumulative impact on cultural resources on the refuge. Beneficial impacts would occur at various levels, depending on the alternative, because of proposed shoreline erosion monitoring and control efforts, environmental education and interpretation programs, and increased field surveys to identify and protect any discovered sites.

Climate Change

Department of the Interior Secretarial Order 3226 states that “there is a consensus in the international community that global climate change is occurring and that it should be addressed in governmental decision making...This Order ensures that climate change impacts are taken into account in connection with Departmental planning and decision making”. Additionally, it calls for the incorporation of climate change into long-term planning documents such as the CCP.

One of the issues in integrating climate change in planning is that the predicted impacts are varied and changing as new information is incorporated into new and improved models. While the magnitude of the impact is uncertain, it is clear is that sea levels will rise, storm events will become more frequent, precipitation rates will change, and daily and seasonal temperatures will be higher (fewer days of freezing and snow cover). This will result in coastal areas becoming inundated, more frequent flooding, wildlife species range shifts, and changes to vegetation and habitat in response to environmental influences. Some of these effects will occur more rapidly than others. Some species of plants and animals, especially those with very specific or narrow environmental or habitat requirements may not be able to adapt fast enough to survive these changes.

To incorporate climate change into planning documents requires management to consider a variety of factors to determine the appropriate response. These include such things as the species, its range and habitat requirements, predicted range shifts, predicted changes in habitat, species status (threatened/

endangered), current refuge management, ability to provide, restore, or enhance habitat for predicted conditions (both locally and regionally), refuge purposes, and the likelihood of having the resources to support the management decision. For each species and/or habitat, management will have three basic options: 1. Do nothing—let the impacts of climate change occur and implement short term actions based on “current conditions” (i.e. manage for 10 to 15 year time blocks); 2. Decide that habitat or species are of critical importance and spend the time and resources needed to maintain existing conditions (i.e. construct dikes to protect existing habitat or land forms or undertake annual restoration of habitat that provides critical nesting habitat); 3. Plan for the effects and implement actions that mitigate some of the impacts (i.e. expand refuge boundaries to offset habitat loss due to sea level rise or implement restoration projects that target habitat that will be more tolerant of predicted conditions).

Each of these options will have an appropriate application in providing for the future of our natural resources but deciding on which option to implement may involve some very difficult decisions which will be complicated as new species or habitat types become imperiled.

In the short term, for the purposes of this CCP, adaptive management principles will be used to help mitigate potential effects of climate change as these effects become more defined. The sea level affecting marsh management (SLAMM) analysis conducted, along with new data on climate change impacts, will be used in the implementation of the objectives in this document. Some objectives may be modified to accommodate the new information. However, since our current management (and proposed management objectives) is focused more on diversity or groups of species as opposed to single species management, we do not expect that integrating climate change impacts will significantly alter the objectives in the CCP.

Over the long term, objectives may change based on more refined impacts and the resulting changes to habitat and species ranges, abundance, and status. However, in general, for Mason Neck Refuge we will continue to manage for mature forest habitat realizing that the species composition of the forest and forest nesting species may change over time. We will continue to pursue protection of the shoreline to mitigate sea level rise due to the significance of the amount of land that can be lost and the contributing impacts on sediment loading, loss of aquatic vegetation and fisheries habitat.

There is a clear possibility that some substantial portion of the wetlands on the Refuge Complex will be impacted by the rising waters of the tidal Potomac River. Due to its lower elevation, this would have a greater impact on Featherstone Refuge. Existing wetlands may become open water or may gradually transform from one type to another (i.e. from forested to emergent marsh). Specific management actions related to this impact will be developed once the extent of wetland loss and impact to trust resources is more defined. In view of that possibility, the Service may seek to begin replacing some of the future lost wildlife values of the refuge with other areas in the Potomac River watershed that could replace these habitats that are vital to Service trust species.

Relationship Between Short-term Uses of the Human Environment and Enhancement of Long-term Productivity

In this section we consider the relationship between local, short-term uses of the human environment and maintaining long-term productivity of the environment. By long-term we mean that the impact would extend beyond the 15-year planning horizon of this draft CCP/EA.

Under all of the alternatives, our primary aim is to maintain or enhance the long-term productivity and sustainability of natural resources on the refuge, in

the Tidal Potomac River Basin, and for migratory birds and interjurisdictional fish and other far ranging species, across the whole range of each of the species. Short term human uses of the refuge are of secondary importance. We allow those uses only if they can be safely supported through access via the PHNS Trail and only if they are compatible with the resource protection goals. The Service strives to protect Federal trust species and the habitats they depend on, as evidenced by the public use restrictions on access and prohibition of types of use other than foot traffic. Outreach and environmental education in alternative B would encourage visitors to be better stewards of our environment.

The dedication of certain areas for new trails on the refuge under alternative B would represent a loss of long-term productivity on a certain few localized areas, but is not considered significant given the comparative refuge size.

In summary, we predict that both of the alternatives would contribute positively to maintaining or enhancing the long-term productivity of the environment.

Unavoidable Adverse Impacts

Unavoidable adverse effects are the effects of those actions that could cause harm to the human environment and that cannot be avoided, even with mitigation measures. There would be some minor, localized short term unavoidable adverse effects associated with trail construction and invasive plant control. Impacts from opening the refuge to certain public activities could also result in some unavoidable effects. However, none of these effects would rise to the level of “significant” and all would be mitigated to some extent. As such, there would be no long-term significant unavoidable adverse impacts that would result under any of the alternatives.

Potential Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those which cannot be reversed, except perhaps in the extreme long term or under unpredictable circumstances. An example of an irreversible commitment is an action which contributes to a species’ extinction. Once extinct, it can never be replaced.

In comparison, irretrievable commitments of resources are those which can be reversed, given sufficient time and resources, but represent a loss in production or use for a period of time. An example of an irretrievable commitment is the development of a segment of the PHNS Trail through the refuge. This regional trail along the Potomac River has national status and a significant number of advocates. This proposed segment through the refuge is an important missing link because there are so few options in the area. Once approved and developed on the refuge it would be very difficult to close or relocate it if for some reason it no longer was compatible and was materially affecting wildlife or habitat. While restoration of the trail to native habitat would be technically feasible, it would be a challenge both in the public opinion arena and because of cost.

Environmental Justice

President Clinton signed into Executive Order No. 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low income populations, with the goal of achieving environmental protection for all communities.

The order directs federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high, adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income community’s access to

public information and participation in matters relating to human health or the environment.

The United States EPA Office of Environmental Justice defines it as follows:

“Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental law, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.” (<http://www.epa.gov/environmentaljustice>)

We believe, based on our socioeconomic and environmental consequences analysis, that neither of our proposed alternatives would place a disproportionately high, adverse environmental, economic, social, or health effects on minority or low-income persons. Prince William County has a substantial minority population, as well as a small percentage of residents living below the poverty line. However, all identified socioeconomic and environmental impacts would not be localized nor be placed primarily or unequally on minority and low-income populations. Persons who reside near Featherstone Refuge and in Prince William County would bear very minor adverse effects and some beneficial effects if the refuge is managed under either of the two proposed alternatives. Adverse impacts, such as anticipated minor increases in traffic and related emissions due to visitation if the refuge is opened to the public as proposed under alternative B, negligible contributions to local mobile source air emissions from refuge equipment and vehicles, would not disproportionately affect minority and low-income populations compared to other segments of the general population. Beneficial impacts include maintaining natural vegetation that improves air and water quality through filtering, paying refuge-revenue sharing payments to the County to offset property tax losses, and providing desired public uses under alternative B.

Before we make any decisions to make major changes in habitat management or the environment we always inform all of our publics, equally, and our programs and facilities are open to all who are willing to adhere to the established Refuge rules and regulations. We do not discriminate in our responses for technical or practical information on conservation issues or when providing technical assistance in managing private lands. Additionally, all refuge uses proposed under alternative B would be open to all members of the public and the refuge does not charge any fees to visitors. The Service is also an equal opportunity employer.

Summary of the Impacts of the Alternatives

The following table 4.3 summarizes the benefits and adverse impacts we described above in chapter 4 for specific resources or programs proposed for Featherstone Refuge under each of the alternatives. For our discussion on cumulative impacts, the relationship between short-term uses of the human environment and enhancement of long-term productivity, unavoidable adverse impacts, potential irreversible and irretrievable commitments of resources, and environmental justice, please refer to the chapter 4 narratives above.

Table 4.3. Summary impact comparison of Featherstone Refuge CCP Alternatives

	Alternative A Current Management	Alternative B Enhanced Management
Regional Air Quality	<p>Natural vegetation on refuge’s 80 acres of forested upland and 220 acres of forest and emergent wetland would be maintained. Air quality would benefit from pollution filtering properties of vegetation and protecting land from development that would otherwise contribute attendant sources of pollutant emissions. Some minimal benefits from protecting forest land due to carbon sequestration; trees serve as long-term carbon “sinks” that reduce atmospheric carbon that contributes to global climate change.</p> <p>Refuge would continue energy efficient practices and additional practices adapted as feasible.</p> <p>Staff vehicles and equipment would contribute a negligible amount to local mobile source air emissions and particulates. Refuge contributions would not be measurable when compared to current off-refuge contributions to pollutant levels from surrounding urban setting with transportation sources and land development.</p>	<p>Same benefits as described under alternative A.</p> <p>Trail construction and maintenance activities on approximately 1.85 mile of trail would cause negligible short-term, localized effects from dust and vehicle and equipment exhausts.</p> <p>Vehicle use by both staff and visitors, and increased equipment use by staff, under alternative B would contribute some minimal additional but negligible increment to local mobile source air emissions.</p>
----- Air Quality Impacts That Would Not Vary By Alternative -----		
<p>Under both alternatives, our management activities should not result in a measurable negative contribution to regional air quality. None of the alternatives would violate EPA standards; all three would comply with the Clean Air Act. There would be no new major stationary or mobile sources of air pollutants at the refuge created under any of the refuge management alternatives. On the contrary, the alternatives range from either continued prohibition on public use to strict limits on refuge uses. Those limits would curtail the potential of contributing man-made sources of emissions by maintaining more than 92 percent of refuge area in natural vegetative cover. The analysis of air quality impacts considered only how the Service’s actions at the refuge might affect criteria air pollutants, visibility, and global climate change to a minimal degree, focusing on the potential for localized air quality impacts or improvement.</p> <p>Visibility concerns due to emission-caused haze at the nearest Class I airsheds—Shenandoah National Park in Virginia and Brigantine Wilderness Area in New Jersey—would not be affected by any of the proposed management alternatives. Management actions and public uses at the refuge under both alternatives would contribute a negligible increment to the overall Prince William County, or greater regional, air emissions levels.</p>		

	Alternative A Current Management	Alternative B Enhanced Management
<p>Regional Water Quality, Wetlands, and Aquatic Biota</p>	<p>Long term benefits from protecting 325 acres of natural habitat including forested riparian areas. Vegetation filters runoff from operations on the refuge and adjacent roadways and developed areas. Benefits would also continue with prohibiting public access to the refuge shoreline.</p> <p>Unauthorized public access has the highest likelihood of impacting water quality and aquatic biota over the long-term. Enforcement program attempts to mitigate this concern.</p> <p>Research studies would continue to include stipulations to minimize impacts to shoreline and waterbodies.</p> <p>Lack off-shore shoreline protection measures would continue to subject area to erosion from wind and wave action. Erosion contributes to the river's sediment load and thereby negatively affecting wetlands and aquatic resources and dependent wildlife.</p> <p>Minimal risk from herbicide use to control invasive plants. Any potential risk would be mitigated through proper application procedures, current leak and spill prevention plans, and using only certified herbicides approved by the Regional Contaminants Coordinator.</p>	<p>Compared to alternative A, there would be increased benefits to water quality and aquatic species from enhanced protection of the riparian forest and wetlands.</p> <p>Off shore shoreline protection measures would be pursued with partners in lead. If projects implemented, some temporary adverse impacts associated with additional turbidity and disturbance to wildlife would be expected.</p> <p>Unauthorized activities would be better controlled with increased Service and VDGIF presence and enforcement. We also would more actively engage in efforts with refuge partners to address water quality issues in the Tidal Potomac River Basin.</p> <p>New trail construction, approx 1.85 miles affecting 3 acres, may cause short term localized impacts with potential for sedimentation and turbidity in adjacent waters. Proper site preparation and use of standard mitigation practices would limit the potential for impacts. Under alternative B, direct impacts on fish given proposed new recreational fishing program implemented under state regulations. Some individual fish harvested, but levels are not expected to affect viability of populations. Some impact on fish eating birds due to harvest and through human disturbance. However, impacts expected to be temporary, short term and localized.</p> <p>Under alternative B, we would likely increase the acreage treated with herbicide for invasive plant control so there would be a minimal, but slightly, increased risk for herbicide to contaminate aquatic habitats compared to alternative A.</p> <p>Under alternative B, hunters would present a slightly increased potential for affecting wetland and aquatic biota compared to alternative A if off-trail soil compaction and erosion occurs. Other public users would be restricted to trail and platform access; however, off trail impacts may still occur in the form of soil compaction, and possibly littering. Outreach, education, and enforcement would be increased compared to alternative A, to minimize threats from authorized and unauthorized activities.</p> <p>Potential impacts from research activities same as alternative A.</p>
<p>----- Water Quality and Aquatic Biota Impacts That Would Not Vary By Alternative -----</p>		
<p>Under both alternatives, no direct, long term adverse impacts to water quality or aquatic species would occur in the vicinity of the refuge or elsewhere in the Potomac River over the long term. We would adhere to all Federal and State regulations, and obtain all permits required for refuge lands, before implementing activities in order to insure compliance with Sections 305(b) and 319 of the Clean Water Act, 33 U.S.C. § 1251 et seq as amended.</p> <p>Refuge lands would continue to benefit water quality in the Basin by excluding development in this area of the watershed and sustaining natural water filtering vegetation, maintaining a forested buffer between Farm Creek and Occoquan Bay and developed areas upslope from the refuge.</p> <p>Because staff entry by vehicle would be limited to the single upland access road, there is a negligible risk to water quality and aquatic biota from leaking petroleum products. Risks from the use of selected low-toxicity chemical herbicides approved for aquatic weed control are low as are risks from herbicide use in adjacent uplands. Leak and spill prevention plans would be kept current under both alternatives.</p>		

	Alternative A Current Management	Alternative B Enhanced Management
Socio-economic	<p>Refuge revenue sharing payments would continue. Limited Service presence benefits neighborhood with helping to enforce against illicit activities, but that presence lowest among the alternatives.</p> <p>Given prohibition on public access, no benefits derived from visitor expenditures in local community.</p> <p>Local community would continue to be frustrated with lack of access. Demand for priority public uses would continue to be unmet. Lack of opportunity for Service to conduct outreach and education about refuge and Refuge System.</p>	<p>Assuming access can be secured; alternative B would increase contributions to local economy compared to alternative A in the form of Refuge and visitor expenditures. For example, proposed refuge trail work would add expenditures to the local economy for labor, materials, and services.</p> <p>Some public demand for recreation would be met by allowing priority public uses. However, some visitors would be impacted with management need to partition uses, and not all the public would approve of new activities.</p> <p>Increased outreach, education and enforcement would help engender a spirit of public stewardship of the refuge which is not now possible, and provide a venue to promote increased understanding and support for the Refuge System.</p>
----- Socio-economic Impacts That Would Not Vary By Alternative -----		
<p>Under both alternatives, we would continue to make Refuge revenue sharing payments to Prince William County. We would also continue to contribute a negligible amount to the local economy of Woodbridge and other communities near Featherstone Refuge in form of staff jobs, income, and expenditures.</p> <p>Protecting land from development in federal ownership has both advantages and disadvantages. Some economic disadvantage with protection since land could be developed to be more advantageous economically, although potential is limited given Refuge location and wetlands. Others would continue to benefit from presence green space in otherwise highly developed urban setting.</p>		

	Alternative A Current Management	Alternative B Enhanced Management
Soils	<p>Beneficial impacts to refuge soils predicted given protection of vegetation and enforcement against unauthorized activities. However, not all activities would be stopped given limited Service presence.</p> <p>Some continued soil loss along shoreline with wind and water impacts, since no off shore protection planned.</p> <p>Invasive plant control measures, including herbicide applications, could affect soils, but only those approved by Regional Contaminants Coordinator would be used.</p>	<p>Benefits from protecting native vegetation would be similar to alternative A.</p> <p>Outreach, education, and enforcement programs would be increased to help minimize authorized and unauthorized visitor impacts.</p> <p>Refuge visitor program would increase the likelihood of disturbance and compaction of soils in areas of the refuge where facilities are built and visitors allowed. Trail location and design would feature soil protection.</p> <p>The proposed fishing program, and the hunt program, if approved in the future after additional NEPA analysis, may lead to off trail effects; however, hunters would be well dispersed and anglers would be in designated areas. A monitoring program with Service and VDGIF staff would help identify problems and increase response time for corrective actions.</p> <p>Management and maintenance activities would increase, thus increasing potential for those activities to affect soils. We would employ best management practices to ensure that no long term, major soil problems—such as unchecked erosion or compaction—result.</p>
----- Soil Impacts That Would Not Vary By Alternative -----		
<p>Under both alternatives, we would continue to maintain protective vegetative cover, and use best management practices in all management activities to maintain soil productivity and health. Site conditions, including soil composition, condition, and hydrology would continue to influence where and how management activities should occur. No site would be managed in a manner inconsistent with its recognized potential. In general, no soil from off-site will be brought onto the refuge unless bringing in clean soil is determined to be less disturbing to refuge resources than using soils on site.</p> <p>There is a potential for adverse impacts from treating invasive plants using herbicides, or mechanical and manual treatments. Impacts would be negligible with preventive measures, and would be limited in scope and scale given small treatment areas.</p>		

	Alternative A Current Management	Alternative B Enhanced Management
Forest Habitat	<p>Under alternative A, benefits would be limited to the long term protection of refuge forest habitat which includes 80 acres of forested upland and 220 acres of forested and emergent wetlands.</p> <p>Some minimal level of risk of loss or damage to forest vegetation involved with invasive plant control activities, including herbicides. However, herbicides would be used only under strict application precautions to ensure that only the targeted plants are affected.</p> <p>Routine maintenance of the access road may result in the loss of individual trees, but we do not expect to affect the quality or diversity of forest habitat present.</p>	<p>Under alternative B there would be increased long-term protection of forest habitats compared to alternative A because of increased presence of staff to conduct outreach and reduce unauthorized activities, increased monitoring of forest health. In addition, if a deer hunt is approved in the future, field reconnaissance by Refuge and VDGIF staff would occur. Forest health would benefit from a deer hunt because deer are suppressing forest regeneration.</p> <p>Developing trails and other infrastructure would result in tree loss; however, this impact would be minimized by using old railroad beds, road bed, and existing unauthorized trails.</p>
<p>-----Forest Habitat Impacts That Would Not Vary By Alternative-----</p>		
<p>Under both alternatives, we would continue work on controlling invasive plants and establishing native forest species capable of growing under the current site conditions in an effort to restore the ecological integrity and diversity of the refuge. Control measures would be implemented using strict procedures and protocols so as not to affect non-target resources or otherwise degrade wildlife habitat. The alternatives would vary in terms of the extent and frequency of using control practices.</p>		

	Alternative A Current Management	Alternative B Enhanced Management
Wetlands	<p>Long term protection of refuge lands benefits wetlands on the refuge.</p> <p>Control of invasive plants has some negligible potential to impact wetlands; however, impact is minimal given precautions in place and use of only herbicides approved for aquatic systems. A leak and spill prevention and emergency clean-up procedures would ensure that such occurrences are rare and are addressed immediately, with short-term effects limited to the immediate location.</p> <p>Unauthorized public access has the highest likelihood of impacting wetlands over the long-term. Enforcement program attempts to mitigate this concern.</p> <p>Research studies would continue to include stipulations to minimize impacts to shoreline and wetlands. Some continued minimal impacts from unauthorized activities.</p>	<p>Under alternative B there would be increased long-term protection of wetlands compared to alternative A because of increased presence of Service and VDGIF staff to conduct outreach, education, and enforcement, reduce unauthorized activities, and increase monitoring of wetlands health.</p> <p>Additional protection afforded with plans to work with partners to explore opportunities to design and implement shoreline and wetlands protection measures.</p> <p>Developing trails and other infrastructure could result in impacts to wetlands; however, this impact would be minimized by design and placement in areas less sensitive. Impacts are predicted to be short-term, with localized turbidity and some minimal loss of wetlands plants, but no substantive habitat alteration or degradation would occur.</p> <p>Unauthorized off trail activities and littering that could impact wetlands would be minimized with increased monitoring, outreach, education and enforcement.</p> <p>As with alternative A, chemical or oil leak and spill prevention and emergency clean-up procedures should ensure that such occurrences are rare and are addressed immediately, with effects limited to the immediate location.</p>
----- Wetland Impacts That Would Not Vary By Alternative -----		
<p>Under both alternatives, refuge wetlands and open water habitats are a priority for protection since they support reproductive habitat for fish and other aquatic species, wading and waterbirds foraging areas, and resting and foraging areas for waterfowl. Refuge wetlands also buffer the shoreline from the erosive effects of the river and Farm Creek. Regardless of the management alternative we select, we would continue to conserve these wetlands and the wildlife they support as one of our highest priorities.</p> <p>We would continue to address impacts from unauthorized refuge uses, in particular, unauthorized fishing. Law enforcement issues related to fishing include littering, illegal trespass and fires. Discarded fishing line and other fishing litter can entangle migratory birds and mammals and cause injury and death (Gregory 1991). Additionally, litter affects water quality which may harm aquatic plants, invertebrates, and fish.</p>		

	Alternative A Current Management	Alternative B Enhanced Management
Birds	<p>Under alternative A, we would continue to benefit birds of conservation concern by protecting 80 acres of upland forest and 220 acres of forested and emergent wetlands, and 25 acres of open water habitat over the long term.</p> <p>There would be short-term localized impacts to bird habitat, and temporary displacement of birds, from management practices such as mowing or herbicide treatments for invasive plant control.</p> <p>Unauthorized activities, particularly during the nesting season, could disturb birds or result in nest abandonment. Enforcement program attempts to mitigate this concern.</p> <p>Research activities have the potential to impact birds, with the extent of the impact dependent on the time of year and techniques used. However, research special use permits would include stipulations to minimize disturbance to birds and habitats.</p>	<p>Under alternative B, increased benefits to birds of conservation concern compared to alternative A due to increased Service presence to enforce against unauthorized activities. Greater presence would better address the issues of illegal trespass, vandalism, and deposition of trash that damage bird habitat and disturb nesting and foraging birds.</p> <p>Invasive plant management activities may affect individual birds by temporary displacement and short-term loss of their specific habitat. These activities would be planned to avoid the main nesting season, so adverse impacts to bird reproduction would not occur. Habitat improvements, particularly control of invasive plants, would benefit many bird species over the long term.</p> <p>Proposed new trails (1.85 miles) and their maintenance would disturb birds and remove more acreage from natural habitat than alternative A. Habitat removal would be minimized with use of old railroad bed, road beds, and existing trails.</p> <p>Opening the refuge to public uses, and allowing dogs on leash, on designated trails would potentially result in additional bird disturbance, disruption, and abandonment on up to 3 acres of trail area. Boat access for hunting and fishing may disturb birds on or near the water. Wildlife disturbances typically result in a temporary displacement without long-term effects on individuals or populations. Some species would avoid the areas people frequent, such as the developed trails, while others may be unaffected by or even drawn to the presence of humans. Long term impacts are anticipated to be minimal since only certain areas are open to the public, and sensitive areas, such as bald eagle nesting sites if they are found in the future, would be closed as needed. In the event of persistent disturbance that may be affecting population viability, activities may be modified or curtailed.</p> <p>Deer hunting, if allowed in the future, would reduce deer impacts on forest regeneration and understory development which are important habitat components for many bird species.</p>
-----Impacts to Birds of Conservation Concern That Would Not Vary By Alternative -----		
<p>Under both alternatives, continued protection of 325 refuge acres would benefit birds of conservation concern that use the refuge to breed or winter or migrate through.</p> <p>Birds may be adversely affected by management methods, such as mowing and the use of herbicides to control invasive plants. These methods would displace birds from treated locations and if any active nests are present they could be damaged or destroyed. The impacts would be minor, highly localized and short-term with no threats to bird populations in terms of adult mortality or breeding success. Treated habitats would be improved over the long term and this would benefit bird populations.</p> <p>Research activities may disturb birds depending on season of use and techniques. 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 also cause disturbance, injury, or death to groups or to individual birds. While mortality is possible, the level would not be predicted to result in a loss of population viability for any species. Permit stipulations would also insure impacts are minimized.</p>		

	Alternative A Current Management	Alternative B Enhanced Management
Other Native Wildlife	<p>Mammalian, reptile, amphibian, and invertebrate species would continue to benefit long term with refuge land protection</p> <p>Mowing or herbicide use would occasionally disturb, injure or kill individual animals, particularly those that are less mobile in treatment locations.</p>	<p>In addition to impacts described for alternative A:</p> <p>Proposed new trails (1.85 miles) and their maintenance would disturb wildlife and remove more acreage from natural habitat than alternative A. Habitat removal would be minimized with use of old railroad bed, road beds, and existing trails.</p> <p>Opening the refuge to public uses, and allowing dogs on leash, on designated trails would potentially result in additional wildlife disturbance, disruption, and abandonment on up to 3 acres of trail area. Boat access for hunting and fishing may disturb wildlife on or near the water. Wildlife disturbances typically result in a temporary displacement without long-term effects on individuals or populations. Some species would avoid the areas people frequent, such as the developed trails, while others may be unaffected by or even drawn to the presence of humans. Long term impacts are anticipated to be minimal since only certain areas are open to the public and sensitive areas would be closed as needed. In the event of persistent disturbance that may be affecting population viability, activities may be modified or curtailed.</p> <p>Deer hunting, if allowed in the future, would reduce deer impacts on forest regeneration and understory development which are important habitat components for many wildlife species. We would adhere to state regulations and not reduce deer numbers to the point they cannot recover. Allowing hunting may result in hunters disturbing non-target species in the course of tracking prey, trampling of vegetation, possible creation of unauthorized trails, and a potential for littering, vandalism and subsequent erosion. Shotgun noise from hunting could cause some wildlife disturbance as well.</p> <p>An indirect long term impact is the potential for visitors to unintentionally introduce and/or spread invasive species. The threat of invasive plant establishment will likely continue to be an issue over the long term and will require annual monitoring, treatment and public education.</p>
-----Impacts to Other Native Wildlife That Would Not Vary By Alternative-----		
<p>Under both alternatives, we would continue to protect refuge lands to support a diversity of ecosystem components and native biodiversity, including all wildlife taxa. Vernal pools, wildlife cavity trees, snags and downed logs are important stand-level features that would be protected to the benefit of many species. The conservation of Federal trust species and species of conservation concern in Virginia would continue to be a priority for our management.</p> <p>Some losses of individual animals would occur from current management activities, but these losses would continue to be negligible, highly localized, and short-term. We do not predict significant mortality or loss of local populations because these actions would be done on a rotational basis, no cover type conversions would occur, and we would avoid animals to the extent possible. Contaminants that might run-off into refuge wetlands from herbicide-treated areas could adversely affect amphibians. Monitoring and corrective measures would continue to be taken to ensure contaminated run-off does not become a problem.</p> <p>We would remove problem animals, such as beaver, through lethal means only when necessary. Outreach and education programs would continue to be used to inform the general public and nearby landowners of the need for and ecological soundness of animal damage control measures.</p> <p>Research activities have the potential to impact wildlife, with the extent of the impact dependent on the time of year and techniques used. However, research special use permits would include stipulations to minimize disturbance to wildlife and habitats.</p>		

	Alternative A Current Management	Alternative B Enhanced Management
Archaeological and Historical Resources	Continued Service protection refuge lands would benefit cultural resources by ensuring that none of the substantial impacts related to development for other uses would affect known or as yet undiscovered archaeological or historic resources on those lands. The higher likelihood of unauthorized entry and use of the refuge under current management would cause the risk of impacts to archaeological and historic resources to be greater than under the other alternatives.	There would be increased benefits to archaeological and historic resources under alternative B because of our increased partnering efforts to locate and protect those resources, particularly those at high risk of damage along the refuge shoreline, and because we would seek to foster greater appreciation of their value by the general public. Some minimal risk from visitors damaging or disturbing archaeological and historic resources on the refuge, although impact is low with requirement to stay on designated routes. Increased staff would be present to conduct outreach, education and enforcement against unauthorized activities impacting these resources. We would perform archaeological reviews, surveys, or studies of project areas as needed or recommended by the Service's Regional Archeologist and consult with the Virginia SHPO regarding refuge undertakings that have potential to affect archaeological resources. We would monitor known sites on the refuge to protect from looting and other ARPA violations.
	----- Archaeological and Historical Resource Impacts That Would Not Vary By Alternative -----	
	Under both alternatives we would protect areas with archaeological or historic resources. We would continue to conduct outreach and education, and use law enforcement if necessary, to protect against loss or damage to these resources. We would take all necessary precautions to ensure that no sites considered eligible for listing on National Register of Historic Places would be affected. This EA will be sent to the Virginia SHPO for review of NHPA Section 106 compliance, and we will also continue to do Section 106 compliance for all individual projects.	
Refuge Users	Limited benefits to select individuals who participate in partner-led group programs under a special use permit. permit With general closure in place, continued unmet demand for priority public uses. Adjacent community residents, in particular, would continue to be frustrated by lack of access.	Benefits to the public would be substantial under alternative B since the refuge would be open to all priority public uses, assuming public access is secured. We would work cooperatively with VDGIF to provide public hunting and fishing opportunities on the refuge as the first priority. These are two activities where public access is rapidly diminishing in the region due to losses from development. With increased Service and VDGIF presence, and authorized access by the public, we predict there would be fewer incidences of trespassing and unauthorized activities, such as dumping waste, on refuge lands which has been a concern by Refuge neighbors. Partitioning of uses and seasonal area closures may be necessary to accommodate all activities and protect wildlife from disturbance during sensitive times of the year. This may result in a few complaints by some visitors who want access and are inconvenienced, or from those who do not support a particular allowed use.
	----- Impacts on or Between Refuge Users That Would Not Vary By Alternative -----	
	Under both alternatives, we would continue to enforce against unauthorized activities.	

Chapter 5



USFWS

Meeting at Mason Neck Refuge

Consultation and Coordination

- Introduction
- Planning to Protect Refuge Resources
- Partners Involved in Refuge Planning
- Contact Information

Introduction

This chapter describes how we engaged others throughout the development of this draft CCP/EA. It details our efforts to encourage the involvement of the public and conservation partners including other Federal and State agencies, County officials, civic groups, non-government conservation and education organizations, and user groups. It also identifies who contributed in writing the plan or significantly contributed to its contents.

It does not detail the dozens of informal discussions the refuge manager and his staff have had over the last four 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.

A 45-day period for public review follows our release of this draft CCP/EA. We encourage you to respond with your ideas about the plan. During that period, we will host open-house public meetings at locations near the refuge to gather your opinions and answer your questions about our proposals. We will weigh your responses carefully before we write the final CCP.

According to Service policy, we must review and update our final CCP at least once every 15 years. We may need to revise it sooner, either in response to significant new information that would markedly change management direction, or if the Service Director or our Regional Director deem it necessary. If so, we will once again announce our revised planning and encourage your participation.

Planning to Protect Refuge Resources

Our refuge planning began informally in June 2006 at an initial strategy meeting between the refuge staff and regional office staff and culminates with this Draft CCP/EA.

June 2 & 16, 2006: We had initial phone calls between refuge staff and regional office planning staff. We discussed the planning process and distinguished between the responsibilities of the regional office staff, refuge staff, and a potential contractor. Also, we discussed the refuge's resources and the potential issues that would need to be addressed in the plan. A tentative schedule for accomplishing the major steps in the planning process and determining when and how we should involve others was also developed.

September 28 & 29, 2006: We held our first team meeting on the refuge. We drafted a vision statement, identified preliminary issues, determined what additional resource information we needed to collect and summarize, discussed who should participate on the core planning team and what other experts we should consult to help us address planning issues. We also developed our timetable for the planning process.

November 6, 2006: We wrote to the executive director of the VDGIF inviting staff in his agency join our core planning team. His response named four individuals.

- January 18 & 19, 2007:** The planning team leader met with refuge staff and the contractor to discuss aspects of the planning process that have been accomplished and what needed to be initiated. Other state agency and Service participation was discussed, a vision and goals were drafted, information on the Affected Environment was shared, and plans for public scoping meetings were developed.
- March 7, 2007:** We distributed a one page newsletter to over 200 citizens, local and elected officials, organizations and agencies, and it was sent out to the entire Friends of Potomac River Refuges mailing list, to announce formally the beginning of the planning process and ask if they want to stay on our project mailing list. We also announced the two public open houses we would host in later in the month.
- March 27 & 28, 2007:** We hosted two open-house meetings in Woodbridge and Lorton, Virginia, having published notices about the meetings in local and regional newspapers, on radio, in our newsletter and on our regional planning website. Twenty-seven people attended the meetings.
- At both meetings, we presented an overview of current refuge management, described the planning process, and explained how people can get involved. We also shared our preliminary vision and goals for the refuge and the issues we already know we need to address. We asked for feedback, and answered any questions about the planning process.
- March 29, 2007:** We convened the core team for the first time, including VDGIF and Virginia Department of Parks and Recreation members. Topics at the meeting included: the planning process steps, what had been accomplished to date, tentative issues to address, and a draft vision and refuge goals. We also identified other preplanning needs yet to be done, and other information sources there were.
- May 15 & 16, 2007:** Refuge staff hosted a field trip to Mason Neck National Wildlife Refuge for the core planning team, including VDGIF and Virginia State Parks representatives, and other state agency and Service experts. The purpose of the field visit on May 15th was to conduct a Visitor Services Review of the refuge, its current program and potential. On May 16th, State agency and Service staff evaluated the refuge's biological program and discussed issues related to bald eagle and waterbird management, and the management of Little Marsh impoundment.

May 18, 2007:	We published a Notice of Intent (to prepare a CCP) in the Federal Register (72 FRN 28066).
October 4 & 5, 2007:	We held a core team meeting to review the status of the planning process, reviewed issues and discussed how to address them, revised the vision and goals, and discussed a framework for three potential alternatives. On October 5, we invited the volunteer coordinator of the Northern Virginia Soil and Water Conservation District and the Potomac River Watershed Coordinator of the Virginia DEP to discuss water quality monitoring the use of volunteers. Members of the Friends of Potomac River Refuges were also at the meeting to learn about the state's volunteer program.
December 2007:	We distributed a planning update newsletter to everyone on our project mailing list, as well as distributed it from the Refuge Complex office and at refuge events. We also posted the newsletter on our website. The newsletter summarizes what we heard at our public meetings, what we have been working on as a planning team, and it encouraged continued involvement in the planning process.
January 9, 2008:	We met with Mason Neck Area Managers and provided an update on the status of the CCP process. Mason Neck Area Managers include: <ul style="list-style-type: none">■ Bureau of Land Management–Meadowood■ Northern Virginia Regional Park Authority–Pohick Bay Regional Park■ Virginia State Parks–Mason Neck State Park■ Virginia State Historic Site–Gunston Hall Plantation
January 30, 2008:	We participated in the Friends of Potomac River Refuges Annual Meeting with the general membership attending. Comments were made in our presentation on the status of the CCP process and how to get involved in the process.
February 20, 2008:	We met with Prince William County Supervisor Frank Principi. There was general discussion of the CCP process and the National Potomac River Heritage Trail through Featherstone National Wildlife Refuge.
March 12, 2008:	We attended a Friends of Potomac River Refuges board meeting and mentioned the status of the CCP.
April 9, 2008:	We attended a Friends of Potomac River Refuges board meeting and mentioned the status of the CCP.
April 10, 2008:	We discussed the status of the CCP at the Merrimac Farm Dedication with David Whitehurst and Jerry Sims of VDGIF. In particular, we discussed management of Featherstone National Wildlife Refuge.

- April 17, 2008:** We met with Jerry Sims and Rick Busch of VDGIF to discuss further details on the management of Featherstone National Wildlife Refuge.
- April 19, 2008:** We co-hosted the Eagle Festival and had a general discussion with interested individuals attending the festival on the CCP process, the status of planning, and how to get involved.
- April 28, 2008:** We met with Prince William County Supervisor Frank Principi, Prince William County Planner Pat Thomas, and NPS Heritage Trail Superintendent Don Briggs to discuss the CCP planning process and the Potomac River National Heritage Trail routing through Occoquan Bay and Featherstone National Wildlife Refuges.
- May 1, 2008:** During the Crows Nest Property Dedication, we had a general discussion with Rick Bush and Jerry Sims of VDGIF on the CCP process and management of Featherstone National Wildlife Refuge.
- May 3, 2008:** We met with Jerry Sims and Rick Busch of VDGIF to discuss further details on the management of Featherstone National Wildlife Refuge.
- May 30, 2008:** We held a core team meeting to discuss progress on writing CCP chapters. We reviewed what the contractor had done to date and provided edits.
- September 16, 2008:** We held a meeting with Eddie Byrne of Kettler Development Corporation to discuss the new development adjacent to Featherstone National Wildlife Refuge and the refuge's needs for dedicated public parking.
- September 18, 2008:** We met with Jerry Sims of VDGIF about management of Featherstone National Wildlife Refuge.
- October 8, 2008:** We met with Jerry Sims, John Rohm, Ron Hughes, Joe Ferdenanson, and VDGIF for a tour of Featherstone National Wildlife Refuge and led a discussion of management activities.
- October 13, 2008:** We met with the Mason Neck Area Managers and provided a CCP status update.
- December 10, 2008:** We discussed the proposed John Smith Water Trail with other Virginia National Wildlife Refuge managers, Nathan Caldwell from the Service's Headquarters, and National Park Service Trail staff present. There was general discussion on status of trail and a conceptual plan. We provided an update on the status of the CCP.
- January 23, 2009:** We provided a CCP status update at the Friends of Potomac River Refuges annual meeting.

Partners Involved in Refuge Planning

January 29, 2009:

We met with James McGlone, Virginia Department of Forestry, to discuss forest management planning for Mason Neck National Wildlife Refuge, which included a discussion of the CCP and proposed goals and objectives for forest management.

Refuge programs enjoy a great deal of support from outside the Service in many arenas: conducting biological surveys, enhancing public use and refuge programs, restoring habitat, and protecting land. Our partnerships will continue to expand under the increasing interest in conserving refuge resources. During the past 4 years, we have apprised the following partners, typically in conjunction with other meetings, forums or events, of the planning process and encouraged their involvement.

- Friends of Potomac River Refuges
- Virginia Department of Game and Inland Fisheries
- Virginia Department of Forestry
- Ducks Unlimited
- Audubon Society of Northern Virginia
- Chesapeake Bay Gateways Network
- The Hartwell Foundation
- Virginia Polytechnic Institute and State University (Virginia Tech)
- Potomac River Region members of the Gateways Network
- USDA—Natural Resources Conservation Service
- USDA—Forest Service, Forest Health
- Mason Neck State Park
- Fairfax County School District
- Virginia Native Plant Society
- College of William and Mary—Center for Conservation Biology
- Audubon Naturalist Society
- Northern Virginia Bird Club
- USDA—Wildlife Services
- Prince William Conservation Alliance
- USDI-Bureau of Land Management
- Gunston Hall Plantation
- Pohick Bay Regional Park—Northern Virginia Regional Park Authority

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Bill Wallen

Occoquan Bay refuge in the fog

Chapter 6



Bill Wallen

Wetland on Mason Neck Refuge

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- **Writers and Major Contributors**
 - **Planning Team**
 - **Other Service Program Involvement**
 - **Other Involvement**

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Other Service Program Involvement

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	Albert Spells	<i>Coordinator</i> , USFWS Virginia Fisheries Program Office. Albert provided fisheries input and reviewed the draft CCP/EA.
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	Tim Binzen	<i>Historian</i> , U.S. Fish and Wildlife Service Northeast Regional Office. Tim researched and drafted overviews of the archaeological, cultural, and historic resources of both Mason Neck and Featherstone refuges. These overviews are included as appendix F to this document.
	Les Vilchek	<i>Cartographer</i> , Chesapeake Marshlands Refuge Complex. Les created the maps found throughout this Draft Comprehensive Conservation Plan and Environmental Assessment.
Other Involvement	John H. Ghent	<i>USDA Forest Service–Forest Health Protection</i> , Forest Entomologist based out of Asheville, North Carolina. John assessed refuge potential for gypsy moth infestation and made recommendations for reducing forest stocking levels.
	Jeff Cooper	<i>Wildlife Biologist</i> , Virginia Department of Game and Inland Fisheries. Jeff provided input on management for bald eagles, waterbirds, and Little Marsh impoundment.
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Bill Wallen

Fall colors at Occoquan Bay Refuge

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USFWS

Green treefrog

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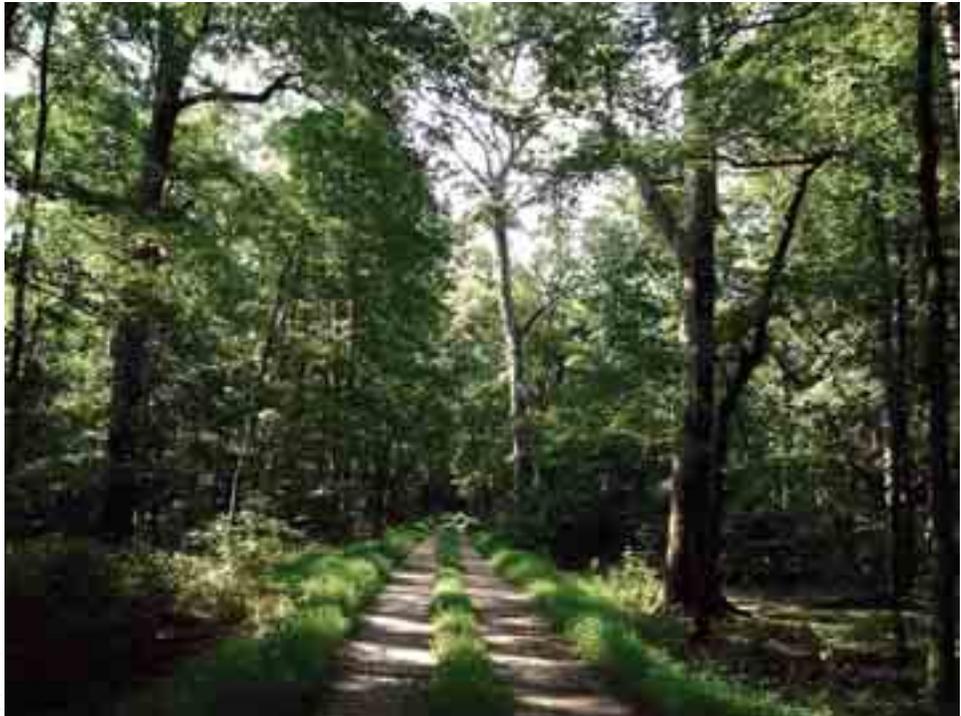
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Glossary



USFWS

Mason Neck Refuge

Glossary (including list of acronyms and abbreviations)

Glossary

accessibility	the state or quality of being easily approached or entered, particularly as it relates to complying with the Americans with Disabilities Act (ADA)
accessible facilities	structures accessible for most people with disabilities without assistance; facilities that meet Uniform Federal Accessibility Standards (UFAS) ; Americans with Disability Act (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
accreting	to grow or to increase gradually
adaptation	adjustment to environmental conditions
adaptive management	<p>Focuses on learning and adapting, through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable ecosystems.</p> <p>Adaptive management helps science managers maintain flexibility in their decisions, knowing that uncertainties exist and provides managers the latitude to change direction will improve understanding of ecological systems to achieve management objectives is about taking action to improve progress towards desired outcomes.</p> <p>(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.)</p>
advanced regeneration	tree seedlings or small saplings that develop in the understory prior to the removal of the overstory.
alternative	a reasonable way to fix an identified problem or satisfy a stated need [40 CFR 1500.2 (see “management alternative”)]
anaerobic	process occurring without oxygen
anuran	of or relating to frogs and toads
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.
anadromous fish	fish that spend a large portion of their life cycle in the ocean and return to freshwater to breed; from the Greek, literally “up-running”
aquatic	growing in, living in, or dependent upon water
avian	of or having to do with birds

avifauna	all birds of a given region
barrier	any obstruction to fish passage, aquatic barrier
basin	the land surrounding and draining into a water body; see “watershed”
basal area	term used in forest management to measure tree density; determined by estimating the cross-sectional area at breast height (4.5 feet) of all trees in a given area; expressed in square feet per acre
best management practices	land management practices that produce desired results; usually used to describe forestry or agricultural practices effective in reducing non-point source pollution, like reseeded skidder trails or not storing manure in a flood plain.
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
breakwater	a barrier protecting a harbor or shore from the impact of waves
breeding habitat	habitat used by migratory birds or other animals during the breeding season
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.
carbon sequestration	process through which carbon dioxide is removed from the atmosphere, for example in forests through the process of photosynthesis. During this process, carbon dioxide is taken up through plants’ leaves and incorporated into the plants’ woody biomass

carbon sink	occurs when carbon sequestration is greater than the amount of carbon released over a given period of time
census-designated place	is a type of place (a concentration of population) identified by the United States Census Bureau for statistical purposes
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	“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	see “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 corridor	connections between suitable habitat that allow passage of plant or animal 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
critical habitat	according to U.S. Federal law, the ecosystems upon which endangered and threatened species depend; Specific geographic areas, whether occupied by a listed species or not, that are essential for its conservation and that have been formally designated by rule published in the Federal Register.
cultural resource inventory	<p>a professional study to locate and evaluate evidence of cultural resources within a defined geographic area</p> <p>[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).]</p>
cultural resource overview	<p>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</p> <p>[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).]</p>
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 measured at breast height (usually 4.5 feet above the ground); commonly used by foresters to describe tree size.
defoliator	an agent that damages trees by destroying leaves or needles
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.
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 (see "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).
natural 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 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
embayment	a bay or baylike formation
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
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]
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
exacerbate	to make more severe or harsh
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
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).
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 management	All activities related to the management of wildland fires
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	see “special focus areas”
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.]
groundwater	water in the ground that is in the zone of saturation, from which wells and springs and groundwater runoff are supplied
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.]

head-of-tide	the farthest point upstream where a river is affected by tidal fluctuations
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
hydrolysis	decomposition of a chemical compound by reaction with water
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
initial attack	An aggressive action to put a fire out consistent with firefighter and public safety, and the values being protected.
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).]
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.
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
living shorelines	Living Shorelines are restored shorelines that use nature-based techniques such as marsh plantings, beach nourishment, and low profile oyster reefs, breakwaters and sills. In addition to protecting property from erosion, living shorelines provide habitat for fish, birds and other wildlife. Like undisturbed natural shorelines, they also protect water quality by trapping excess nutrients and sediment.
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)
macrophytes	a macroscopic plant in an aquatic environment
management alternative	a set of objectives and the strategies needed to accomplish each objective [FWS Manual 602 FW 1.4]
management concern	see “issue” and “migratory nongame birds of management concern”

management opportunity	see “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 (see “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).
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 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

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 (see “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	see “unit objective”
oligohaline	Low salinity; salinity of 0.5 to 5 parts per thousand
other-than-sight materials	Interpretive materials accessible by the visually impaired refuge visitor
outdoor education	educational activities that take place in an outdoor setting
palustrine forested wetlands	Dominated by trees, include wooded swamps and low-lying hardwood forests near rivers. Sixty-eight percent of the wetlands in the Chesapeake Bay watershed are forested. <i>Source: Chesapeake Bay Program http://www.chesapeakebay.net/wetlds1.htm</i>
palustrine wetlands	palustrine wetlands includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all tidal wetlands where salinity due to ocean-derived salts is below 0.5 ppt
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
payment in lieu of taxes	see Revenue Sharing Act of 1935, Chapter One, Legal Context
phenology	the study of periodic plant and animal life cycle events and how these are influenced by seasonal and interannual variations in climate

photolysis	chemical process by which molecules are broken down into smaller units through the absorption of light
physiographic	relating to physical geography
PM_{2.5}; PM₁₀	PM_{2.5} particles are air pollutants with a diameter of 2.5 micrometers or less, small enough to invade even the smallest airways; PM₁₀ - Particles 10 micrometers or less in size (smaller than the diameter of a human hair).
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] Synonyms: prescribed burn and controlled burn.
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
promotory	a high point of land or rock projecting into a body of water; a prominent mass of land overlooking or projecting into a lowland
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
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 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

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)]
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.
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.]
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 [see 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 (see “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

selective removal/ selective cutting	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
shrublands	habitats dominated by various species of shrubs, often with many grasses and forbs
siltation	to fill, cover, or obstruct with silt or mud
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 disproportionately 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
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, their importance as migrant landbird stopover or breeding habitat; the presence of unique or rare communities; or the presence of important fish habitat.]
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 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 (or other vegetation) 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	see “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/sites/areas	habitat where birds rest and feed during migration
stormwater	A term used to describe water runoff generated when precipitation from rain and snowmelt events flows over land or impervious surfaces
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.
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
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
tributary	a stream or river that flows into a larger stream, river, or lake, feeding it water
trust resource	<p>a resource that the Government holds in trust for the people through law or administrative act</p> <p>[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.]</p>
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
upgradient	against the direction that groundwater flows; similar to “upstream” for surface water
upland	dry ground (i.e., other than wetlands)
use of wildland fire	Management of either wildfire or prescribed fire to meet resource objectives specified in Land/Resource Management Plans. Synonym: Fire Use.
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
volatilization	the process whereby a dissolved sample is vaporised

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.
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 (see “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	see “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]. An unplanned ignition caused by lightning, volcanoes, unauthorized, and accidental human-caused actions and escaped prescribed fires.
wildland fire	A general term describing any non-structure fire that occurs in the vegetation and / or natural fuels. Includes both prescribed fire and wildfire.
wildland urban interface	The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.
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]

Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ACJV	Atlantic Coast Joint Venture
ADA	Americans with Disabilities Act
AHWP	Annual Habitat Work Plan
APHIS	Animal and Plant Health Inspection Service (USDA)
AQI	Air Quality Index
ARPA	Archaeological Resources Protection Act
ASMFC	Atlantic States Marine Fisheries Commission
ATV	All-Terrain Vehicle
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BIDEH	Biological Integrity, Diversity, and Environmental Health
BLM	Bureau of Land Management
BMPs	Best Management Practices
CARE	Cooperative Alliance for Refuge Enhancement
CCP	Comprehensive Conservation Plan
CDP	Census-designated Place
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWD	Chronic Wasting Disease
DOI	United States Department of the Interior
EA	Environmental Assessment
EDU	Ecological Drainage Unit
EIS	Environmental Impact Statement
EP	Eastern Population
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FIDS	Forest Interior Dwelling Species
FHWA	Federal Highway Administration
FOPRR	Friends of Potomac River Refuges
FONSI	Finding of No Significant Impact

FTE	Full-time Equivalency
FWS	United States Fish and Wildlife Service
GCN	Greatest Conservation Need
GIS	Geographic Information System
GPS	Global Positioning System
HMP	Habitat Management Plan
HQ	Hazard Quotient
IBA	Important Bird Area
IBP	Institute for Bird Populations
IMP	Inventory and Monitoring Plan
IPM	Integrated Pest Management Plan
IPCC	Intergovernmental Panel on Climate Change
LOC	Level of Concern
MANEM	Mid-Atlantic/New England/Maritime
MAPS	Monitoring Avian Production and Survivorship
MBTA	Migratory Bird Treaty Act
MDDNR	Maryland Department of Natural Resources
MHT	Mean High Tide
MOA/MOU	Memorandum of Agreement/Understanding
NABCI	North American Bird Conservation Initiative
NAWCP	North American Waterbird Conservation Plan
NAWMP	North American Waterfowl Management Plan
NEPA	National Environmental Policy Act
NGO	Non-Governmental Organization
NHCR	National State Agency Herpetological Conservation Report
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOI	Notice of Intent
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NVRC	Northern Virginia Regional Commission

Acronyms and Abbreviations

NVRPA	Northern Virginia Regional Park Authority
NWPS	National Wilderness Preservation System
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
PARC	Partners in Amphibian and Reptile Conservation
PIF	Partners in Flight
PHNST	Potomac Heritage National Scenic Trail
PRFC	Potomac River Fisheries Commission
RONs	Refuge Operation Needs System
SAMMS	Service Asset Maintenance Management System
SAV	Submerged Aquatic Vegetation
SHPO	State Historic Preservation Office
SLAMM	Sea Level Affecting Marshes Model
SWG	State Wildlife Grant
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USDA-FS	United States Department of Agriculture Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VADCR	Virginia Department of Conservation and Recreation
VCN	Virginia Conservation Network
VDF	Virginia Department of Forestry
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
VDOT	Virginia Department of Transportation
VMRC	Virginia Marine Resources Commission
VRE	Virginia Railway Express
VSP	Visitor Services Plan
WAP	Virginia Wildlife Action Plan
WIA	Wilderness Inventory Area

WIMS	Weed Information Management System
WQA	Water Quality Analysis
WSA	Wilderness Study Area

Appendix A



Steve Maslowski/USFWS

Wood thrush

Species of Conservation Concern at Elizabeth Hartwell Mason Neck and Featherstone National Wildlife Refuges

Table A.1. Mason Neck Refuge Birds of Conservation Concern

Common Name	Breeding ¹	FWS BCC 2008, Region 5 ²	Atlantic Coast Joint Venture BCR 30 ³	PIF 1999, Area 44 ⁴	VA Species of Concern ⁵	FIDS list for Chesapeake Area ⁶	Sp ⁷	Su	F	W
WATERFOWL										
American Black Duck	X		HH	lb	II		u	u	c	a
American Wigeon			H				c	c	c	a
Bufflehead			M				c	c	c	c
Canada Goose - Atlantic Population	X		HH				c	u	c	c
Canvasback			M				c	-	u	c
Common Goldeneye			H				u	-	u	c
Gadwall			H				o	-	u	u
Greater Scaup			H		IV		o	-	o	o
Green-winged Teal			H				c	-	u	a
Hooded Merganser	X		H				c	-	c	c
Lesser Scaup			M				c	-	a	c
Mallard	X		M				u	-	u	u
Northern Pintail			M				o	-	o	u
Red-breasted Merganser			M				u	-	u	c
Redhead			M		III		o	-	o	u
Ruddy Duck			M				u	-	u	u
Tundra Swan			M				c	-	c	c
Wood Duck	X						-	-	r	r
WATERBIRDS										
American Bittern		ü	M	II	II		u	o	u	r
Black-crowned Night-Heron	X		M		III		o	o	o	-
Caspian Tern				V	SSC		o	o	o	o
Common Moorhen				V			-	r	-	-
Forster's Tern				V	IV		u	u	u	-
Great Blue Heron	X			V			c	a	a	c
Great Egret	X			V	SSC		u	u	u	r
Green Heron	X				IV		u	o	u	-
Horned Grebe		ü	H		IV		c	c	c	o
King Rail			M	lb	II		o	o	o	o

Species of Conservation Concern at Elizabeth Hartwell Mason Neck and Featherstone National Wildlife Refuges

Common Name	Breeding ¹	Atlantic Coast Joint				VA Species of Concern ⁵	FIDS list for Chesapeake Area ⁶	Sp ⁷	Su	F	W
		FWS BCC 2008, Region 5 ²	Venture BCR 30 ³	PIF 1999, Area 44 ⁴							
Least Bittern	X	ü	M	II	III		o	o	o	o	
Least Tern		ü	H	II	II		c	-	c	u	
Little Blue Heron			M	V	II		c	o	c	u	
Pied-billed Grebe		ü		V			o	o	o	o	
Snowy Egret		ü	M				o	-	u	-	
Sora			M				o	-	u	-	
Tricolored Heron			M	V	III		u	-	u	-	
Virginia Rail					IV		o	o	o	o	
SHOREBIRDS											
American Woodcock	X		HH		IV		u	u	u	o	
Common Snipe			M				c	u	c	-	
Dunlin			H		IV		r	-	-	-	
Greater Yellowlegs			H				u	-	u	o	
Killdeer	X		M				-	-	-	r	
Least Sandpiper			M				c	u	u	-	
Lesser Yellowlegs		ü	M				u	-	u	-	
Solitary Sandpiper		ü	H				c	u	u	o	
Spotted Sandpiper			M				r	-	-	-	
Willet			H	III			c	c	c	c	
LANDBIRDS											
Acadian Flycatcher	X			lb		§	a	a	a	-	
American Kestrel	X			II			u	o	u	u	
American Redstart	X					§	c	c	c	-	
Bald Eagle	X	ü	M	V	I (ST)		c	c	c	c	
Baltimore Oriole	X		H				u	u	u	-	
Bank Swallow	X			V			u	u	u	-	
Barn Owl	X			II	III		r	r	r	r	
Barred Owl	X			V		§	c	c	c	c	
Bay-breasted Warbler		ü	H				u	-	u	-	
Black-and-white Warbler	X		H		IV	§	c	u	c	-	

Common Name	Breeding ¹	FWS BCC 2008, Region 5 ²	Atlantic Coast Joint Venture BCR 30 ³	PIF 1999, Area 44 ⁴	VA Species of Concern ⁵	FIDS list for Chesapeake Area ⁶	Sp ⁷	Su	F	W
Blackburnian Warbler			M				u	-	u	-
Blue-winged Warbler		ü	HH	lb	IV		o	-	u	-
Broad-winged Hawk	X		H			§	u	u	u	-
Brown Creeper	X				IV	§	u	-	u	c
Brown Thrasher	X		H	II	IV		c	c	c	o
Canada Warbler		ü	M		IV		u	-	u	-
Carolina Chickadee	X			II			a	a	a	a
Cerulean Warbler	X	ü	M	lb	II	§	u	u	u	-
Chimney Swift	X		H	II	IV		c	c	a	-
Chuck-will's-widow				III	IV		r	-	-	-
Cliff Swallow	X			V			o	-	o	-
Cooper's Hawk				V			u	u	u	u
Eastern Kingbird	X		H		IV		c	c	c	-
Eastern Meadowlark	X				IV		o	o	o	o
Eastern Wood-Pewee	X			lb	IV		c	c	c	-
Field Sparrow	X		H	II	IV		u	u	u	c
Golden-crowned Kinglet					SSC		c	-	c	c
Golden-winged Warbler		ü	M		I		o	-	u	-
Gray Catbird	X		M	II	IV		c	c	c	o
Great Crested Flycatcher	X		H				u	c	u	-
Hairy Woodpecker	X					§	u	u	u	u
Hermit Thrush					SSC		c	r	c	a
Hooded Warbler	X					§	o	o	o	-
Kentucky Warbler	X	ü	H	lb	IV	§	u	u	u	-
Loggerhead Shrike		ü	M	V	I (ST)		-	-	r	r

Species of Conservation Concern at Elizabeth Hartwell Mason Neck and Featherstone National Wildlife Refuges

Common Name	Breeding ¹	FWS BCC 2008, Region 5 ²	Atlantic Coast Joint Venture BCR 30 ³	PIF 1999, Area 44 ⁴	VA Species of Concern ⁵	FIDS list for Chesapeake Area ⁶	Sp ⁷	Su	F	W
Louisiana Waterthrush	X		H	lb	IV	§	u	u	u	-
Magnolia Warbler					SSC		c	-	c	-
Marsh Wren	X		H		IV		u	u	u	r
Mourning Warbler					SSC		r	-	o	-
Northern Bobwhite	X		H	ll	IV		r	r	r	r
Northern Flicker	X		H				c	c	c	c
Northern Harrier				V	III		u	-	u	u
Northern Parula	X				IV	§	c	a	c	-
Northern Rough-winged Swallow	X				IV		c	c	c	-
Osprey	X			V			c	c	u	-
Ovenbird	X				IV	§	a	c	a	-
Peregrine Falcon		ü		V	I (ST)		-	-	r	-
Pileated Woodpecker	X					§	u	u	u	u
Prairie Warbler	X	ü	HH	lb	IV		c	c	c	-
Prothonotary Warbler	X		H	lb	IV	§	u	u	u	-
Purple Finch					SSC		u	-	u	u
Red-breasted Nuthatch					SSC		o	-	o	o
Red-eyed Vireo	X					§	a	a	a	-
Red-headed Woodpecker	X	ü	M	ll			u	u	u	u
Red-shouldered Hawk	X			V		§	u	u	u	u
Rose-breasted Grosbeak					IV		u	-	u	-
Rufous-sided (Eastern) Towhee	X		H	ll	IV		c	c	c	u
Rusty Blackbird			H		IV		u	-	u	u
Savannah Sparrow				IV			u	-	-	o
Scarlet Tanager	X			ll	IV	§	c	c	a	-

Common Name	Breeding ¹	FWS BCC 2008, Region 5 ²	Atlantic Coast Joint Venture BCR 30 ³	PIF 1999, Area 44 ⁴	VA Species of Concern ⁵	FIDS list for Chesapeake Area ⁶	Sp ⁷	Su	F	W
Veery						§	o	r	o	-
Whip-poor-will	X	ü	H		IV	§	r	r	r	-
White-eyed Vireo	X			lb			u	c	c	-
Willow Flycatcher			H		IV		u	o	u	-
Wood Thrush	X	ü	HH	lb	IV	§	a	a	a	-
Worm-eating Warbler	X	ü	H	lb	IV	§	u	u	u	-
Yellow Warbler	X				IV		u	o	u	-
Yellow-bellied Flycatcher					SSC		o	-	o	-
Yellow-billed Cuckoo	X				IV		c	c	c	-
Yellow-breasted Chat	X			II	IV		u	u	u	-
Yellow-throated Vireo	X		H	lb	IV	§	u	u	u	-

Sources: USFWS, 1995; ACJV, no date; PIF, 1999; USFWS, 2002; VDGIF, 2006; VDGIF, 2005; CACCA, 2000

¹ K=species known to occur on refuge, S=species that possibly or probably occurs on refuge

² ü denotes species listed by USFWS in Birds of Conservation Concern 2008 for the Northeast Region

³ HH=Highest Concern; H=High Concern; M=Moderate Concern

⁴ Tier I=High Continental Priority; Tier II=High Regional Priority; Tier III= Additional Watch List; Tier IV=Additional Federally listed under ESA; Tier V=Additional State listed

⁵ I=Critical Conservation Need; II=Very High Conservation Need; III=High Conservation Need; IV=Moderate Conservation Need; SSC=State Species of Concern; ST=VA State-listed Threatened; SE=VA State-listed Endangered

⁶ § denotes forest interior dwelling bird species in the Chesapeake Bay area

⁷ Occurrence on refuge by season.

Seasons: Sp–Spring Su–Summer F–Fall W–Winter

Occurrence: a=abundant; c=common, o=occasional; u=uncommon, r=rare

Table A.2. Known or Suspected Reptiles and Amphibians of Mason Neck Refuge

Species	Scientific Name	VA Species of Concern ¹
SALAMANDERS AND NEWTS		
Marbled Salamander	<i>Ambystoma opacum</i>	
Red-spotted Newt	<i>Notophthalmus viridescens</i>	
Slimy Salamander	<i>Plethodon glutinosus</i>	
Spotted Salamander	<i>Ambystoma maculatum</i>	
TOADS AND FROGS		
American Toad	<i>Anaxyrus americanus</i>	
American Bullfrog	<i>Lithobates catesbeiana</i>	
Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>	
Gray Treefrog	<i>Hyla versicolor</i>	
Green Frog	<i>Lithobates clamitans</i>	
Green Treefrog	<i>Hyla cinerea</i>	
Eastern Cricket Frog	<i>Acris crepitans crepitans</i>	
Pickerel Frog	<i>Lithobates palustris</i>	
Southern Leopard Frog	<i>Lithobates sphenoccephala</i>	
Spring Peeper	<i>Pseudacris crucifer</i>	
Upland Chorus Frog	<i>Pseudacris feriarum</i>	
TURTLES		
Eastern Box Turtle	<i>Terrapene carolina</i>	III
Eastern Mud Turtle	<i>Kinostemon subrubrum</i>	
Eastern Painted Turtle	<i>Chrysemys picta</i>	
Musk Turtle	<i>Stemotherus odoratus</i>	
Red-bellied Turtle	<i>Pseudemys rubriventris</i>	
Snapping Turtle	<i>Chelydra serpentina</i>	
Spotted Turtle	<i>Clemmys muhlenbergii</i>	III
SKINKS AND LIZARDS		
Broad-headed Skink	<i>Plestiodon laticeps</i>	
Five-lined Skink	<i>Plestiodon fasciatus</i>	
Little Brown/Ground Skink	<i>Scincella lateralis</i>	
Northern Fence Lizard	<i>Sceloporus undulatus hyacinthinus</i>	

Species	Scientific Name	VA Species of Concern ¹
SNAKES		
Common Ribbonsnake	<i>Thamnophis sauritus sauritus</i>	IV
Eastern Gartersnake	<i>Thamnophis sirtalis sirtalis</i>	
Eastern Hog-nose Snake	<i>Heterodon platirhinos</i>	IV
Eastern Kingsnake	<i>Lampropeltis getula getula</i>	
Eastern Milksnake	<i>Lampropeltis triangulum triangulum</i>	
Eastern Ratsnake	<i>Pantherophis alleghaniensis</i>	
Eastern Smooth Earthsnake	<i>Virginia valeriae valeriae</i>	
Eastern Wormsnake	<i>Carphophis amoenus amoenus</i>	
Mole Kingsnake	<i>Lampropeltis calligaster rhombomaculata</i>	
Northern Black Racer	<i>Coluber constrictor constrictor</i>	
Northern Brownsnake	<i>Storeria dekayi dekayi</i>	
Northern Cooperhead	<i>Agkistrodon contortrix mokasen</i>	
Northern Red-bellied Snake	<i>Storeria occipitomaculata occipitomaculata</i>	
Northern Ring-necked Snake	<i>Diadophis punctatus edwardsii</i>	
Northern Rough Greensnake	<i>Opheodrys aestivus aestivus</i>	
Northern Scarletsnake	<i>Cemophora coccinea copei</i>	IV
Northern Watersnake	<i>Nerodia sipedon sipedon</i>	
Queen snake	<i>Regina septemvittata</i>	IV
Red Cornsnake	<i>Pantherophis guttatus</i>	
Timber Rattlesnake	<i>Crotalus horridus</i>	

¹Virginia State Comprehensive Wildlife Conservation Plan – Priority Species

I – Tier I: Critical conservation need ; II – Tier II: Very high conservation need ; III – Tier III: High conservation need ; IV – Tier IV: Moderate Conservation Need; SSC – Species of Special Concern ; SE – State Endangered

Table A.3. Known or Suspected Mammals of Mason Neck Refuge

Species	Scientific Name	VA Species of Concern ¹
Beaver	<i>Castor canadensis</i>	
Big Brown Bat	<i>Eptesicus fuscus</i>	
Coyote	<i>Canis latrans</i>	
Eastern Chipmunk	<i>Tamias striatus</i>	
Eastern Cottontail	<i>Sylvilagus floridanus</i>	
Eastern Mole	<i>Scalopus aquaticus</i>	
Eastern Pipistrelle	<i>Pipistrellus subflavus</i>	
Gray Fox	<i>Urocyon cinereoargenteus</i>	
Gray Squirrel	<i>Sciurus carolinensis</i>	
House Mouse	<i>Mus musculus</i>	
Long-tailed Weasel	<i>Mustela frenata</i>	
Meadow Vole	<i>Microtus pennsylvanicus</i>	
Mink	<i>Neovison vison</i>	
Muskrat	<i>Ondatra zibethicus</i>	
Norway Rat	<i>Rattus norvegicus</i>	
Pine Vole	<i>Microtus pinetorum</i>	
Raccoon	<i>Procyon lotor</i>	
Red Fox	<i>Vulpes vulpes</i>	
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	
Rice Rat	<i>Oryzomys palustris</i>	
River Otter	<i>Lontra canadensis</i>	SSC
Short-Tailed Shrew	<i>Blarina brevicauda</i>	
Southern Flying Squirrel	<i>Glaucomys volans</i>	
Striped Skunk	<i>Mephitis mephitis</i>	
Virginia Opossum	<i>Didelphis virginiana</i>	
White-footed Mouse	<i>Peromyscus leucopus</i>	
White-tailed Deer	<i>Odocoileus virginianus</i>	
Woodchuck	<i>Marmota monax</i>	

Source: Klimkiewicz et al, Year Unknown)

¹Virginia State Comprehensive Wildlife Conservation Plan – Priority Species

I – Tier I: Critical conservation need ; II – Tier II: Very high conservation need ; III – Tier III: High conservation need ; IV – Tier IV: Moderate Conservation Need: SSC – Species of Special Concern ; SE – State Endangered

Table A.4. Fish Species of Conservation Concern in Mason Neck Refuge area

Species Common Name	USFWS Northeast Strategic Fisheries Plan – Potomac Watershed ¹	State Comprehensive Wildlife Conservation Plan Priorities ²
Alewife	IJ; H	IV
American eel		IV
American shad		IV
Atlantic sturgeon	IJ	II; SSC
Blueback herring		
Brook Trout	SS; H	
Bridle shiner		I; SSC
Hickory shad	M	
Ironcolor shiner		IV
Least brook lamprey		IV
Logperch		IV
Shortnose sturgeon	E; H	I; SE
Striped bass	H	

¹ USFWS Northeast Strategic Fisheries Plan 2009-2013 – List of Species of Conservation and Management Concern. See <http://www.fws.gov/northeast/fisheries/reports/reports/FisheriesStrategicPlan.pdf> for individual rankings.

IJ- Interjurisdictional Species of Conservation and Management Concern; SOC – Species of Concern

SS – Special Species ; E – Federally Endangered ; H – High Priority ; M- Medium Priority

²Virginia State Comprehensive Wildlife Conservation Plan – Priority Species

I – Tier I: Critical conservation need ; II – Tier II: Very high conservation need ; III – Tier III: High conservation need ; IV – Tier IV: Moderate Conservation Need; SSC – Species of Special Concern ; SE – State Endangered

Table A.5. Plants Found at Mason Neck Refuge

Common Name	Scientific Name
Amaranth	<i>Amaranthus sp.</i>
American Holly	<i>Ilex opaca</i>
American Beech	<i>Fagus grandifolia</i>
Arrow Arum	<i>Peltandra virginica</i>
Arrow Vine	<i>Polygonum sagittatum</i>
Barnyard Grass	<i>Echinochloa crusgalli</i>
Beef Steak Plant	<i>Perilla frutescens</i>
Black Haw	<i>Viburnum pruniifolium</i>
Black Walnut	<i>Juglans nigra</i>
Black Willow	<i>Salix sericea</i>
Broad Leaf Uniola	<i>Uniola latifolia</i>
Broad Leaved Cattail	<i>Typha latifolia</i>
Bush Dogwood	<i>Cornus amomum</i>
Button Bush	<i>Cephalanthus occidentalis</i>
Cardinal Flower	<i>Lobelia cardinalis</i>
Catbriar, Common Greenbriar	<i>Smilax rotundifolia</i>
Chestnut Oak	<i>Quercus prinus</i>
Chickory	<i>Cichorium intybus</i>
Christmas Fern	<i>Polystichum acrostichoides</i>
Clearweed	<i>Pilea pumila</i>
Climbing Hempweed	<i>Mikania scandens</i>
Cocklebur	<i>Xanthium sp.</i>
Common Dodder	<i>Cuscuta gronovii</i>
Common Elderberry	<i>Sambucus canadensis</i>
Common Elodea	<i>Elodea canadensis</i>
Coontail	<i>Ceratophyllum demersum</i>
Cordgrass	<i>Phragmites communis</i>
Deertongue Grass	<i>Dichantherium clandestinum</i>
Devil's Walking Stick	<i>Aralia spinosa</i>
Dodder	<i>Cuscuta gronovii</i>
Duck Potato, Arrowhead	<i>Sagittaria latifolia</i>
Duckweed	<i>Lemna valdiviana</i>
Eastern Bladderwort	<i>Utricularia gibba</i>

Common Name	Scientific Name
Eastern Hemlock	<i>Tsuga canadensis</i>
Eurasian Watermilfoil	<i>Myriophyllum spicatum</i>
False Stinging Nettle	<i>Boehmeria cylindrica</i>
Fanwort	<i>Cabomba carolinana</i>
Floating Primrose Willow	<i>Ludwigia ducurens</i>
Floating Water Primrose	<i>Jussiaea diffusa</i>
Foxtail	<i>Setaria italica</i>
Fragrant Water Lily	<i>Nymphaea odorata</i>
Frogbit	<i>Limnobium spongia</i>
Frostweed Aster	<i>Aster pilosus</i>
Grape	<i>Vitis sp.</i>
Great Bulrush	<i>Scirpus validus</i>
Hackberry	<i>Celtis occidentalis</i>
Halberd Leaved Tearthumb	<i>Polygonum arifloium</i>
Hedge Hyssop	<i>Gratiola viscidula</i>
Hickory	<i>Carya sp.</i>
Hog Peanut	<i>Amphicarpa bracteata</i>
Horse Nettles	<i>Solanum carolinense</i>
Hydrilla	<i>Hydrilla verticillata</i>
Iris	<i>Iris sp.</i>
Jack in the Pulpit	<i>Arisaema triphyllum</i>
Japanese Barberry	<i>Berberis thunbergii</i>
Japanese Clematis	<i>Clematis temiflora</i>
Japanese Honeysuckle	<i>Lonicera japonica</i>
Large Bur Marigold	<i>Bidens laevis</i>
Lizard's Tail	<i>Saururus cemuus</i>
Marsh Dayflower	<i>Aneilema keisak</i>
Marsh Fern	<i>Thelypteris thelypteroides</i>
Marsh Mallow	<i>Hibiscus moscheutos</i>
Marsh Purslane	<i>Ludwigia palustris</i>
Marsh St. Johnswort	<i>Hypericum virginicum</i>
Mountain Laurel	<i>Kalmia latifolia</i>
Mulberry	<i>Morus sp.</i>
Mustard	<i>Brassica</i>

Common Name	Scientific Name
Narrow Fruited Primrose Willow	<i>Ludwigia leptocarpa</i>
Narrow Leaved Cattail	<i>Typha angustifolia</i>
New York Ironweed	<i>Vernonia noveboracensis</i>
Nodding Bur Marigold	<i>Bidens cenua</i>
Partridgeberry	<i>Mitchella repens</i>
Pawpaw	<i>Asimina triloba</i>
Persimmon	<i>Diospyros virginiana</i>
Pickerel Weed	<i>Pontederia cordata</i>
Pinkweed	<i>Polygonum pensylvanicum</i>
Pipewort, Fireweed	<i>Erectites hieracifolia</i>
Poison Ivy	<i>Toxicodendron radicans</i>
Pumpkin Ash	<i>Fraxius profunda</i>
Rattlesnake Fern	<i>Botrychium virginianum</i>
Red Cedar	<i>Juniperus virginiana</i>
Red Rooted Sedge	<i>Cyperus erythrorhizos</i>
Red Maple	<i>Acer rubrum</i>
Red Mulberry	<i>Morus rubra</i>
Redroot Cyperus	<i>Cyperus erythrorhizos</i>
Rice Cutgrass	<i>Leersia oryzoides</i>
Rose of Sharon	<i>Hibiscus syriacus</i>
Royal Fern	<i>Osmunda regalis</i>
Saltreed Grass	<i>Spartina cynosuroides</i>
Sassafras Tree	<i>Sassafras albidum</i>
Silky Lespedeza	<i>Lespedeza cuneata</i>
Silver Grass, Eulalia	<i>Miscanthus sinensis</i>
Softstem Bulrush	<i>Scirpus validus</i>
Spatterdock	<i>Nuphar luteum</i>
Spiny Cocklebur	<i>Xanthium spinosum</i>
Spotted Jewelweed	<i>Impatiens capensis</i>
Spotted Smartweed	<i>Polygonum punctatum</i>
Staghorn Sumac	<i>Rhus typhina</i>
Stripped Pipsissewa	<i>Chimaphila maculata</i>
Swamp Loosestrife	<i>Decodon verticillatus</i>
Swamp Milkweed	<i>Asclepias incarnata</i>

Common Name	Scientific Name
Swamp Rose	<i>Rosa palustris</i>
Swamp Rose Mallow	<i>Hibiscus moscheutos</i>
Swamp White Oak	<i>Quercus bicolor</i>
Sweet Flag, Calamus	<i>Acorus calamus</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Sycamore	<i>Platanus occidentalis</i>
Tag Alder	<i>Alnus serrulata</i>
Tall Goldenrod	<i>Solidago altissima</i>
Three Square	<i>Schoenoplectus (Scirpus) americanus</i>
Tickseed Sunflower	<i>Bidens coronata</i>
Trailing Arbutus	<i>Epigaea repens</i>
Trumpet Vine	<i>Campsis radicans</i>
Tulip Poplar	<i>Liriodendron tulipifera</i>
Virgin's Bower	<i>Clematis virginiana</i>
Virginia Bugleweed	<i>Lycopus virginicus</i>
Virginia Creeper	<i>Parthenocissus quinquefolia</i>
Virginia Dayflower	<i>Commelina virginica</i>
Virginia Willow	<i>Itea virginica</i>
Walter's Millet	<i>Echinochloa walteri</i>
Water Hemp	<i>Amaranthus cannabinus</i>
Water Meal	<i>Wolffia</i>
Water Smartweed	<i>Polygonum punctatum</i>
Water Willow	<i>Justicia americana</i>
White Oak	<i>Quercus alba</i>
Wild Rice	<i>Zizania aquatica</i>
Wild Bean	<i>Phaseolus spp.</i>
Wild Celery	<i>Valisneria americana</i>
Wild Indigo Bush	<i>Amorpha fruticosa</i>
Winged Monkey Flower	<i>Mimulus alatus</i>
Wingstem	<i>Verbesina alternifolia</i>
Winterberry	<i>Ilex verticillata</i>
Yerba de Tajo	<i>Eclipta alba</i>

Table A.6. Featherstone Refuge Birds of Conservation Concern

Common Name	Known/ Suspected ¹	FWS BCC 2008, Region 5 ²	Atlantic Coast Joint Venture BCR 30 ³	PIF 1999, Area 44 ⁴	VA Species of Concern ⁵	FIDS list for Chesapeake Area ⁶	Sp ⁷	Su	F	W
WATERFOWL										
American Black Duck	K		HH	lb	II		u	u	c	a
American Wigeon	S		H				c	c	c	a
Bufflehead	K		M				c	c	c	c
Canvasback	K		M				c	-	u	c
Canada Goose - Atlantic Population	K		HH				c	u	c	c
Common Goldeneye	S		H				u	-	u	c
Gadwall	K		H				o	-	u	u
Greater Scaup	S		H		IV		o	-	o	o
Green-winged Teal	K		H				c	-	u	a
Hooded Merganser	K		H				c	-	c	c
Lesser Scaup	K		M				c	-	a	c
Mallard	K		M				u	-	u	u
Northern Pintail	K		M				o	-	o	u
Red-breasted Merganser	K		M				u	-	u	c
Red-breasted Merganser	K		M				u	-	u	u
Redhead	K		M		III		o	-	o	u
Ruddy Duck	K		M				u	-	u	u
Tundra Swan	K		M				c	-	c	c
Wood Duck	K				III		-	-	r	r
WATERBIRDS										
American Bittern	S	ü	M	II	II		u	o	u	r
Bonaparte's Gull	K									
Caspian Tern	K			V	SSC		o	o	o	o
Common Moorhen	K			V			-	r	-	-

Common Name	Known/ Suspected ¹	FWS BCC 2008, Region 5 ²	Atlantic Coast Joint Venture BCR 30 ³	PIF 1999, Area 44 ⁴	VA Species of Concern ⁵	FIDS list for Chesapeake Area ⁶	Sp ⁷	Su	F	W
Forster's Tern	K			V	IV		u	u	u	-
Great Blue Heron	K			V			c	a	a	c
Great Egret	K			V	SSC		u	u	u	r
Greater Black-backed Gull	K						c	-	c	c
Green Heron	K				IV		u	o	u	-
King Rail	S		M	lb	II		o	o	o	o
Least Bittern	S	ü	M	II	III		o	o	o	o
Pied-billed Grebe	K	ü		V			o	o	o	o
Royal tern	S	ü	M		II		r		r	
Sora	S		M				o	-	u	-
Tricolored Heron	K		M	V	III		u	-	u	-
Virginia Rail	S				IV		o	o	o	o
Yellow-crowned Night Heron	S		M				-	r	r	-
SHOREBIRDS										
American Woodcock	S		HH		IV		u	u	u	o
Common Snipe	K		M				c	u	c	-
Dunlin	K		H		IV		r	-	-	-
Greater Yellowlegs	K		H				u	-	u	o
Killdeer	K		M				-	-	-	r
Least Sandpiper	S		M				c	u	u	-
Lesser Yellowlegs	K	ü	M				u	-	u	-
Semipalmated Plover	S	ü	M				r	r	-	-
Semipalmated Sandpiper	S	ü	H				r	-	-	-
Solitary Sandpiper	K	ü	H				c	u	u	o
Spotted Sandpiper	K		M				r	-	-	-
Willet	K		H	III			c	c	c	c

Species of Conservation Concern at Elizabeth Hartwell Mason Neck and Featherstone National Wildlife Refuges

Common Name	Known/ Suspected ¹	FWS BCC 2008, Region 5 ²	Atlantic Coast Joint Venture BCR 30 ³	PIF 1999, Area 44 ⁴	VA Species of Concern ⁵	FIDS list for Chesapeake Area ⁶	Sp ⁷	Su	F	W
Wilson's (Common) Snipe	S		M				u	-	u	u
LANDBIRDS										
Acadian Flycatcher	K			lb		§	a	a	a	-
American Kestrel	S			II			u	o	u	u
American Redstart	K					§	c	c	c	-
Bald Eagle	K	ü	M	V	II(ST**)		c	c	c	c
Baltimore Oriole	K		H				u	u	u	-
Bank Swallow	K			V			u	u	u	-
Barn Owl	K			II	III		r	r	r	r
Barred Owl	S			V		§	c	c	c	c
Bay-breasted Warbler	K	ü	H				u	-	u	-
Black-and- white Warbler	K		H		IV	§	c	u	c	-
Blackburnian Warbler	S		M				u	-	u	-
Black-throated Green Warbler	K				I	§	r	-	r	-
Blue-winged Warbler	K	ü	HH	lb			o	-	u	-
Broad-winged Hawk	K		H			§	u	u	u	-
Brown Creeper	K				IV	§	u	-	u	c
Brown Thrasher	K		H	II	IV		c	c	c	o
Canada Warbler	S	ü	M		IV		u	-	u	-
Carolina Chickadee	K			II			a	a	a	a
Cerulean Warbler	K	ü	M	lb	II	§	u	u	u	-
Chimney Swift	K		H	II	IV		c	c	a	-
Chuck-will's- widow	K			III	IV		r	-	-	-

Species of Conservation Concern at Elizabeth Hartwell Mason Neck and Featherstone National Wildlife Refuges

Common Name	Known/ Suspected¹	FWS BCC 2008, Region 5²	Atlantic Coast Joint Venture BCR 30³	PIF 1999, Area 44⁴	VA Species of Concern⁵	FIDS list for Chesapeake Area⁶	Sp⁷	Su	F	W
Cliff Swallow	S			V			o	-	o	-
Cooper's Hawk	K			V			u	u	u	u
Eastern Kingbird	K		H		IV		c	c	c	-
Eastern Meadowlark	K				IV		o	o	o	o
Eastern (Rufous-sided) Towhee	K		H	II a			c	c	c	u
Eastern Wood-Pewee	K			II b	IV		c	c	c	-
Field Sparrow	K		H	II	IV		u	u	u	c
Golden-crowned Kinglet	K				SSC		c	-	c	c
Golden-winged Warbler	K	ü	M		I		o	-	u	-
Gray Catbird	K		M	II	IV		c	c	c	o
Great Crested Flycatcher	K		H				u	c	u	-
Hairy Woodpecker	K					§	u	u	u	u
Hermit Thrush	K				SSC		c	r	c	a
Hooded Warbler	S					§	o	o	o	-
Kentucky Warbler	S	ü	H	II b	IV	§	u	u	u	-
Loggerhead Shrike	K	ü	M	V	I (ST)		-	-	r	r
Louisiana Waterthrush	K		H	II b	IV	§	u	u	u	-
Magnolia Warbler	K				SSC		c	-	c	-
Marsh Wren	S		H		IV		u	u	u	r
Mourning Warbler	K				SSC		r	-	o	-
Northern Bobwhite	K		H	II	IV		r	r	r	r
Northern Flicker	K		H				c	c	c	c

Species of Conservation Concern at Elizabeth Hartwell Mason Neck and Featherstone National Wildlife Refuges

Common Name	Known/ Suspected ¹	FWS BCC 2008, Region 5 ²	Atlantic Coast Joint Venture BCR 30 ³	PIF 1999, Area 44 ⁴	VA Species of Concern ⁵	FIDS list for Chesapeake Area ⁶	Sp ⁷	Su	F	W
Northern Harrier	S			V	III		u	-	u	u
Northern Parula	K				IV	§	c	a	c	-
Northern Rough-winged Swallow	K				IV		c	c	c	-
Osprey	K			V			c	c	u	-
Ovenbird	K				IV	§	a	c	a	-
Peregrine Falcon	S	ü		V	I (ST)		-	-	r	-
Pileated Woodpecker	K					§	u	u	u	u
Pine Warbler	K			IIb			u	r	u	-
Prairie Warbler	K	ü	HH	Ib	IV		c	c	c	-
Prothonotary Warbler	K		H	Ib	IV	§	u	u	u	-
Purple Finch	S				SSC		u	-	u	u
Red-breasted Nuthatch	S				SSC		o	-	o	o
Red-eyed Vireo	K					§	a	a	a	-
Red-headed Woodpecker	K	ü	M	II			u	u	u	u
Red-shouldered Hawk	K			V		§	u	u	u	u
Rose-breasted Grosbeak	K				IV		u	-	u	-
Rufous-sided (Eastern) Towhee	K		H	II	IV		c	c	c	u
Rusty Blackbird	K	ü	H		IV		u	-	u	u
Savannah Sparrow	K			IV			u	-	-	o
Scarlet Tanager	K			II	IV	§	c	c	a	-
Seaside Sparrow	S				IV		r	-	-	-
Sedge Wren	S	ü	M		III		-	-	r	-

Common Name	Known/ Suspected ¹	FWS BCC 2008, Region 5 ²	Atlantic Coast Joint Venture BCR 30 ³	PIF 1999, Area 44 ⁴	VA Species of Concern ⁵	FIDS list for Chesapeake Area ⁶	Sp ⁷	Su	F	W
Swainson's Thrush	K					§	u	-	r	-
Veery	S					§	o	r	o	-
Whip-poor-will	K	ü	H		IV	§	r	r	r	-
White-eyed Vireo	K			lb			u	c	c	-
Willow Flycatcher	S		H		IV		u	o	u	-
Wood Thrush	K	ü	HH	lb	IV	§	a	a	a	-
Worm-eating Warbler	S	ü	H	lb	IV	§	u	u	u	-
Yellow-bellied Flycatcher	S				SSC		o	-	o	-
Yellow-billed Cuckoo	K				IV		c	c	c	-
Yellow-breasted Chat	K			II	IV		u	u	u	-
Yellow-throated Vireo	S		H	lb	IV	§	u	u	u	-
Yellow Warbler	K				IV		u	o	u	-

Sources: USFWS, 1995; ACJV, no date; PIF, 1999; USFWS, 2002; VDGIF, 2006; VDGIF, 2005; CACCA, 2000

¹ K=species known to occur on refuge, S=species that possibly or probably occurs on refuge

² ü denotes species listed by USFWS in Birds of Conservation Concern 2008 for the Northeast Region

³ HH=Highest Concern; H=High Concern; M=Moderate Concern

⁴ Tier I=High Continental Priority; Tier II=High Regional Priority; Tier III= Additional Watch List; Tier IV=Additional Federally listed under ESA; Tier V=Additional State listed

⁵ I=Critical Conservation Need; II=Very High Conservation Need; III=High Conservation Need; IV=Moderate Conservation Need; SSC=State Species of Concern; ST=VA State-listed Threatened; SE=VA State-listed Endangered

⁶ § denotes forest interior dwelling bird species in the Chesapeake Bay area

⁷ Occurrence on refuge by season.

Seasons: Sp- Spring Su- Summer F-Fall W- Winter

Occurrence: a=abundant; c=common, o=occasional; u=uncommon, r=rare

Table A.7. Known or Suspected Reptiles and Amphibian on Featherstone Refuge

Common Name	Scientific Name	VA Species of Concern ¹
SALAMANDERS AND NEWTS		
Eastern Newt	<i>Notophthalmus viridescens</i>	
Four-toed Salamander	<i>Hemidactylium scutatum</i>	
Jefferson's Salamander	<i>Ambystoma jeffersonianum</i>	
Marbled Salamander	<i>Ambystoma opacum</i>	
Mud Salamander	<i>Pseudotriton montanus</i>	IV
Northern Dusky Salamander	<i>Desmognathus fuscus</i>	
Red Salamander	<i>Pseudotriton ruber</i>	
Redback Salamander	<i>Plethodon cinereus</i>	
Slimy Salamander	<i>Plethodon glutinosus</i>	
Spotted Salamander	<i>Ambystoma maculatum</i>	
Three-lined Salamander	<i>Eurycea guttolineata</i>	
Two-lined Salamander	<i>Eurycea bislineata</i>	
TOADS AND FROGS		
American Toad	<i>Anaxyrus americanus</i>	
Bullfrog	<i>Lithobates catesbeiana</i>	
Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>	
Fowler's Toad	<i>Anaxyrus fowleri</i>	
Gray Treefrog	<i>Hyla versicolor</i>	
Green Frog	<i>Lithobates clamitans</i>	
Green Treefrog	<i>Hyla cinerea</i>	
Northern Cricket Frog	<i>Acris crepitans</i>	
Pickerel Frog	<i>Lithobates palustris</i>	
Southern Leopard Frog	<i>Lithobates sphenocephala</i>	
Spring Peeper	<i>Pseudacris crucifer</i>	
Upland Chorus Frog	<i>Pseudacris feriarum feriarum</i>	
Wood Frog	<i>Lithobates sylvatica</i>	ST
TURTLES		
Eastern Box Turtle	<i>Terrapene carolina</i>	III
Eastern Mud Turtle	<i>Kinostemon subrubrum</i>	
Eastern Musk Turtle	<i>Stemotherus odoratus</i>	
Painted Turtle	<i>Chrysemys picta</i>	
Red-bellied Turtle	<i>Pseudemys rubriventris</i>	
Snapping Turtle	<i>Chelydra serpentina</i>	

Common Name	Scientific Name	VA Species of Concern ¹
Spotted Turtle	<i>Clemmys muhlenbergii</i>	III
Wood Turtle	<i>Clemmys insculpta</i>	I, State Threatened
LIZARDS AND SKINKS		
Broadhead Skink	<i>Eumeces laticeps</i>	
Eastern Fence Lizard	<i>Sceloporous undulatus</i>	
Five-lined Skink	<i>Eumeces fasciatus</i>	
Ground Skink	<i>Scincella lateralis</i>	
Six-lined Racerunner	<i>Cnemidophorus sexlineatus</i>	
Southeastern Five-lined Skink	<i>Eumeces inexpectatus</i>	
SNAKES		
Black Racer	<i>Coluber constrictor</i>	
Brown Snake	<i>Storeria sp.</i>	
Copperhead	<i>Agkistrodon contortix mokasen</i>	
Corn Snake	<i>Elaphe guttata</i>	
Eastern Garter Snake	<i>Thamnophis sirtalis sirtalis</i>	
Eastern Hognose Snake	<i>Heterodon platyrhinos</i>	IV
Eastern Kingsnake	<i>Lampropeltis getula getula</i>	
Eastern Milk Snake	<i>Lampropeltis triangulum triangulum</i>	
Eastern Ribbon Snake	<i>Thamnophis sauritus sauritus</i>	IV
Mole Kingsnake	<i>Lampropeltis calligaster rhombomaculata</i>	
Northern Water Snake	<i>Nerodia sipedon sipedon</i>	IV
Queen Snake	<i>Regina septemvittata</i>	
Rat Snake	<i>Elaphe obsoleta</i>	
Ringneck Snake	<i>Diadophis punctatus</i>	
Rough Green Snake	<i>Opheodrys aestivus aestivus)</i>	
Scarlet Snake	<i>Lampropeltis triangulum elapsoides</i>	IV
Smooth Earth Snake	<i>Virginia valeriae</i>	
Timber Rattlesnake	<i>Crotalus horridus</i>	
Worm Snake	<i>Carphophis amoenus amoenus</i>	

¹Virginia State Comprehensive Wildlife Conservation Plan – Priority Species

I – Tier I: Critical conservation need ; II – Tier II: Very high conservation need ; III – Tier III: High conservation need ; IV – Tier IV: Moderate Conservation Need; SSC – Species of Special Concern ; SE – State Endangered

Table A.8. Known or Suspected Mammals on Featherstone Refuge

Species	Scientific Name	VA Species of Concern ¹
Beaver	<i>Castor canadensis</i>	
Big Brown Bat	<i>Eptesicus fuscus</i>	
Black Rat	<i>Rattus rattus</i>	
Coyote	<i>Canis latrans</i>	
Deer Mouse	<i>Peromyscus maniculatus nubiterre</i>	
Eastern Chipmunk	<i>Tamias striatus</i>	
Eastern Cottontail	<i>Sylvilagus transitionalis</i>	
Eastern Harvest Mouse	<i>Reithrodontomys humulis</i>	
Eastern Mole	<i>Scalopus aquaticus</i>	
Eastern Pipistrelle	<i>Pipistrellus subflavus</i>	
Eastern Woodrat	<i>Neotoma floridana</i>	
Evening Bat	<i>Nycticeius humeralis</i>	
Fox Squirrel	<i>Sciurus niger vulpinus</i>	
Gray Fox	<i>Urocyon cinereoargenteus</i>	
Gray Squirrel	<i>Sciurus carolinensis</i>	
Hoary Bat	<i>Lasiurus cinereus</i>	
House Mouse	<i>Mus musculus</i>	
Least Shrew	<i>Cryptotis parva</i>	
Little Brown Myotis	<i>Myotis lucifugus</i>	
Longtail Weasel	<i>Mustela frenata</i>	
Marsh Rice Rat	<i>Oryzomys palustris</i>	
Masked Shrew	<i>Sorex cinereus</i>	
Meadow Jumping Mouse	<i>Zapus hudsonius</i>	
Meadow Vole	<i>Microtus pennsylvanicus</i>	
Mink	<i>Mustela vison</i>	
Muskrat	<i>Ondatra zibethicus</i>	
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	
Norway Rat	<i>Rattus norvegicus</i>	
Pygmy Shrew	<i>Sorex hoyi</i>	
Raccoon	<i>Procyon lotor</i>	
Red Bat	<i>Lasiurus borealis</i>	
Red Fox	<i>Vulpes vulpes</i>	
Red Squirrel	<i>Tamiasciurus hudsonicus loquax</i>	

Species	Scientific Name	VA Species of Concern ¹
River Otter	<i>Lontra canadensis</i>	SSC
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	
Southeastern Shrew	<i>Sorex longirostris</i>	
Southern Bog Lemming	<i>Synaptomys cooperi</i>	IV
Southern Flying Squirrel	<i>Glaucomys volans</i>	
Star-nosed Mole	<i>Condylura cristata</i>	SSC
Striped Skunk	<i>Mephitis mephitis</i>	
Virginia Opossum	<i>Didelphis virginiana</i>	
White-footed Mouse	<i>Peromyscus leucopus</i>	
White-tailed Deer	<i>Odocoileus virginianus</i>	
Woodchuck	<i>Marmota monax</i>	
Woodland Vole	<i>Microtus pinetorum</i>	

¹Virginia State Comprehensive Wildlife Conservation Plan – Priority Species

Tier I: Critical conservation need ; Tier II: Very high conservation need ; Tier III: High conservation need ; Tier IV: Moderate Conservation Need; SSC – Species of Special Concern ; SE – State Endangered

Table A.9. Fish Species of Conservation Concern in Featherstone Refuge area

Species Common Name	USFWS Northeast Strategic Fisheries Plan – Potomac Watershed ¹	State Comprehensive Wildlife Conservation Plan Priorities ²
Alewife	IJ; H	IV
American eel		IV
American shad		IV
Atlantic sturgeon	IJ	II; SSC
Blueback herring		
Brook Trout	SS:H	
Bridle shiner		I; SSC
Hickory shad	M	
Ironcolor shiner		IV
Least brook lamprey		IV
Logperch		IV
Shortnose sturgeon	E; H	I; SE
Striped bass	H	

¹USFWS Northeast Strategic Fisheries Plan 2009-2013 – List of Species of Conservation and Management Concern. See <http://www.fws.gov/northeast/fisheries/reports/reports/FisheriesStrategicPlan.pdf> for individual rankings.

IJ- Interjurisdictional Species of Conservation and Management Concern; SOC – Species of Concern

SS – Special Species ; E – Federally Endangered ; H – High Priority ; M- Medium Priority

²Virginia State Comprehensive Wildlife Conservation Plan – Priority Species

I – Tier I: Critical conservation need ; II – Tier II: Very high conservation need ; III – Tier III: High conservation need ; IV – Tier IV: Moderate Conservation Need: SSC – Species of Special Concern ; SE – State Endangered

Table A.10. Plant Species of Conservation Concern for Featherstone Refuge area

Common Name	Scientific Name
Earleaf Foxglove	<i>Agalinis auriculata</i>
Purple Milkweed	<i>Asclepias purpurascens</i>
Red Milkweed	<i>Asclepias rubra</i>
Blue-hearts	<i>Buchnera americana</i>
Carolina Fanwort	<i>Cabomba caroliniana</i>
Brown Bog Sedge	<i>Carex buxbaumii</i>
A Sedge	<i>Carex vestita</i>
Pear Hawthorn	<i>Crataegus calpodendron</i>
Engelmann's Quillwort	<i>Isoetes appalachiana</i>
Small Whorled Pogonia *	<i>Isotria medeoloides</i>
Northern Bog Clubmoss	<i>Lycopodiella inundata</i>
Stiff Goldenrod	<i>Oligoneuron rigidum var. rigidum</i>
One-sided Wintergreen	<i>Orthilia secunda</i>
Torrey's Mountain-mint	<i>Pycnanthemum torrei</i>
Shinleaf	<i>Pyrola elliptica</i>
White Water Crow-foot	<i>Ranunculus aquatilis var. diffusus</i>
Prairie Rose	<i>Rosa setigera</i>
Hardstemmed Bulrush	<i>Schoenoplectus acutus var. acutus</i>
Long-leaf Wedgescale	<i>Sphenopholis filiformis</i>
Yellow Nodding Ladies'-tresses	<i>Spiranthes ochroleuca</i>
Marsh Hedgenettle	<i>Stachys pilosa var. arenicola</i>
Trailing Stitchwort	<i>Stellaria alsine</i>
Bog Fern	<i>Thelypteris simulata</i>
Buffalo Clover	<i>Trifolium reflexum</i>

* Federally Threatened; State Endangered; not currently known to occur on Refuge

Appendix B



Bill Wallen

Sunrise over Painted Turtle Pond on Occoquan Bay Refuge

Findings of Appropriateness and Compatibility Determinations

- Introduction
- Findings of Appropriateness
- Compatibility Determinations

Findings of Appropriateness and Compatibility Determinations

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Introduction

This appendix presents the findings of appropriateness and the compatibility determinations we have developed for this CCP. Both findings of appropriateness and compatibility determinations are required by law (The National Wildlife Refuge System Administration Act of 1966 (Administration Act) as amended by The National Wildlife Refuge System Improvement Act of 1997 (Improvement Act)) and Service policy (603 FW 1 for finding of appropriateness; 603 FW 2 for Compatibility Determinations).

The finding of appropriateness documents our process for determining whether a proposed or existing non-wildlife dependent use, or any non-priority public use, is appropriate for a refuge. Six priority public uses were established by the Improvement Act: wildlife observation and photography, environmental education and interpretation, hunting, and fishing.

The compatibility determinations document our process for determining whether a proposed or existing wildlife-dependent recreational use, or any other use determined appropriate, is a compatible activity for a refuge. In evaluating compatibility, we must use professional judgment to determine that the use will not materially interfere with or detract from the fulfillment of the Refuge System mission, or the purposes of the refuge. All refuge uses, including recreational uses, refuge management economic activities, or other uses of a refuge by the public or other non-Service entity require compatibility determinations. Economic uses must also contribute to achieving refuge purposes and the mission of the Refuge System.

Compatibility determinations are not required for refuge management activities conducted by the Service or a Service-authorized agent to fulfill one or more purposes of the refuge, or the Refuge System mission. Examples of activities which do not require a compatibility determination include: prescribed burning; water level management; invasive species control; routine scientific monitoring, studies surveys and censuses; historic preservation activities; law enforcement activities; or the maintenance of existing refuge facilities, structures and improvements.

Compatibility determinations for existing wildlife-dependent recreational uses are re-evaluated every 15 years or when we prepare or revise the refuge's CCP, whichever is sooner. We re-evaluate compatibility determinations for all other uses every 10 years or when conditions change or significant new information about the use or its effects becomes available, whichever is sooner.

As you read through this appendix, you will notice that Occoquan Bay Refuge is included in most of the finding of appropriateness and compatibility determinations. Occoquan Bay Refuge's CCP was previously completed in 1997 and preceded current Service policy for finding of appropriateness and compatibility determinations. We determined that it was most effective and efficient to address activities for the entire Potomac River Refuge Complex, including Occoquan Bay, Mason Neck and Featherstone refuges, since staff, funding, and other management resources are shared among those refuge. In addition, we felt it made the most sense to establish a consistent timeline for the mandatory re-evaluations required by Service policy.

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Berry picking/ Mushroom Harvesting/Flower Picking/Medicinal Harvesting

NARRATIVE:

Berry picking, mushroom harvesting, flower picking, and medicinal harvesting are not priority public uses of the National Wildlife Refuge System Improvement Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Berry picking, mushroom harvesting, flower picking, and medicinal harvesting have been found to be not appropriate for the Potomac River NWR Complex. These uses would encourage visitors to stray from designated public use trails creating habitat damage and increased instances of refuge violations.

Impacts such as trampling vegetation and temporarily disturbing wildlife would occur. Many of the berry bushes, mushrooms, flowers, or medicinal plants found on the Complex are not located right next to trails and would require wandering off of designated trails. Visitors walking off established trails to collect any of these items may impact plants indirectly by compacting soils and walking on young plants, reducing survival and regeneration. Wildlife may avoid using suitable habitat due to the temporary disturbance created by visitors off trail.

Documented trespassing cases have occurred in the past by visitors engaged in these unauthorized uses. Participating in any of these activities would be interpreted by Refuge Law Enforcement as “Disturbing, injuring, ... destroying, collecting or attempting to disturb, injure, ... destroy or collect any plant ...” (50 CFR 27.51)

These uses have not been historical or traditional uses of Complex.

Berry picking, mushroom harvesting, flower picking, and medicinal harvesting do not support a Refuge purpose, objective or goal and would not benefit the natural or cultural resources present within the Complex. Berry picking, mushroom harvesting, flower picking, and medicinal harvesting have been found to be not appropriate for the Potomac River NWR Complex.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Biking off of designated routes

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: _____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence:

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Biking off of designated routes

NARRATIVE:

Biking off of designated routes is not identified as a priority public use of the National Wildlife Refuge System under 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 (Public Law 105-57). Biking off of designated routes has been found to be not appropriate for the Potomac River NWR Complex. Biking in this manner causes conflicts with existing uses and requires increased maintenance duties.

Biking is not allowed on Woodmarsh Trail and Great Marsh Trail on the Elizabeth Hartwell Mason Neck NWR; Lake Drive, Deephole Point Road, Fox Road, Easy Road, Bayview Road, Delta Road, a portion of Charlie Road (section that is not included in the Wildlife Drive), and a portion of Taylor Point Road (section that is not included in the Wildlife Drive) on the Occoquan Bay NWR; and biking will not be allowed on any of the spur trails (planned) off of the proposed Potomac Heritage National Scenic Trail on Featherstone Refuge. Visitors experience the priority public uses of wildlife observation, photography, environmental education, and interpretation traveling by foot on these trails and roads. Biking on these trails and roads are not required to experience these uses. In addition, the existing trails and roads mentioned above are not wide enough to support the two-way traffic of multiple uses. Conflicts between bike groups, mountain bikes, and wildlife would occur as fast moving bikers flush or disturb wildlife adjacent to trails.

Trail and road maintenance is another issue. The Complex currently deals with maintenance of refuge trails and roads based on staff availability. These areas are monitored by volunteers (when available) and deficiencies are noted and reported to Complex staff. Instances of downed trees and erosion due to inclement weather occur occasionally and refuge response may take days, weeks, and in some cases months before repairs can be initiated.

Finally, biking in additional areas on the refuges was not an activity in which the public expressed interest during the public scoping meetings. Currently, biking is allowed on the following designated trails within the Complex: Elizabeth Hartwell Mason Neck NWR – High Point Trail; Occoquan Bay NWR – Wildlife Drive; and, Featherstone NWR – proposed Potomac Heritage National Scenic Trail. Opportunities for biking are available at other public lands and parks within a mile of each refuge within the Complex.

Biking off of designated trails does not support a Refuge purpose, objective or goal and would not benefit the natural or cultural resources present within the Complex. Biking off of designated trails has been found to be not appropriate for the Potomac River NWR Complex.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

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)? Abandonment of Property 50CFR Ch. 1 27.93		✓
(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: _____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence:

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Geocaching

NARRATIVE:

Geocaching is not a priority public uses of the National Wildlife Refuge System Improvement Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Geocaching has been found to be not appropriate for the Potomac River NWR Complex. This activity encourages visitors to stray from designated public use trails creating habitat damage and increased instances of refuge violations.

This use would encourage visitors to stray from designated public use trails. Impacts such as trampling vegetation and temporarily disturbing wildlife would occur. Visitors walking off established trails to locate a GPS point may impact plants indirectly by compacting soils and walking on young plants, reducing survival and regeneration. Wildlife may avoid using suitable habitat due to the temporary disturbance created by visitors off trail.

This use is not a historical or traditional use of the Complex. Documented trespassing cases have occurred in the past by visitors engaged in this unauthorized use.

Geocaching does not support a Refuge purpose, objective or goal and would not benefit the natural or cultural resources present within the Complex. Geocaching has been found to be not appropriate for the Potomac River NWR Complex.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

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: _____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence:

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Horseback Riding

NARRATIVE:

Horseback riding, used as a means to conduct priority public uses, has been found to be not appropriate for the Potomac River NWR Complex. The Complex does not have parking space to support trailers in our designated parking areas. Trails and roads are unable to safely accommodate cars, horses, hikers, and bikers. The Complex does not have the staff resources to manage the use properly. Horseback riding would add significantly to the workload of law enforcement, visitor services, and maintenance staff because of the need to highly manage and monitor activities; trails would need continual maintenance (see below impacts). In addition, the use is accommodated at the Bureau of Land Management – Meadowood Division, which is less than a mile from the Complex.

Potential impacts of horseback travel include: soil compaction and erosion, downstream sedimentation, trampling and mortality of fragile plant communities, habitat loss/deterioration, wildlife disturbance, hydrologic changes and a shift in plant communities along trails. These potential impacts as reported in literature and through in-field investigation and observation at another Northeast Refuge (Canaan Valley NWR – West Virginia) are listed below:

Impacts to plants: Horse travel can impact plants on trails by directly crushing them. Indirectly, horses can impact plants by compacting soils diminishing soil porosity, aeration and nutrient availability (Kuss, 1986). Hammitt and Cole (1998) note, compaction limits the ability of plants to re-vegetate affected areas. Plants growing in wet or moist soils are the most sensitive to disturbance from trampling effects (Kuss, 1986). Moist and wet soil conditions are common in Canaan Valley particularly during spring and early summer and can occur on upland trails that have been incised and are channeling water.

Horse use may cause local impacts to plants and soils when confined. West Virginia Conservation Officer Harold Spencer observed that tying horses to trees damaged plants and soils. Confined horses in Canaan Valley ate the bark of nearby trees. This occurred at upland camps where horses were left for extended periods (Spencer, 2002). According to Cole (1983), bark damage from tethering horses to trees can result in insect invasions and girdling that can ultimately kill the tree. Soil compaction and erosion at these sites was also cited as a problem, especially where it exposed tree roots (Cole, 1983). Erosion from horse hooves may increase root exposure.

Soil Impacts: Horses cause soil compaction, particularly when soils are wet which can directly affect plant growth and survival (Kuss, 1986). Horseback riding has been found to cause braided trails in excessively muddy trail sections (Summer, 1986). Weaver and Dale (1978) found horse use caused a greater loss of vegetation cover, wider and deeper trails, and greater soil compaction when compared to hiker use on meadow and forest trail conditions. Horses may cause trail erosion by loosening the soil and increasing soil particle detachment under both wet and dry trail conditions (Deluca et al., 1998).

Field investigations of trails in Canaan Valley have documented extensive damage displaying classic examples of the erosive nature of Mauch Chunk derived soils after years of unregulated use. In addition, many trails are now trapping and channeling water creating more erosive conditions.

Kuss (1986) found that increasing moisture content of soils reduces the ability of the soil to support traffic. Summer (1986) recommended that horse trails be established on dry, well-drained sites. Routine maintenance to remove water and repair existing erosion is required to sustain horseback travel on most routes on the Main Tract (Rizzo, 2002; Zeedyk, 2002).

Invasive Species: Exposed soil and an abundance of sunlight along roads and trails provide ideal conditions for the establishment of invasive plant species. Invasive plant species may be transported through the presence of

exotic plant seeds in feed hay. This concern has initiated strict requirements for weed free hay in some natural areas. At Yellowstone National Park and Green Mountain National Forest and Finger Lakes National Forest only processed feed (pelletized or cubed hay) or certified “weed seed free” hay is allowed in the back country (Oloff, 2001; Zimmer, 2001).

Hydrologic Impacts: Roads and trails used for horseback travel can affect the hydrology of an area, primarily through alteration of drainage patterns. Bartgis and Berdine (1991) note that roads and trails can divert water from their original drainage patterns. This results in some drainages becoming dry while others accelerate erosion by being forced to carry more water. Zeedyk (2002) documented many instances in Canaan Valley where existing trails were channeling water away from historic wetlands and in some cases causing erosion and sedimentation of bog and other wetland communities. These problems have profoundly if not irreversibly altered the extent, depths, characteristics and function of the wetlands on the Main Tract (Zeedyk, 2002).

Wildlife Impacts: Horseback travel can cause disturbances to wildlife. Disturbances vary with the wildlife species involved and the type, level, frequency, duration and the time of year such activities occur. Whittaker and Knight (1998) note that wildlife response can include attraction, habituation and avoidance. These responses can have negative impacts to wildlife such as mammals becoming habituated to humans making them easier targets for hunters. Human induced avoidance by wildlife can prevent animals from using otherwise suitable habitat.

Trails can disturb wildlife outside the immediate trail corridor (Trails and Wildlife Task Force, 1998, Miller et al., 2001). Miller et al. (1998) found bird abundance and nesting activities (including nest success) increased as distance from a recreational trail increased in both grassland and forested habitats. Bird communities in this study were apparently affected by the presence of recreational trails, where American robins were found near trails and specialist species (i.e. grasshopper sparrows) were found farther from trails. Nest predation was also found to be greater near trails (Miller et al., 1998).

Disturbance can cause shifts in habitat use, abandonment of habitat and increase energy demands on affected wildlife (Knight and Cole, 1991). Flight in response to disturbance can lower nesting productivity and cause disease and death. Knight and Cole (1991) suggest recreational activities occurring simultaneously may have a combined negative impact on wildlife. Hammitt and Cole (1998) conclude that the frequent presence of humans in wildland areas can dramatically change the normal behavior of wildlife mostly through unintentional harassment.

Seasonal sensitivities can compound the effect of disturbance on wildlife. Examples include regularly flushing birds during nesting or causing mammals to flee during winter months, thereby consuming large amounts of stored fat reserves. Hammitt and Cole (1998) note that females with young (such as white-tailed deer) are more likely to flee from a disturbance than those without young. Some uses, such as bird observation, are directly focused on viewing certain wildlife species and can cause more significant impacts during breeding season and winter months.

Wildlife disturbance from horse use has been cited for trail closures in West Virginia. A trail was closed at the Bluestone Wildlife Management Area due to anticipated impacts of disturbance to wild turkey populations (Silvester, 2001).

Impacts to wildlife may be indirectly caused through erosion and subsequent sedimentation of streams and vernal pools. Increased sediment loads can reduce aquatic vegetation and dissolved oxygen concentrations (Sadoway, 1986). Sedimentation can directly kill aquatic invertebrates which in turn impacts the success of amphibian larvae and adults (Sadoway, 1986). Observations by refuge staff in 2002 document numerous occurrences of amphibian egg masses that failed after becoming coated in sediment from eroding trails and roads nearby. Bartgis and Berdine (1991) report that sedimentation was damaging habitat in Canaan Valley and could cause impacts to the rare plants, water quality and possibly affect habitat of the southern water shrew (*Sorex palustris punctulatus*), a state Species of Concern.

User Conflicts: Conflicts between trail users are commonly reported in the literature (Knight and Gutzwiller, 1995, Ramthun, 1995, Watson et al., 1994, Chavez et al., 1993). Conflicts range from concerns over personal

safety to certain user groups feeling that they should be given priority over other groups based on a past history or other reasons. Providing safe routes for wildlife-oriented activities is an important consideration for wildlife observation trails on the refuge. Safety considerations include ability of multiple modes of access to use a trail without creating dangerous conditions, ability to maintain a trail to allow safe use and timing of various uses such as wildlife observation.

Horseback riding does not support a Refuge purpose, objective or goal and would not benefit the natural or cultural resources present within the Complex. Horseback riding has been found to be not appropriate for the Potomac River NWR Complex.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Non-wildlife Dependent Group Gatherings

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

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(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: _____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence:

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Non-wildlife Dependent Group Gatherings

NARRATIVE:

Non-wildlife dependent group gatherings such as, but not limited to, ceremonies, weddings, memorial services, family reunions, etc., are not priority public uses of the National Wildlife Refuge System Improvement Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

These types of uses do not support a Refuge purpose, objective or goal and would not benefit the natural or cultural resources present within the Complex. Non-wildlife dependent group gatherings have been found to be not appropriate for the Potomac River NWR Complex.

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Organized or Facility-supported Picnicking

NARRATIVE:

Picnicking is not identified as a priority public use of the National Wildlife Refuge System under 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 (Public Law 105-57). Picnicking has been found to be not appropriate for the Potomac River NWR Complex.

The Complex does not provide the amenities for picnicking activities, such as picnic tables, shelters, excessive trash containers, grills, etc. In addition, we do not have the resources to manage a large picnic area or program. Although organized picnicking is prohibited, this does not preclude visitors from bringing food with them for nutrition or safety reasons while they participate in other appropriate and compatible activities on the Complex

Prohibiting picnicking may positively impact wildlife and wildlife habitat; if only by reducing the amount of soil compaction, vegetation trampling, and trash and food waste that might occur on and off trails and the frequency and extent of wildlife disturbance.

Organized or facility-supported picnicking does not support a Refuge purpose, objective or goal and would not benefit the natural or cultural resources present within the Complex. Organized or facility-supported picnicking has been found to be not appropriate for the Potomac River NWR Complex.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Swimming and Sunbathing on Refuge Shore

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: _____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence:

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Swimming and Sunbathing on Refuge Shore

NARRATIVE:

Swimming and sunbathing are not identified as a priority public use of the National Wildlife Refuge System under 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 (Public Law 105-57). Swimming and sunbathing have been found to be not appropriate for the Potomac River NWR Complex.

The Potomac River NWR Complex has a total of 8.5 miles of shoreline and is closed to all public access. During the summer months, sections of the shoreline during low tide become exposed and are attractive to boaters and other users of the Potomac River and Occoquan Bay. This attraction creates safety concerns and increases the instances where law enforcement response is necessary. The shoreline has never been opened to public access and is protected for use by native wildlife. The Complex does not have the facilities or staff to manage these uses.

Swimming and sunbathing does not support a Refuge purpose, objective or goal and would not benefit the natural or cultural resources present within the Complex. Swimming and sunbathing has been found to be not appropriate for the Potomac River NWR Complex.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Elizabeth Hartwell Mason Neck NWR and Featherstone NWR

Use: Dog Walking

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: _____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence:

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Elizabeth Hartwell Mason Neck NWR and Featherstone NWR

Use: Dog Walking

NARRATIVE:

Elizabeth Hartwell Mason Neck NWR trails and the proposed trails for Featherstone NWR are ideal for walking dogs. Although dogs can increase disturbance to wildlife, the Refuge will strictly enforce a leash law to keep the dog localized with the pedestrian. Dog walking has been found to be appropriate for Elizabeth Hartwell Mason Neck NWR and Featherstone NWR.

Dog walking is an existing use on the Elizabeth Hartwell Mason Neck NWR and will be restricted to the current and planned trails on both refuges that are designated as open to the public.

COMPATIBILITY DETERMINATION

USE:

Dog walking

REFUGE NAME:

Elizabeth Hartwell Mason Neck and Featherstone National Wildlife Refuges

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Date Established: 1 February 1969

Establishing Authorities: Endangered Species Act (16 U.S.C. 1534), the Refuge Recreation Act (16 U.S.C. 460[k] – 460[k][4]), an Act Authorizing the Transfer of Certain Property for Wildlife , or other purposes (16 U.S.C. 667b), and the Migratory Bird Conservation Act (16 U.S.C. 715d).

Featherstone National Wildlife Refuge

Date Established: 23 February 1970

Establishing Authorities: Public Law 91-499 (1970).

REFUGE PURPOSE(S):

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Lands acquired under the Endangered Species Act are “... to conserve (A) fish or wildlife which are listed as endangered species or threatened species Or (B) plants ...” (16 U.S.C. § 1534); lands acquired under the Refuge Recreation Act were found to be “... suitable for– (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ...” 16 U.S.C. § 460k-1 “... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ...” (16 U.S.C. 460[k] – 460[k][4]); lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife , or other purposes were established for their “... particular value in carrying out the national migratory bird management program.” (16 U.S.C. § 667b); and lands acquired under the Migratory Bird Conservation Act were “... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” (16 U.S.C. § 715d).

Featherstone National Wildlife Refuge

Lands acquired under Public Law 91-499 (1970) were established to “... to protect the natural features of a contiguous wetland area.” Public Law 91-499, dated Oct. 22, 1970.

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

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” (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57).

DESCRIPTION OF USE:

(a) What is this use? Is it a priority public use?

The use is dog walking. Dog walking is not a priority public use of the National Wildlife Refuge System under 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 (Public Law 105-57).

(b) Where would the use be conducted?

Dog walking would be allowed in the following areas:

1. On all current and future public trails located on the Elizabeth Hartwell Mason Neck NWR, including but not limited to the Joseph V. Gartlan Jr. Great Marsh Trail, the Woodmarsh Trail, and the High Point Trail.
2. We also propose to allow dog walking along any newly created trails on Featherstone NWR.

(c) When would the use be conducted?

Elizabeth Hartwell Mason Neck NWR: Year-round, during refuge hours of operation (typically April 1- September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). A temporary closure to these activities would be implemented during any scheduled Refuge hunt dates.

Featherstone NWR: Assuming trails have been developed and public access is available, year-round, during refuge hours of operation (typically April 1- September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). A temporary closure to these activities would be implemented during any scheduled Refuge hunt dates.

(d) How would the use be conducted?

Dog owners enter the Refuge, park in the visitor parking lots, and proceed to the open trails. Dogs must be kept on a leash, no longer than ten feet in length. This leash law will be strictly enforced to minimize wildlife and visitor disturbance. Owners will be required to clean up after their dogs.

A Refuge brochure/flyer will be developed for visitor information and education, specifically informing them about regulations and ethics while engaging in this activity on the Refuge. Refuge signs regarding dog walking will be developed and placed when and where necessary to help regulate this activity. Refuge staff patrols by foot and vehicle will be conducted to advise visitors of regulations, monitor visitor activity, and as necessary, to enforce the regulations.

(e) Why is this use being proposed?

Visitors can participate in wildlife-dependant recreation while walking a dog. There is a current demand for this use on the Refuge, and therefore, we plan to continue with our existing policy on dog walking to better meet the needs of our public and minimize wildlife disturbances.

AVAILABILITY OF RESOURCES:

Permitting this use is within the resources available to administer our Visitor Services Program. There is no additional staff or material costs incurred to the Refuge. Compliance with the leash law is within the regular duties of the Law Enforcement Officer.

ANTICIPATED IMPACTS OF THE USE:

Potential Impacts to Birds: The presence of dogs and pedestrians on the refuge, either on trails or off trails, is likely to cause temporary disturbance to birds. A study done in Colorado (Miller et al. 2001) found that robins, representing forest species, and western meadowlarks and vesper sparrows, representing grassland species, flushed when approached by dogs on and off leash. Dogs alone generally resulted in less disturbance than when pedestrians were present, either alone or holding a leashed dog. The authors surmised that because dogs resemble coyotes and foxes, which are not considered significant predators of songbirds (Leach and Frazier 1953, Andelt et al. 1987), they may not have been perceived as an important threat. Disturbance was generally

greater off trails than on trails. Dogs alone are not likely to cause significant disturbance beyond that caused by foxes and coyotes. Any disturbance would be temporary and should not lead to loss of migratory birds or their habitats.

Potential Impacts to Threatened and Endangered Species: Bald eagles were delisted as a threatened species in 2007, but remain a management focus for the refuge. We have no evidence to suggest that the temporary presence of dogs on the refuge will have negative effects on bald eagle nesting or roosting. If necessary to prevent disturbance, we will post sensitive bald eagle areas, such as nests and known roosts, as closed areas for dog walking.

Potential Impacts to wetlands: It is unlikely that dogs will enter refuge wetlands due to trail location and refuge regulations. All dogs must be on leash and regulations state that visitors must remain on trails during visits to either refuge.

Potential Impacts to other fish and wildlife resources: There can be an increase in wildlife disturbance from dog walking simply due to normal dog behavior (i.e. jumping, barking, running off a leash). At some level, domestic dogs maintain instincts to hunt and/or chase. Given the appropriate stimulus, those instincts can be triggered in many different settings. Even if the chase instinct is not triggered, dog presence in and of itself has been shown to disrupt many wildlife species (Sime, 1999). Sime presents some effects of disturbance, harassment, and displacement on wildlife attributable to domestic dogs that accompany recreationists. Sime states that authors of many wildlife disturbance studies concluded that dogs with people, dogs on-leash, or loose dogs provoked the most pronounced disturbance reactions from their study animals. Dogs extend the zone of human influence when off-leash. Many ungulate species demonstrated more pronounced reactions to unanticipated disturbances, as a dog off-leash would be until within very close range. In addition, dogs can force movement by ungulates (avoidance or evasion during pursuit), which is in direct conflict with overwinter survival strategies which promote energy conservation. Sime continues to highlight that dogs are noted predators for various wildlife species in all seasons. Domestic dogs can potentially introduce diseases (distemper, parvovirus, and rabies) and transport parasites into wildlife habitats. While dog impacts to wildlife likely occur at the individual scale, the results may still have important implications for wildlife populations. For most wildlife species, if a “red flag” is raised by pedestrian-based recreational disturbance, there could also be problems associated with the presence of domestic dogs. Lastly, dog waste can create sanitation issues and an unsightly environment to other Refuge visitors.

We do not expect a substantial increase in the cumulative effects of visitor use over the 15 year timeframe of this plan. Staff, in collaboration with volunteers, will monitor and evaluate the effects of these priority public uses to discern and respond to any unacceptable impacts on wildlife or habitats. To mitigate those impacts, the Complex will continue to close areas to the public to protect wildlife during critical life periods.

PUBLIC REVIEW AND COMMENT:

As part of the Elizabeth Hartwell Mason Neck/Featherstone CCP process, this compatibility determination will undergo extensive public review, including a comment period of 45 days following the release of the Draft CCP/EA.

DETERMINATION (CHECK ONE BELOW):

- Use is not compatible
- Use is compatible with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Dogs must be on a leash, no longer than ten feet in length and must refrain from entering closed areas.

JUSTIFICATION:

Although dogs can increase disturbance to wildlife, the Refuge will strictly enforce a leash law to keep dogs and disturbances localized with the pedestrian. This is an existing use at the Mason Neck Refuge and expectations for the proposed Potomac Heritage National Scenic Trial to support this use on Featherstone Refuge are high.

We have not had significant negative impacts from this use. There are no documented incidences of domestic dog-wildlife disturbances, nor of dog-people problems.

We believe most dog walkers are local residents, who regularly visit the Mason Neck Refuge for wildlife-dependant recreation, and who understand our policy. We will have an increase in dog walking activity on the Featherstone Refuge because we do not offer that use now; however, the increase is not expected to be substantial because of the lack of access points available to the general public.

SIGNATURE:

Refuge Manager: _____
(Signature) (Date)

CONCURRENCE:

Regional Chief: _____
(Signature) (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE:

LITERATURE CITED:

Andelt, W.F., J.G. Kie, F.F. Knowlton, and K. Cardwell. 1987. Variation in coyote diets associated with season and successional changes in vegetation. *Journal of Wildlife Management* 51:273-277.

Leach, H.R., and W.H. Fraizer. 1953. A study of the possible extent of predation on heavy concentrations of valley quail with special reference to the bobcat. *California Fish and Game* 39:527- 538.

Miller, S.G., R.L. Knight and C.K. Miller. 2001. Wildlife responses to pedestrians and dogs. *Wildlife Society Bulletin* 29(1):124-132.

Sime, C. A. 1999. Domestic Dogs in Wildlife Habitats. Pages 8.1-8.17 in G. Joslin and H. Youmans, coordinators. *Effects of recreation on Rocky Mountain wildlife: A Review for Montana. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society.* 307pp.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Outdoor 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: _____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence:

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Outdoor Events

NARRATIVE:

Competitive or non-competitive outdoor events that are appropriate on the Refuge include those that incorporate compatible uses such as wildlife observation and interpretation. These events would not be hosted by the Refuge, but rather the Refuge would participate as a partner in the event (e.g., the Eagle Run, Elizabeth Hartwell Day related activities). Each request has different logistics, and therefore, would be evaluated for impacts on the Refuge mission, and a Special Use Permit is issued unless found to be detrimental to the Refuge mission. Outdoor Events have been found to be appropriate for the Potomac River NWR Complex.

COMPATIBILITY DETERMINATION

USE:

Outdoor Events

REFUGE NAME:

Elizabeth Hartwell Mason Neck, Featherstone and Occoquan Bay National Wildlife Refuges (Potomac River National Wildlife Refuge Complex)

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

The Potomac River National Wildlife Refuge Complex is composed of three nationally significant wildlife areas: Mason Neck, Featherstone, and Occoquan Bay National Wildlife Refuges.

Each National Wildlife Refuge (NWR) is established under specific legislation or administrative authority. Similarly, each refuge has one or more specific legal purposes for which it was established. The establishing legislation or authority and the purposes for each refuge in the Potomac River NWR Complex (Refuge Complex) are provided below:

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Date Established: 1 February 1969

Establishing Authorities: Elizabeth Hartwell Mason Neck NWR (Mason Neck Refuge) was established under the Endangered Species Act (16 U.S.C. 1534), the Refuge Recreation Act (16 U.S.C. 460[k] – 460[k][4]), an Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes (16 U.S.C. 667b), and the Migratory Bird Conservation Act (16 U.S.C. 715d).

Featherstone National Wildlife Refuge

Date Established: 23 February 1970

Establishing Authorities: Featherstone NWR (Featherstone Refuge) was established under Public Law 91-499 (1970).

Occoquan Bay National Wildlife Refuge

Date Established: 28 June 1998

Establishing Authorities: Occoquan Bay NWR (Occoquan Refuge) was established under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes (16 U.S.C. 667b).

REFUGE PURPOSE(S):

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under the Endangered Species Act are “... to conserve (A) fish or wildlife which are listed as endangered species or threatened species Or (B) plants ...” (16 U.S.C. § 1534); lands acquired under the Refuge Recreation Act were found to be “... suitable for– (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ...” 16 U.S.C. § 460k-1 “... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ...” (16 U.S.C. 460[k] – 460[k][4]); lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes were established for their “... particular value in carrying out the national migratory bird management program.” (16 U.S.C. § 667b); and lands acquired under the Migratory Bird Conservation Act were “... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” (16 U.S.C. § 715d).

Featherstone National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under Public Law 91-499 (1970) were established to "... to protect the natural features of a contiguous wetland area." Public Law 91-499 (1970), dated Oct. 22, 1970.

Occoquan Bay National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes were established for their "... particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b)

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 this use? Is it a priority public use?

This use is for competitive and non-competitive outdoor events, such as foot and/or wellness and physical fitness events, fishing derbies, clean-ups, or youth scavenger hunts, sponsored by private, charitable, and other non-profit clubs or groups, that provide for an interpretive, wildlife observation, and/or environmental education opportunity, and contribute to the public's understanding and appreciation of the Refuge's natural resources. These events are not considered priority public uses of the National Wildlife Refuge System under 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 (Public Law 105-57). Such activities do, however, assist in pursuing the recent national initiative supported by the Service, in terms of "Connecting People with Nature" through healthy outdoor experiences in natural settings provided by public lands. These events primarily include walks, such as the Volksmarch on open trails, but may also include bicycle rides on the Wildlife Drive at Occoquan Bay or on the High Point Trail at Elizabeth Hartwell Mason Neck. Or, an event may be a run, such as the Eagle Run or the Hartwell Day Run. Other regularly occurring events include shoreline clean-up days. Events are held one to five times, annually, and occur at different times throughout the year. Events may have up to 250 participants, although generally less than 100. Participants use established roads and trails that are already open to the public. Clean-up events may include all portions of the Refuge. Participants in clean-ups generally work on shoreline areas or seasonally flooded bottomlands where debris is deposited.

(b) Where would the use be conducted?

Outdoor events would be allowed on any public use trail or area deemed as open to public access within the Complex. This includes the trails on all refuges and at the proposed new headquarters/visitor contact station and any additional planned trails. This use would not be permitted in areas managed for habitat conservation or wildlife protection.

(c) When would the use be conducted?

Elizabeth Hartwell Mason Neck NWR: Year-round, during refuge hours of operation (typically April 1- September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). A temporary closure to these activities would be implemented during any scheduled Refuge hunt dates.

Occoquan Bay NWR: Year-round, during refuge hours of operation (typically April 1- September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). A temporary closure to these activities would be implemented during any scheduled Refuge hunt dates.

Featherstone NWR: Assuming trails have been developed and public access is available, year-round, during refuge hours of operation (typically April 1- September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). A temporary closure to these activities would be implemented during any scheduled Refuge hunt dates.

(d) How would the use be conducted?

Each request must be presented in writing with details of who, what, where, when, why, and how the event will be conducted. Each request has different logistics, and therefore, would be evaluated for impacts on the Refuge mission. Using professional judgment, as long as there is no significant negative impact to natural resources or visitor services, or violation of Refuge regulations, a Special Use Permit will be issued outlining the framework in which this use can be conducted. Refuge staff will ensure compliance with the Permit.

(e) Why is this use being proposed?

Each year the Potomac River NWR Complex receives requests to conduct outdoor events. Every time the request is made, we initially evaluate the impacts of the request, and if found to be minimal, issue a Special Use Permit. Allowing special outdoor events will provide a controlled arena for introducing the public to the wildlife values of the Refuge. Two events currently occur each year: (1) the Eagle Run in January of each year and; (2) the Hartwell Day Run in April of each year. In some instances, pre-event orientations designed to promote resource conservation and natural resource stewardship will be provided to the event organizer, allowing event participants to receive interpretive and environmental education messages.

AVAILABILITY OF RESOURCES:

Permitting this use is within the resources available to administer our Visitor Services Program. Additional staff costs are incurred to review each request, coordinate with the outside entity and process a Special Use Permit, if necessary. Compliance with the terms of the Permit is within the regular duties of the Law Enforcement Officer. Anticipated costs are:

- Senior Refuge Biologist (GS-12) and/or GS-09 Refuge Biologist (review request) - 1 day/yr. = \$325
- Visitor Services Manager (GS-12) and/or GS-09 Refuge Operations Specialist (coordinate with entity) - 1 day/yr. = \$348
- Refuge Manager (GS-14) (review and approval) - 1 day/yr. = \$416
- Deputy Refuge Manager (GS-11) (review request, process and issue SUP) – 3 days/yr. = \$870
- Law Enforcement Officer (GS-09) (enforcement patrols) 1 day/yr. = \$208

ANTICIPATED IMPACTS OF THE USE:

Conflicts may occur when humans and wildlife are both present in close proximity. Standard and special permit stipulations would strictly limit any adverse conditions that may affect wildlife, thereby mitigating such risk. Outdoor events will occur in areas of the Refuge that are already identified more for their public use value than for habitat. Therefore, no significant adverse impacts from this use are anticipated.

Direct impacts have an immediate affect on wildlife. We expect those impacts to include the presence of humans disturbing wildlife, which typically results in a temporary displacement without long-term effects on wildlife 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. Overall, human effects should not be significant, because most of the Refuge will experience minimal public use.

Potential impacts to birds: An indirect benefit to upland habitats and associated species would derive from careful, strategic placement of trails and event locales. Public awareness and appreciation of the refuge, its habitats, and resources would inspire some to volunteer or in other ways support the refuge needs and conservation of resources on the landscape in general. Increases in annual visitor numbers from constructing new trails along Treestand and Sycamore Roads and improvements to the existing public trails at Mason Neck, trails at Occoquan Bay, and new trails at Featherstone, and other planned activities described herein have the potential to cause disturbance to nesting, migrating, and wintering birds. However, the potential impacts vary due to each refuge's respective habitat management scenario and the types of visitor use. Direct impacts on wildlife in the form of disturbance can be expected wherever humans have access to an area, and the degree

may vary depending on the habitat type. In general, human presence disturbs most wildlife, which typically results in a temporary displacement without long-term effects on individuals or populations.

Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson, 1985). Response of wildlife to human activities includes: departure from site (Owen 1973, Burger 1981, Korschgen et al., 1985, Henson and Grant 1991, Kahl 1991, Klein 1993), use of suboptimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Korschen et al., 1985, Morton et al., 1989, Ward and Stehn 1989, Havera et al., 1992, Klein 1993), and increase in energy expenditure (Morton et al., 1989, Belanger and Bedard 1990). McNeil et al. (1992) found that many waterfowl species avoid disturbance by feeding at night instead of during the day. The location of recreational activities impacts species in different ways. Miller et al. (1998) found that nesting success was lower near recreational trails, where human activity was common, than at greater distances from the trails. A number of species have shown greater reactions when pedestrian use occurred off trail (Miller, 1998). In addition, Burger (1981) found that wading birds were extremely sensitive to disturbance in the northeastern U.S. In regard to waterfowl, Klein (1993) found migratory dabbling ducks to be the most sensitive to disturbance and migrant ducks to be more sensitive when they first arrived, in the late fall, than later in winter. She also found gulls and sandpipers to be apparently insensitive to human disturbance, with Burger (1981) finding the same to be true for various gull species.

For songbirds, Gutzwiller et al. (1997) found that singing behavior of some species was altered by low levels of human intrusion. Pedestrian travel can impact normal behavioral activities, including feeding, reproductive, and social behavior. Studies have shown that ducks and shorebirds are sensitive to pedestrian activity (Burger, 1981; 1986). Resident waterbirds tend to be less sensitive to human disturbance than migrants, and migrant ducks are particularly sensitive when they first arrive (Klein, 1993). In areas where human activity is common, birds tolerated closer approaches than in areas receiving less activity. Some species, such as wood thrush, will avoid areas frequented by people, such as developed trails and buildings, while other species, particularly highly social species such as eastern tufted titmouse, Carolina chickadee, or Carolina wren, seem unaffected or even drawn to a human presence. When visitors approach too closely to nests, they may cause the adult bird to flush exposing the eggs to weather events or predators. Provided that visitor use is confined to trails, disturbance during the breeding season will be limited to the trail area. The extent of this disturbance on either side of the trail also depends on visibility, the density of vegetation through which the trail is laid. Overall, direct impacts from non-consumptive uses should be greatly reduced if trails and other high-use facilities avoid area-sensitive habitats (interiors of grasslands).

Laskowski et al. (1993), studied behavior of snowy egrets, female mallards, and greater yellowlegs on Back Bay NWR in Virginia Beach, VA. The study location was within 91.4 meters of impoundment dikes used by the general public. Behavior of snowy egrets was recorded during August and September 1992 to represent post-breeding marsh and wading birds. Mallards were monitored during migration (November 1992) and during the winter January (1993). Greater yellowlegs' behavior was observed during the northward shorebird migration (May 1993). Behavior was monitored during the typical public activities of walking, bicycling, and driving a vehicle past the sample sites.

The study found that snowy egret resting behavior decreased and alert behavior increased in the presence of humans. Preening decreased when humans were present, but this change was not significant. Feeding, walk/swim, and flight behaviors were not related to human presence. Female mallards in November increased feeding, preening and alert behaviors in the presence of humans. Resting, walk/swim, and flight behavior were not influenced by human presence. In January, female mallard resting and preening behavior were not influenced by the presence of humans. However, feeding, alert, walk/swim, and flight behaviors were related to human presence. Greater yellowlegs increased alert behavior in the presence of humans. No other behaviors were affected. Maintenance behavior (combined feeding, resting, and preening) decreased when humans were present for all study species. In addition, this decrease was accompanied by an increase in escape behavior by each species. Maintenance behavior of mallards in January decreased in the presence of vehicles and combined disturbance. Escape behavior increased when vehicles were present. Maintenance behavior of greater yellowlegs declined when bicycles and vehicles were present but was not influenced by pedestrian presence.

The presence of bicycles and vehicles increased escape behavior. Snowy egrets and female mallards increased movement between subplots and to areas within the study area but further from the disturbance.

During a five year study which involved nine different species of birds, they found only minimal evidence that intrusion affected bird distributions (Gutzwiller and Anderson, 1999). This study also found that the species affected by intrusion were not consistent from year to year or within study areas and could be due to habituation of intrusion (Gutzwiller and Anderson, 1999).

Potential impacts to threatened and endangered species: We included bald eagles in this section due to the fact that they were a focal species during refuge establishment at Mason Neck and because of the extra protection they are afforded under the Bald and Golden Eagle Protection Act. Permitting public access to any waterfront or marsh managed by the refuge holds the possibility of impacting bald. Impacts may either be displacement or temporary disturbance depending on the extent of use of a given site by visitors and eagles. We plan to continue to allow use public trails and areas open to the general public for events, which include but are not limited to Woodmarsh and Joseph V. Gartlan, Jr. Great Marsh Trail, the proposed Sycamore Trail and Treestand Trail at Mason Neck; along the open public areas and trails/roads at Occoquan Bay; and along the proposed open areas or trails at Featherstone. All of these areas are adjacent to water bodies used by bald eagles, some in high concentrations and for nesting. As trees mature and forest riparian buffers are improved, sites with low concentrations will likely increase in importance to bald eagles. We will avoid potential adverse impacts to bald eagles by strictly following the management guidelines developed by state and federal agencies. These include sight and distance setbacks from nests and concentration areas and time-of-year restrictions.

Potential impacts to wetlands: Potential adverse impacts to wetlands could arise if public use were allowed to occur directly in wetlands, or if erosion of sediments into wetlands was allowed to occur during facility of an event. We will manage events to ensure that minimal to no impacts will occur in this manner.

Potential impacts to other fish and wildlife: Mammals in Virginia occupy a diverse array of habitat types, ecological niches, and food webs and play an important role in the ecosystems in the refuge boundary. As a taxonomic group, mammals will also benefit from the refuge land protection and management actions relative to riparian habitats, forests, grasslands, shrub, and wetlands proposed for listed species, waterfowl, and migratory birds. Likewise, the refuge will benefit from careful attention to the impacts to mammals resulting from any of its activities. We evaluated the management actions and public uses proposed for each of the refuge CCP alternatives for their potential to benefit or adversely affect large and small, aerial, terrestrial, and wetland mammals. The activities described in this determination should have no long-term impact on mammal use of the refuge.

Protection and good stewardship of the area's herpetofauna is another priority of the Refuge, and fits into nearly all the goals for wetlands, uplands, and riparian habitats. We evaluated the public uses described herein for their potential to benefit or adversely affect amphibians and reptiles or their habitats used for mating, reproduction, over-wintering, and foraging. Although most species that occur on the refuge are very common and widespread, there is concern for two species of turtle: eastern box and spotted, and amphibians everywhere are considered to be experiencing a general decline. Some areas are experiencing loss of mixed mature forest due to development or high rates of conversion to timber farms. This impacts vernal pools needed by amphibians for over-wintering and reproduction. No vernal pools will be impacted by these proposed activities. Public outreach and education efforts by the refuge that emphasize buffering of wetlands, connectivity and easy access between forest, grassland, and wetlands, protection of vernal pools, and augmentation of patch size will benefit amphibians and reptiles on an even larger scale where embraced by other landowners.

Sometimes maintenance actions for public use may involve preparations or outcomes that have direct negative impacts to amphibians and reptiles. Mowing of grassy access roads and public use trails occasionally destroys turtles, snakes or frogs if conducted during times of movement (warm months). The best way to minimize this direct type of negative impact is to keep public use and access roads mowed short so that they do not become attractive habitat. However, in many cases it will be impossible to find a perfect time to carry out maintenance actions that will completely avoid conflict for wildlife. Opening a limited amount of habitat for the public to experience and appreciate through a network of interpretive trail systems and outdoor classroom sites should heighten an awareness of the habitat needs and plight of declining reptiles and amphibians in the minds of children and adults. There is limited opportunity outside the refuge boundary area for adults to be exposed to the more reticent, uncommon, or interior species of reptiles and amphibians in natural habitats. Adults are homeowners, landowners, land managers, and land-use decision makers, and they have considerable influence on the value systems of children.

Opportunities to learn and marvel about the habits, appearance, and needs of reptiles and amphibians and their role in the ecosystem will indirectly benefit this group of animals if these learning experiences translate into beneficial changes in landscaping, yard maintenance, pesticide use, and management of towns and communities.

Enhancement and expansion of the trail systems for public use poses the potential threat of blocking access between different habitat types, depending on the placement, length, width, and substrate material of the trails. Some salamander species will not cross openings that are too wide or dry, bare ground (Vinson 1998),

thus earthen trails, if exposed to sunlight could become dry enough to form a barrier. Gravel roads or trails, even though thought to be permeable, also act as a barrier to salamander movement (Marsh et al. 2005). The trails will therefore be located on level terrain, avoiding ravines which are home to amphibians and reptiles. At most these trails will be five miles in length on Mason Neck and Occoquan Bay and will be no more than 4 miles in length at Featherstone, and their widths no more than six feet. Disturbance to basking or nesting turtles may occur where public use is concentrated at points where land and water interface. Basking turtles can usually find alternate resting surfaces. Nesting turtles, once engaged in the act of digging usually will not allow their attention to be drawn to anything else, and at such time are vulnerable to predators. A turtle wishing to make landfall to attempt egg-laying however, may be dissuaded by the presence of humans at the site. Because there will be ample wetland-forest-grassland interface elsewhere, we expect that the cumulative impact of roads and trails to amphibians and reptiles at the landscape scale will be insignificant. Artificial illumination may have both positive and negative impacts on the nocturnal behavior and ecology of frogs (Buchanan 2002) and salamanders (Wise and Buchanan 2002). While it may enhance prey detection it may also hurt predator avoidance, cause aggression between individuals of the same species, cause temporary blindness in frogs (sudden bright light), disrupt or confuse migration to or from ponds for salamanders (Wise and Buchanan 2002) or inhibit reproduction by frogs adapted to low illumination (Buchanan 2002).

Potential Impacts to habitat: People can be vectors for invasive plants by moving seeds or other propagules from one area to another. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife. The threat of invasive plant establishment will always be an issue requiring annual monitoring and treatment when necessary. Our staff will work at eradicating invasive plants and educating the visiting public. Also, opening the lands within the Complex to public use can often result in littering, vandalism, or other illegal activities.

Cumulative Impacts: In summary, our research, observations and knowledge of the area provide no evidence that cumulatively, the visitor activities we propose to allow will have an unacceptable effect on wildlife resources or their habitats.

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. Although we do not expect substantial cumulative impact from this use in the near term, it will be important for Refuge staff to monitor this use and, if necessary, respond to conserve high-quality wildlife resources.

We do not expect a substantial increase in the cumulative effects of visitor use over the 15 year timeframe of this plan. Staff, in collaboration with volunteers, will monitor and evaluate the effects of this use to discern and respond to any unacceptable impacts on wildlife or habitats. To mitigate those impacts, the Complex will continue to close areas to the public to protect wildlife during critical life periods.

PUBLIC REVIEW AND COMMENT:

As part of the Elizabeth Hartwell Mason Neck/Featherstone CCP process, this compatibility determination will undergo extensive public review, including a comment period of 45 days following the release of the Draft CCP/EA.

DETERMINATION (CHECK ONE BELOW):

Use is not compatible

Use is compatible with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Each request must be presented in writing with details of who, what, where, when, why, and how the event will be conducted. Each request will then be evaluated for impacts to the Refuge. All current Refuge regulations

and standard Special Use Permit stipulations will apply, along with special stipulations, depending on the nature and scope of the event to be permitted.

- See section A above for a detailed description of use and initial boundaries.
- A refundable bond may be taken to ensure that any facility or resource damage is repaired or restored.
- Event permit holders will be invoiced for any necessary Refuge staff overtime associated with managing the permit, and coordinating the special event with other Refuge activities.
- Group size may not exceed 250 individuals and may be further limited, depending upon the nature and scope of the event, and a management evaluation of public safety and resource protection risk.
- Based upon professional judgment, and as long as there is no significant negative impact to natural resources or visitor services, or violation of Refuge regulations, a Special Use Permit can be issued outlining the framework within which this use can be conducted.

JUSTIFICATION:

We currently allow hunting, wildlife observation, photography, environmental education and interpretation. Events that are not considered priority public uses, such as races or competitions, are conducted by means of a compatible use. Although these uses do not directly contribute to the achievement of the Refuge purposes or the National Wildlife Refuge System mission, they do provide for an interpretive, wildlife observation, and/or environmental education opportunity, thereby contributing to the public’s understanding and appreciation of the Refuge’s natural resources. Therefore, a group event can be compatible as long as it is appropriate, conducted safely, and does not conflict with priority uses on the Refuge.

SIGNATURE:

Refuge Manager: _____
(Signature) (Date)

CONCURRENCE:

Regional Chief: _____
(Signature) (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE: _____

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Research (including inventories and monitoring)

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: _____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence:

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWR's)

Use: Research (including inventories and monitoring)

NARRATIVE:

The use is research conducted by non-Service personnel on the Potomac River NWR Complex (Complex). It is not a priority public use of the National Wildlife Refuge System under 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 (Public Law 105-57). Research has been found to be appropriate for the Potomac River NWR Complex.

The Potomac River NWR Complex does not have the resources to conduct all the necessary surveys and studies to manage all resources or to conduct studies which benefit natural resources in general. Therefore, we encourage research by outside entities to assist us in collecting and providing data for our wise use. All research proposals are evaluated for their benefits to the Refuge mission and issued a Special Use Permit if found beneficial. All research projects require the principle investigator to provide summary reports of findings and acknowledge the Potomac River NWR Complex for their participation.

COMPATIBILITY DETERMINATION

USE:

Research (including inventories and monitoring)

REFUGE NAME:

Elizabeth Hartwell Mason Neck, Featherstone and Occoquan Bay National Wildlife Refuges (Potomac River National Wildlife Refuge Complex)

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

The Potomac River National Wildlife Refuge Complex is composed of three nationally significant wildlife areas: Mason Neck, Featherstone, and Occoquan Bay National Wildlife Refuges.

Each National Wildlife Refuge (NWR) is established under specific legislation or administrative authority. Similarly, each refuge has one or more specific legal purposes for which it was established. The establishing legislation or authority and the purposes for each refuge in the Potomac River NWR Complex (Refuge Complex) are provided below:

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Date Established: 1 February 1969

Establishing Authorities: Elizabeth Hartwell Mason Neck NWR (Mason Neck Refuge) was established under the Endangered Species Act (16 U.S.C. 1534), the Refuge Recreation Act (16 U.S.C. 460[k] – 460[k][4]), an Act Authorizing the Transfer of Certain Property for Wildlife , or other purposes (16 U.S.C. 667b), and the Migratory Bird Conservation Act (16 U.S.C. 715d).

Featherstone National Wildlife Refuge

Date Established: 23 February 1970

Establishing Authorities: Featherstone NWR (Featherstone Refuge) was established under Public Law 91-499 (1970).

Occoquan Bay National Wildlife Refuge

Date Established: 28 June 1998

Establishing Authorities: Occoquan Bay NWR (Occoquan Refuge) was established under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes (16 U.S.C. 667b).

REFUGE PURPOSE(S):

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under the Endangered Species Act are “... to conserve (A) fish or wildlife which are listed as endangered species or threatened species Or (B) plants ...” (16 U.S.C. § 1534); lands acquired under the Refuge Recreation Act were found to be “... suitable for– (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ...” 16 U.S.C. § 460k-1 “... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ...” (16 U.S.C. 460[k] – 460[k][4]); lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife , or other purposes were established for their “... particular value in carrying out the national migratory bird management program.” (16 U.S.C. § 667b); and lands acquired under the Migratory Bird Conservation Act were “... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” (16 U.S.C. § 715d).

Featherstone National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under Public Law 91-499 (1970) were established to "... to protect the natural features of a contiguous wetland area." Public Law 91-499 (1970), dated Oct. 22, 1970.

Occoquan Bay National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes were established for their "... particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b)

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 this use? Is it a priority public use?

The use is research (including inventories and monitoring) conducted by non-Service personnel on the Potomac River NWR Complex (Complex). It is not a priority public use of the National Wildlife Refuge System under 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 (Public Law 105-57).

There is much that can be learned from field research within the Refuge. Baseline information in the biological, geophysical, hydrological and other fields is still in need of being collected. There are many opportunities for consultants, colleges and universities, and other agencies and/or organizations to obtain permission to conduct critical and noteworthy research on the Refuge.

Two provisions of the National Wildlife Refuge Improvement Act are to "maintain biological integrity, diversity and environmental health" and to conduct "inventory and monitoring." Monitoring and research are an integral part of National Wildlife Refuge management. Plans and actions based on thorough research and consistent monitoring provide an informed approach to management affects on wildlife and habitat.

Currently, research applicants are required to submit a proposal that outlines: (1) objectives of the study; (2) justification for the study; (3) detailed methodology and schedule; (4) potential impacts on Refuge wildlife or habitat, including disturbance (short and long term), injury, or mortality (this includes a description of measures the researcher will take to reduce disturbance or impacts); (5) research personnel required; (6) costs to Refuge, if any; and (7) progress reports and end products (i.e., reports, thesis, dissertations, publications). Research proposals are reviewed by Refuge staff and conservation partners, as appropriate, for approval. Evaluation criteria currently include, but are not limited to, the following:

- Research that will contribute to specific Refuge management issues will be given higher priority over other research requests.
- Research that will conflict with other ongoing research, monitoring, or management programs will not be granted.
- Research projects that can be accomplished off-Refuge are less likely to be approved.
- Research which causes undue disturbance or is intrusive will likely not be granted. Level and type of disturbance will be carefully evaluated when considering a request.
- Refuge evaluation will determine if any effort has been made to minimize disturbance through study design, including considering adjusting location, timing, scope, number of permittees, study methods, number of study sites, etc.

- If staffing or logistics make it impossible for the Refuge to monitor researcher activity in a sensitive area, the research request may be denied, depending on the specific circumstances.
- The length of the project will be considered and agreed upon before approval. Projects will be reviewed annually.

(b) Where would the use be conducted?

The locations of the research will vary, depending on the research project being conducted. The entire Complex is open and available for scientific research. A research project is usually limited to a particular habitat type, plant or wildlife species. On occasion, research projects will encompass an assemblage of habitat types, plants or wildlife. The locations will be limited to those areas of the refuge that are absolutely necessary for conducting the research and that do not create a significant negative impact to Refuge operations and wildlife use.

(c) When would the use be conducted?

The timing of the research will depend entirely on the research project needs. We will allow scientific research on the Complex throughout the year, as long as that use does not present a significant negative impact to wildlife use and management operations. Some projects could be short-term in design, requiring one or several visits over the course of a few days or weeks. Others could be multiple year studies that require more frequent visits to the location. The timing of each use will be limited to the minimum required for completion. If a research project occurs during any Refuge hunting program, special precautions will be required and enforced to ensure public health and safety.

(d) How would the use be conducted?

The mechanics of the research work will depend entirely on the individual research project. We will carefully scrutinize the objectives, methods, and approach of each research project before allowing it to occur on the Complex. We will not permit a research project that lacks an approved study plan and protocol, compromises public health and safety or presents a significant negative impact to wildlife resources within the Complex. This permitted research use must be regulated and governed by the conditions and other terms of a Refuge special use permit (SUP). The SUP will provide any needed protection to individual Refuge policies, mission, wildlife populations, and natural habitats. In addition, all research projects require the primary investigator to submit written summary reports of all findings, and acknowledge the Complex's participation.

(e) Why is this use being proposed?

Research by non-Service personnel is conducted by colleges, universities, federal, state, and local agencies, non-governmental organizations, and qualified members of the public. Such studies further our understanding of the natural environment that we are responsible for managing. Research is therefore an important part of the adaptive management process that often results in improved management of refuge habitats and wildlife populations. Much of the information that research generates can be applied to management practices both on and adjacent to the Complex.

The Service encourages and supports research and management studies on refuge lands that will improve and strengthen decisions for 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 Game Agencies, and that address important management issues, or demonstrate techniques for managing species or habitats.

The Complex will also consider research for other purposes that may not relate directly to Refuge-specific objectives, but contribute to the broader enhancement, protection, use, preservation or management of native populations of fish, wildlife and plants, and their natural diversity in the Northeast Region and/or the Atlantic Flyway. All proposals must comply with Service policy on compatibility.

AVAILABILITY OF RESOURCES:

The costs for administering and managing research opportunities at the Potomac River NWR Complex involves personnel time required to review research proposals submitted. The research incumbent will then be

responsible to develop, operate and maintain the research project as specified in the Special Use Permit, the Cooperative Agreement, or Memorandum of Understanding.

Anticipated costs are:

- Senior Refuge Biologist (GS-12) and/or GS-09 Refuge Biologist (review request) -1 day/yr. = **\$325**
- Visitor Services Manager (GS-12) and/or GS-09 Refuge Operations Specialist (coordinate with entity) - 1 day/yr. = **\$348**
- Refuge Manager (GS-14) (review and approval) - 1 day/yr. = **\$416**
- Deputy Refuge Manager (GS-11) (review request, process and issue SUP) – 3 days/yr. = **\$870**
- Law Enforcement Officer (GS-09) (enforcement patrols) 1 day/yr. = **\$208**

ANTICIPATED IMPACTS OF THE USE:

The service encourages approved research projects to further the understanding of natural resource problems which will, in turn, increase our ability to manage our trust resources. Properly conducted studies will have little negative impact on refuge flora, fauna, or wildlife species.

Ideally, any research project conducted on the refuge would positively contribute to one or more of our interim objectives. There may be short-term disturbance to plants and wildlife during field investigations, but this is unavoidable in most cases. We will conduct Intra-Service Section 7 Biological Evaluations for any proposal that could be anticipated to have an impact on any federally threatened or endangered species. We will ensure that the refuge or any non-Service researchers obtain any special permits, including collection and banding permits, required by State or Federal law prior to issuing a SUP.

PUBLIC REVIEW AND COMMENT:

As part of the Elizabeth Hartwell Mason Neck/Featherstone CCP process, this compatibility determination will undergo extensive public review, including a comment period of 45 days following the release of the Draft CCP/EA.

DETERMINATION (CHECK ONE BELOW):

Use is not compatible

Use is compatible, with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

The criteria for evaluating a research proposal, outlined in the Description of Use section above, will be used when determining whether a proposed study will be approved on the Refuge. If proposed research methods are evaluated and determined to have potential adverse impacts on refuge wildlife or habitat, then the refuge would determine the utility and need of such research to conservation and management of refuge wildlife and habitat. If the need was demonstrated by the research permittee and accepted by the refuge, then measures to minimize potential impacts (e.g., reduce the numbers of researchers entering an area, restrict research in specified areas) would be developed and included as part of the study design and on the SUP. SUPs will contain specific terms and conditions that the researcher(s) must follow relative to activity, location, duration, seasonality, etc. to ensure continued compatibility. All Refuge rules and regulations must be followed unless alternatives are otherwise accepted in writing by Refuge management.

All information, reports, data, collections, or documented sightings and observations, that are obtained as a result of this permit are the property of the Service and can be accessed by the Service at any time from the permittee at no cost, unless specific written arrangements are made to the contrary. The Refuge also requires the submission of annual or final reports and any/all publications associated with the work done on the Refuge. Each SUP may have additional criteria. Each SUP will also be evaluated individually to determine if a fee will be charged and for the length of the permit.

Extremely sensitive wildlife habitat areas would be avoided unless sufficient protection from research activities (i.e., disturbance, collection, capture and handling) is implemented to limit the area and/or wildlife potentially impacted by the proposed research. Where appropriate, some areas may be temporarily/seasonally closed so that research would be permitted when impacts to wildlife and habitat are less of a concern. Research activities will be modified to avoid harm to sensitive wildlife and habitat when unforeseen impacts arise.

Refuge staff will monitor researcher activities for potential impacts to the refuge and for compliance with conditions on the SUP. The refuge manager may determine that previously approved research and special use permits be terminated due to observed impacts. The refuge manager will also have the ability to cancel a SUP if the researcher is out of compliance with the stated conditions.

JUSTIFICATION:

This program as described is determined to be compatible. Any potential negative impacts of research activities on the resources of the Potomac River NWR Complex will be minimized by the restrictions included in the SUP special conditions. In addition, the research study design and researcher activities will be regulated and monitored by Refuge staff.

The Service encourages approved research to further our understanding of refuge natural resources and management. Research by non-Service personnel adds greatly to the information base for refuge managers to make proper decisions and practice adaptive management. Research conducted by non-Service personnel 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. In most cases it should supplement them.

SIGNATURE:

Refuge Manager: _____
(Signature) (Date)

CONCURRENCE

Regional Chief: _____
(Signature) (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE: _____

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Potomac River NWR Complex (Elizabeth Hartwell Mason Neck, Occoquan Bay, and Featherstone NWRs)

Use: Non-motorized Modes of Access on Designated Trails

NARRATIVE:

This finding of appropriateness covers certain modes of non-motorized access on two specifically designated trails on the Refuge Complex: the High Point Trail on Mason Neck NWR and the proposed Potomac Heritage National Scenic Trail on Featherstone NWR. Specifically under consideration are jogging and non-motorized wheeled transport such as bicycles, inline-skates, scooters, and skateboards¹.

Both of these trails are part of regional transportation corridors and these modes of transport provide alternative means of access to refuge lands for visitors, including those whose origin or destination may be off-refuge land (to or from Mason Neck State Park or through Featherstone NWR on the proposed route of the Potomac Heritage National Scenic Trail). In addition to the convenience of these activities, they also allow exposure to the elements which afford visitors the opportunity to immerse themselves in nature. They also facilitate access to interpretation infrastructure and activities designed to increase the public's understanding and appreciation of the Refuge Complex's natural and cultural resources.

These uses are limited to only two specifically designated trails with hardened surfaces, where road width allows safe passage of other users. Designated trails also have sufficient viewing distance for users to detect the approach of other visitors on the refuges and maneuver to accommodate them. This minimizes conflicts with other public uses, including priority public uses. In addition, the High Point Trail is recognizable as a high-volume multi-purpose trail by virtue of its construction (e.g. asphalt with painted center line) and its proximity to a main access road. Most visitors, therefore, would not have the expectation for quiet nature viewing along this trail. There have been no complaints received about any of these non-motorized modes of access impacting Refuge Complex visitors engaged in priority public uses.

These forms of non-motorized access have therefore been found appropriate on designated trails because it is consistent with the goals of the visitor service's program for the Refuge Complex, facilitates alternative modes of transportation, and contributes to the public's understanding, appreciation, and enjoyment of the refuge's natural and cultural resources.

¹ Wheelchair use is another form of non-motorized access accommodated on the Refuge Complex. In addition to being permitted on the High Point Trail on Elizabeth Hartwell Mason Neck Refuge and the proposed Potomac Heritage National Scenic Trail on Featherstone Refuge, it is also permitted any where it can be safely accommodated on refuge roads and trails.

COMPATIBILITY DETERMINATION

USE:

Non-motorized Modes of Access on Designated Trails

REFUGE NAME:

Elizabeth Hartwell Mason Neck, Featherstone, and Occoquan Bay National Wildlife Refuges (Potomac River National Wildlife Refuge Complex)

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

The Potomac River National Wildlife Refuge Complex is composed of three nationally significant wildlife areas: Mason Neck, Featherstone, and Occoquan Bay National Wildlife Refuges.

Each National Wildlife Refuge (NWR) is established under specific legislation or administrative authority. Similarly, each refuge has one or more specific legal purposes for which it was established. The establishing legislation or authority and the purposes for each refuge in the Potomac River NWR Complex (Refuge Complex) are provided below:

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Date Established: 1 February 1969

Establishing Authorities: Elizabeth Hartwell Mason Neck NWR (Mason Neck Refuge) was established under the Endangered Species Act (16 U.S.C. 1534), the Refuge Recreation Act (16 U.S.C. 460[k] – 460[k][4]), an Act Authorizing the Transfer of Certain Property for Wildlife , or other purposes (16 U.S.C. 667b), and the Migratory Bird Conservation Act (16 U.S.C. 715d).

Featherstone National Wildlife Refuge

Date Established: 23 February 1970

Establishing Authorities: Featherstone NWR (Featherstone Refuge) was established under Public Law 91-499 (1970).

Occoquan Bay National Wildlife Refuge

Date Established: 28 June 1998

Establishing Authorities: Occoquan Bay NWR (Occoquan Refuge) was established under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes (16 U.S.C. 667b).

REFUGE PURPOSE(S):

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under the Endangered Species Act are “... to conserve (A) fish or wildlife which are listed as endangered species or threatened species Or (B) plants ...” (16 U.S.C. § 1534); lands acquired under the Refuge Recreation Act were found to be “... suitable for– (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ...” 16 U.S.C. § 460k-1 “... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ...” (16 U.S.C. 460[k] – 460[k][4]); lands acquired under the Act

Authorizing the Transfer of Certain Property for Wildlife , or other purposes were established for their “... particular value in carrying out the national migratory bird management program.” (16 U.S.C. § 667b); and lands acquired under the Migratory Bird Conservation Act were “... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” (16 U.S.C. § 715d).

Featherstone National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under Public Law 91-499 (1970) were established to “... to protect the natural features of a contiguous wetland area.” Public Law 91-499 (1970), dated Oct. 22, 1970.

Occoquan Bay National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife , or other purposes were established for their “... particular value in carrying out the national migratory bird management program.” (16 U.S.C. § 667b)

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 it a priority public use?

The use is certain modes of non-motorized access on two specifically designated trails on the Refuge Complex: the High Point Trail on Mason Neck NWR and the proposed Potomac Heritage National Scenic Trail on Featherstone NWR. Specifically evaluated are jogging and non-motorized wheeled transport such as bicycles, inline-skates, scooters, and skateboards. This use is not a priority public use within the National Wildlife Refuge System, but facilitates alternative modes of transportation on the Refuge Complex.

(b) Where will this use be conducted?

This use is allowed on two specifically designated trails on the Refuge Complex: the High Point Trail on Elizabeth Hartwell Mason Neck Refuge (which passes through the refuge and terminates at Mason Neck State Park) and the proposed segment of the Potomac Heritage National Scenic Trail through Featherstone Refuge. Currently, Occoquan Bay Refuge does not have any trails appropriate to accommodate this use.

This use is not allowed on any other Refuge Complex trails, nor is it allowed off-trail.

(c) When will the use be conducted?

This use is authorized according to the following:

Elizabeth Hartwell Mason Neck NWR: Year-round, during refuge hours of operation (typically April 1- September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). A temporary closure to these activities would be implemented during any scheduled Refuge hunt dates.

Featherstone NWR: Assuming trails have been developed and public access is available, year-round, during refuge hours of operation (typically April 1- September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). A temporary closure to these activities would be implemented during any scheduled Refuge hunt dates.

(d) How will the use be conducted?

Some refuge visitors will arrive to the refuge by vehicle and then engage in this use on the designated trails (e.g. transport bike by car and unload at trailhead), while others will arrive by non-motorized transportation (e.g. jog to Mason Neck Refuge from Mason Neck State Park).

This use is limited to designated trails with hardened surfaces that are wide enough to accommodate the safe passage of other trail users. Designated trails also have sufficient viewing distance for users engaged in this use to detect the approach of other users with enough space to maneuver to accommodate them. Similarly, pedestrian users on the trail can see the users from a reasonably safe distance.

This use occurs on both an individual and group basis. Generally, the groups are smaller than 10 people which, in our observations, do not detract from a positive wildlife-dependent recreational experience for other visitors in proximity. We have also received no complaints about any user conflicts.

Information kiosks identify the roads and trails open for travel and explain permitted public uses, including where this use is allowed. Refuge staff will continue to monitor for potential safety concerns and environmental impacts. Safety and information signs are in place and maintained as necessary. Designated trails will be maintained to minimize environmental effects such as erosion and sedimentation and to provide safe conditions for public access. The existing designated trail is on asphalt and there has been no evident of erosion from current use; however, Refuge staff will continue to monitor for any degradation of conditions.

Additional trails may also be considered in the future consistent with the final CCP or other appropriate regulatory process. Refuge staff will conduct regular monitoring of these non-motorized activities and would respond accordingly to minimize any safety or environmental impacts. Responses may include temporary closures, modifications to trail routes, or adding additional infrastructure to minimize short-term, localized, or predicted long-term impacts to soils and other resources, or to minimize safety concerns.

WHY IS THIS USE BEING PROPOSED?

These means of non-motorized access provide visitors with additional modes of transportation to access or travel through the refuges. The use also provides visitors with a way to view and enjoy the refuges' diverse natural and cultural resources. This exposure may lead to a better understanding of the importance and value of the Refuge System to the environment and the American people. This use has occurred with little to no impacts and some of these modes of access (e.g. bicycling) are extremely popular activities on the refuges.

AVAILABILITY OF RESOURCES:

The resources necessary to provide and administer this use is available within current and anticipated Refuge Complex budgets. Staff time associated with administration of this use is related to maintaining trails, insuring signs are posted, conducting outreach to visitors about refuge uses, and monitoring the effects of public uses on refuge resources and visitors. These staff activities will be conducted in conjunction with those outlined in the "Wildlife Observation, Photography, Environmental Education, and Interpretation" compatibility determination, and this use will not require any additional staffing or resources beyond what is necessary for those activities. Therefore, the costs listed below are identical to those listed in the compatibility determination for "Wildlife Observation, Photography, Environmental Education, and Interpretation."

Costs associated with administering this use include:

- Visitor Services Park Ranger GS-09 – 38 weeks/yr. = **\$39,155**
- Deputy Refuge Manager (GS-11) – 3 weeks/yr. = **\$3,740**
- Refuge Manager (GS-14) - 1 week/yr. = **\$1,969**
- Law Enforcement Officer (GS-09) - 10 weeks/yr. = **\$10,304**
- Maintenance Worker (WG-10) - 10 weeks/yr = **\$11,416**
- Administrative Support Assistant (GS-7) – 1 week/yr. = **\$980**
- *In addition volunteer hours ranging from 400 to 650 hours contributing approximately \$10,400.00.*

Additional staff needs and costs are anticipated with the addition of trails and activities within the Complex. It will be necessary to hire a Visitor Services Manager (GS-11/12), Park Ranger (GS-5), Maintenance Worker (WG-9) and Maintenance Worker (WG-6) to compliment current staffing. The Visitor Services Manager will be available for public outreach and to facilitate the visitor services program on the complex. The Park Ranger will monitor visitor use and aide in facilitating visitor services opportunities. Maintenance staff will perform the regular maintenance duties and repairs that relate to visitor services.

Costs associated with administering additional uses include:

- Visitor Services Manager (GS-12) – 38 weeks/yr. = \$53,245
- Maintenance Worker (WG-9) - 10 weeks/yr. = \$9,584
- Maintenance Worker (WG-6) - 10 weeks/yr = \$7,796
- Park Ranger (GS-5) – 38 weeks/yr. = \$24,229

ANTICIPATED IMPACTS OF USE:

The use has the potential to affect a variety of migratory and resident wildlife and their habitats. Possible negative effects include disturbing wildlife, removing or trampling soils and vegetation, littering, vandalism, and entering closed areas. Refuge staff will conduct regular monitoring of the use and would respond accordingly to minimize any safety or environmental impacts.

Effects on Hydrology, Water Quality, and Soils: Designated routes will only occur on hardened surfaces designed to avoid impacts to streams, marshes or other wetlands, and minimize the introduction of soil sediment and alternation of hydrology in those areas. Rarely, if ever, trail maintenance may cause short term erosion and sedimentation in area waters. The locations of the trails and placement of culverts minimize changes to drainage patterns. The implications of poorly situated culverts is they could cause some drainages to receive less water and become drier, while forcing other drainages to carry more water resulting in accelerated erosion and increased water levels. However, these impacts have not been observed on the refuges.

If the use occurs off designated trails on native surfaces, it has the potential to effect soils and hydrology. Extensive tire or wheel ruts could cause soil compaction and create channeling or pooling of water during wet conditions. None of these conditions have been observed.

In addition, refuge staff will monitor designated trails for damage and remediate problem areas as needed. Outreach and law enforcement activities will continue to insure use off designated trails is kept to a rare occurrence.

Effects on Vegetation: Unauthorized use off of designated trails can also damage vegetation. Plants can physically be crushed by off-trail use. In addition, the use can cause compaction of soils, particularly when soils are wet, which can degrade plant communities associated with fragile organic soils. Soil compaction can also diminish the soil porosity, aeration, and nutrient availability, directly affecting plant growth and survival (Kuss 1986). Compaction can also limit re-vegetation of areas due to increased difficulty for root growth and penetration in the affected soils (Hammitt and Cole 1998). Kuss (1986) found plant species adapted to wet or moist habitats are the most sensitive, and increased moisture content reduces the ability of the soil to support recreational traffic.

Another potential affect on vegetation is the introduction of invasive plants. If native vegetation is impacted to the point that bare soil conditions are created, then invasive plants could invade. It is also possible that this use could transport and introduce invasive plant seeds from off-refuge (e.g. in bicycle tires), but there is no evidence that this is a major source of introduction. Refuge staff will continue to monitor for invasive species and control or eliminate them in conjunction with our existing annual invasive plant control program.

No impacts to vegetation have been observed, nor are they predicted, with these types of uses on the designated trails. In addition, as noted above, outreach and law enforcement activities will continue to insure unauthorized use is kept to a rare occurrence.

Effects on Wildlife: Disturbances to wildlife caused by human activities outdoors in natural settings, including the use described, vary with the wildlife species involved and the type, level, frequency, duration and the time of year that the human activities occur. The responses of wildlife to human activities include avoidance or departure from the site (Owen 1973, Burger 1981, Kaiser and Fritzell 1984, Korschen et al. 1985, Henson and Grant 1991, Kahl 1991, Klein 1993, Whittaker and Knight 1998), the use of sub-optimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior or habituation (Burger 1981, Korschen et al. 1985, Morton et al. 1989, Ward and Stehn 1989, Havera et al. 1992, Klein 1993, Whittaker and Knight 1998), attraction (Whittaker and Knight 1998), and an increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990). Mammals may become habituated to humans making them easier targets for hunters. Disturbance can cause shifts in habitat use, abandonment of habitat and increased energy demands on affected wildlife (Knight and Cole 1991).

The effects of trails on wildlife are complex and not limited to the trail footprint. Trail use can disturb areas outside the immediate trail corridor (Trails and Wildlife Task Force 1998, Miller et al. 2001). Miller et al. (1998) describe a 75-meter zone of influence where bird abundance and nesting activities (including nest success) were found to increase as distance from a recreational trail increased in both grassland and forested habitats. Bird communities in this study were apparently affected by the presence of recreational roads and trails, where common species (e.g., American robins) were found near trails and rare species (e.g., grasshopper sparrows) were found farther from trails. Songbird nest failure was also greater near trails (Miller et al. 1998).

Several studies have examined the effects of recreationists on birds using shallow-water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger 1981, Burger 1986, Klein 1993, Burger et al. 1995, Klein et al. 1995, Rodgers and Smith 1995, Rodgers and Smith 1997, Burger and Gochfeld 1998). Overall, the existing research demonstrates that disturbances from recreation activities have at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger 1981, Burger 1986, Klein 1993, Burger et al. 1995, Klein et al. 1995, Rodgers and Smith 1997, Burger and Gochfeld 1998). The findings that were reported in these studies are summarized as follows in terms of visitor activity and avian response to disturbance.

Presence: Birds avoided places where people were present and when visitor activity was high (Burger 1981, Klein et al. 1995, Burger and Gochfeld 1998). Batten (1977) and Burger (1981) found that wading birds were extremely sensitive to disturbance in the northeastern United States. However, the designated trails for this use is not located near any sensitive waterbird concentration areas. Klein (1993) found that, as the intensity of human disturbance increased, avoidance response by water birds increased. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). McNeil et al. (1992) found that many waterfowl species avoid disturbance by feeding at night instead of during the day. Studying the effects of human visitation on water birds at the J.N. "Ding" Darling National Wildlife Refuge, Klein (1989) found resident water birds to be less sensitive to disturbance than migrants were; the study also found that sensitivity varied according to species and individuals within species. In general, Klein found that herons and cranes were quite tolerant of people but were disturbed as they took terrestrial prey; great blue herons, tricolored herons, great egrets, and little blue herons were disturbed to the point of flight more than other birds. Kushlan (1978) found that the need of these birds to move frequently while feeding might disrupt inter-specific and intra-specific relationships. Gutzwiller et al. (1994) found that singing behavior of some songbird species was altered by low levels of human intrusion. Some bird species habituate to repeated intrusion; frequently disturbed individuals of some species have been found to vocalize more aggressively, have higher body masses, or tend to remain in place longer (Cairns and McLaren 1980).

Distance: Disturbance increased with decreased distance between visitors and birds (Burger 1986), though exact measurements were not reported and likely differ based on species and activity.

Reproduction and nesting success: Flight in response to disturbance can lower nesting productivity and cause disease and death (Knight and Cole 1991). Miller et al. (1998) found bird abundance and nesting activities (including nest success) increased as distance from a recreational trail increased in both grassland and forested habitats. Bird communities in this study were apparently affected by the presence of recreational trails, where

common species (i.e., American robins) were found near trails and more specialized species (i.e., grasshopper sparrows) were found farther from trails. Nest predation also was found to be greater near trails (Miller et al., 1998). Disturbance may affect the reproductive fitness of males by hampering territory defense, male attraction and other reproductive functions of song (Arrese 1987). Disturbance, which leads to reduced singing activity, makes males rely more heavily on physical deterrents in defending territories, which are time- and energy-consuming (Ewald and Carpenter 1978).

Noise: Noise caused by visitors resulted in increased levels of disturbance (Burger 1986, Klein 1993, Burger and Gochfeld 1998), though noise was not correlated with visitor group size (Burger and Gochfeld 1998).

Knight and Cole (1991) suggest recreational activities occurring simultaneously may have a combined negative impact on wildlife. Hammitt and Cole (1998) conclude that the frequent presence of humans in ‘wildland’ areas can dramatically change the normal behavior of wildlife mostly through ‘unintentional harassment.’

Seasonal sensitivities can compound the effect of disturbance on wildlife. Examples include regularly flushing birds during nesting or causing mammals to flee during winter months, thereby consuming large amounts of stored fat reserves. Hammitt and Cole (1998) note that females with young (such as white-tailed deer) are more likely to flee from a disturbance than those without young. Some uses, such as bird observation, are directly focused on viewing certain wildlife species and can cause more significant impacts during breeding season.

Wildlife associated with aquatic habitats may also be affected by the use. Impacts that cause erosion and subsequent sedimentation of streams and vernal pools can reduce aquatic vegetation and dissolved oxygen concentrations (Sadoway 1986), and possibly kill aquatic invertebrates, fish, and affect the success of amphibian larvae and adults (Sadoway 1986). Because designated trails are on hardened surfaces and primarily in upland sites or located to minimize impacts to water and wetlands, the use as authorized on designated trails is not expected to increase erosion or sedimentation problems.

Anticipated impacts of the use on wildlife include temporary disturbances to species using habitats directly adjacent to the trails. This use generally occurs from spring through fall which may result in occasional direct impacts to wildlife. These direct impacts may include nest abandonment of bird species nesting adjacent to trails and mortality of amphibians, reptiles, and small mammals struck by a user while crossing the road or trails. Direct mortality is more likely to occur due to cars than the other modes of access included in this use, and there are no recorded incidents of wildlife deaths due to this use on the refuges. Long-term impacts may include certain wildlife species avoiding trail corridors as a result of this use over time. The designated trails are located primarily in continuous tracts of hardwood forest on the refuges where forest cover may help reduce disturbance.

Refuge staff will take appropriate measures to avoid or minimize negative effects to wildlife from this use. Trails will continue to be periodically assessed to prevent habitat degradation. If there is evidence of unacceptable adverse impacts on wildlife, we will re-route, curtail, or close trails to this use as deemed appropriate. We will post and enforce Refuge Complex regulations, and establish, post, and enforce closed areas as needed. Based on the information provided above, this use is not anticipated to significantly increase wildlife habitat fragmentation or cause significant impacts on wildlife through disturbance.

PUBLIC REVIEW AND COMMENT:

As part of the Elizabeth Hartwell Mason Neck/Featherstone NWRs CCP process, this compatibility determination will undergo extensive public review, including a comment period of 45 days following the release of the Draft CCP/EA.

DETERMINATION (CHECK ONE BELOW):

- Use is not compatible
- Use is compatible with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

The following actions will occur to ensure compatibility:

- Refuge regulations will be posted and enforced to help insure compliance and confine users to designated routes only. Closed areas will be established as needed, posted, and enforced. Signs necessary for visitor information, safety, and traffic control will be kept up to date.
- The use is restricted to Refuge Complex open hours (see details under “Description of Use”, part (c) “When will the use be conducted?”).
- Trails designated for the use is annually inspected for maintenance needs. Prompt action is taken to correct any conditions that risk public safety. Trails are maintained at a level that reasonably insures safe travel.
- The designated trails will continue to be monitored periodically to determine if they continue to meet the compatibility criteria established by the refuge. Should monitoring and evaluation of the use indicate that the compatibility criteria are or will be exceeded, appropriate action will be taken to ensure continued compatibility, including modifying or discontinuing the use.
- Routine law enforcement patrols will continue to be conducted throughout the year, and will continue to check for unauthorized uses. The patrols also serve as education and outreach to visitors to promote compliance with refuge regulations. They also will continue to monitor public use patterns and public safety, and document visitor interactions.
- Potential conflicts with other public uses, such as hunting, will be minimized by using trailhead signs and other media to inform the visitors about current public use activities as well as which activities are authorized in specific locations throughout the refuge.

JUSTIFICATION:

The modes of transport described above are extremely popular and established activities on the Refuge Complex and, based on staff observations, have occurred with little to no environmental impact. This use is only authorized on designated trails which are on well-maintained hardened surfaces, thereby limiting any increased physical impact from this activity to soils, hydrology, and vegetation. In addition, this use is not predicted to increase resource impacts over and above other, existing allowed public uses. In fact, these modes of access offer an alternative to cars, and thereby can reduce the amount of carbon emissions attributed to Refuge Complex visitors.

The two designated trails occur primarily in extensive closed canopy forest habitat. Disturbance that may occur along these routes potentially impacts only a fraction of the habitat available for wildlife in the Refuge Complex, and occurs within the most abundant habitat types on each refuge. By limiting use to designated trails on a small percentage of the refuges and within the most common habitat types on each refuge, disturbance will be limited and manageable.

For these reasons, disturbance effects will not prevent achieving refuge purposes or the mission of the Refuge System for conserving, restoring, and protecting wildlife resources.

We will post and enforce refuge regulations at information kiosks, and establish, post, and enforce closed areas as needed. We also evaluate the trails periodically to assess their condition to prevent degradation. If evidence of unacceptable adverse impacts appears, we will repair the trail through scheduled maintenance programs, or re-route, curtail, or close trails as deemed appropriate.

Conflicts between this use and other refuge uses are very rare. Most trails on the Refuge Complex are closed to this use to prevent user conflicts and to reduce the overall impact on priority public uses. Given the size of the refuges and limited amount of trail open to this use, conflicts are expected to continue to be very minor or non-existent.

Because of the criteria established for permitting this use, the modes of access discussed are considered to be acceptable and manageable methods for facilitating alternative transportation to the Refuge Complex. For the reasons discussed above, this access will not affect the ability to conserve wetlands or protect, manage, and restore the wildlife and plant resources, as mandated through the refuges' establishing purposes, or the mission of the Refuge System. We therefore conclude that non-motorized modes of access on designated trails will not materially interfere with or detract from the mission of the Refuge System or the purposes for which Elizabeth Hartwell Mason Neck, Occoquan Bay, or Featherstone NWRs were established.

SIGNATURE:

Refuge Manager _____ (Signature) _____ (Date)

CONCURRENCE:

Regional Chief _____ (Signature) _____ (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE: _____

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COMPATIBILITY DETERMINATION

USE:

Wildlife Observation, Photography, Environmental Education, and Interpretation

REFUGE NAME:

Elizabeth Hartwell Mason Neck, Featherstone and Occoquan Bay National Wildlife Refuges (Potomac River National Wildlife Refuge Complex)

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

The Potomac River National Wildlife Refuge Complex is composed of three nationally significant wildlife areas: Mason Neck, Featherstone, and Occoquan Bay National Wildlife Refuges.

Each National Wildlife Refuge (NWR) is established under specific legislation or administrative authority. Similarly, each refuge has one or more specific legal purposes for which it was established. The establishing legislation or authority and the purposes for each refuge in the Potomac River NWR Complex (Refuge Complex) are provided below:

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Date Established: 1 February 1969

Establishing Authorities: Elizabeth Hartwell Mason Neck NWR (Mason Neck Refuge) was established under the Endangered Species Act (16 U.S.C. 1534), the Refuge Recreation Act (16 U.S.C. 460[k] – 460[k][4]), an Act Authorizing the Transfer of Certain Property for Wildlife , or other purposes (16 U.S.C. 667b), and the Migratory Bird Conservation Act (16 U.S.C. 715d).

Featherstone National Wildlife Refuge

Date Established: 23 February 1970

Establishing Authorities: Featherstone NWR (Featherstone Refuge) was established under Public Law 91-499 (1970).

Occoquan Bay National Wildlife Refuge

Date Established: 28 June 1998

Establishing Authorities: Occoquan Bay NWR (Occoquan Refuge) was established under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes (16 U.S.C. 667b).

REFUGE PURPOSE(S):

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under the Endangered Species Act are “... to conserve (A) fish or wildlife which are listed as endangered species or threatened species Or (B) plants ...” (16 U.S.C. § 1534); lands acquired under the Refuge Recreation Act were found to be “... suitable for– (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ...” 16 U.S.C. § 460k-1 “... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ...” (16 U.S.C. 460[k] – 460[k][4]); lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife , or other purposes were established for their “... particular value in carrying out the national migratory bird management program.” (16 U.S.C. § 667b); and lands acquired under the Migratory Bird Conservation Act were “... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” (16 U.S.C. § 715d).

Featherstone National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under Public Law 91-499 (1970) were established to "... to protect the natural features of a contiguous wetland area." Public Law 91-499 (1970), dated Oct. 22, 1970.

Occoquan Bay National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes were established for their "... particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b)

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 PROPOSED USE:

(a) What is this use? Is it a priority public use?

The uses are wildlife-oriented recreational activities including: wildlife observation, photography, environmental education and interpretation, including special self-led groups participating in these activities. These are priority public uses of the National Wildlife Refuge System under 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 (Public Law 105-57).

(b) Where would the use be conducted?

Elizabeth Hartwell Mason Neck NWR

Priority public uses will normally occur along access roads and the Woodmarsh and Joseph V. Gartlan Jr. Great Marsh Trails. Parking areas are available at both trail heads. In addition, several parking locations are available throughout the Mason Neck Refuge for activities occurring under special conditions.

Wildlife observation and photography will occur generally on designated trails and access roads or at developments such as photography blinds and observation platforms. Currently several trails are available for wildlife observation and photography. Woodmarsh Trail, which is 2.5 miles long, is located off of High Point Road and features gravel and earthen paths, boardwalks, and an overlook onto the Great Marsh. The Joseph V. Gartlan Great Marsh Trail (Great Marsh Trail) is .75 miles one-way and is located off of Gunston Road. The Great Marsh Trail is accessible and features an observation platform.

Habitats along Woodmarsh and Great Marsh Trails include a mature deciduous forest and the Great Marsh, one of the largest marshes in Fairfax County. These habitats provide great opportunities to see wildlife such as bald eagles, many species of birds, animals that live in and frequent the water's edge, and several types of flora and fauna. Future plans include making improvements to existing trails and adding additional trails for added opportunities. Opportunities to improve existing trails will be accommodated to provide a safe trail system for wildlife and visitors when changes occur adjacent to or on the trail that require action. These changes may include but are not limited to changes in habitat due to downed trees or flooding, sensitive habitat occurrences due to nesting species, or recognition of a better or safer path to direct the trail.

One new trail project would connect the Woodmarsh Trail to the Great Marsh Trail. Another project would provide visitors additional opportunities along Sycamore Road from the Woodmarsh Trail kiosk adjacent to Sycamore Road through to the end of Sycamore Road at Sycamore Point during trail closures of sensitive habitat. Developing a trail out to Sycamore Point will provide opportunities for observation platforms along the Potomac River.

High Point Trail, a multi-purpose trail of which only ½ mile of the 3 mile trail traverses the Refuge, is located along High Point Rd. It features accessible paths and boardwalks and its function is to provide safe access for pedestrians to the Mason Neck State Park. This is the only trail that allows bicycling and other pedestrian

uses along with foot traffic on the Refuge. The trail was developed to provide a safe alternative to pedestrians that were using High Point Road to access the State Park. Future plans also include interpretive waysides and interpretive media to be provided adjacent to the trail.

On-refuge environmental education activities will occur year-round during refuge hours of operation; however most of the field programs will be associated with the fall and spring school year terms usually mid-morning through the afternoon. The environmental education activities will primarily include teacher-guided field trips exploring topics requested by teachers, teacher workshops, and more structured curriculum-based topics. Opportunities to partner with the adjacent Mason Neck State Park in some aspects of the environmental education activities will be sought. The environmental education site currently includes a pavilion, two portalets, and a ½ mile environmental education trail. The site will be improved to facilitate possible increased visitation. Repairs include, but are not limited to replacing the pavilion, installing improved restroom facilities, and rehabbing the environmental education trail.

On-refuge interpretation activities will occur generally on designated trails and access roads or at developments such as kiosks and observation platforms. Currently the interpretive sites located on Woodmarsh Trail are located at a kiosk at the parking lot, a wayside interpretive panel at the beginning of the trail and a kiosk at the back end of the trail adjacent to Sycamore Road. The interpretive sites located along the Joseph V. Gartlan Jr. Great Marsh Trail include a kiosk near the parking lot and a wayside interpretive panel at the end of the trail on the Great Marsh Overlook. Each kiosk at the head of both trails provides interpretive information, brochures, and bulletin boards highlighting information on refuge happenings. Future plans include updating and adding interpretive materials, waysides, kiosks, and/or other interpretive media formats where possible along these trails to facilitate the explanation of refuge resources, management, and to enhance self-guided opportunities. Woodmarsh Trail will also be renovated to feature a paved parking lot and improved kiosk facilities.

Off - and on-site opportunities to support multi-agency interpretive efforts will be supported by the refuge. Future plans include, but are not limited to an interpretive multi-agency kiosk that provides information about each agency located on the Mason Neck peninsula and a Traveler's Information System that would provide information about the refuge on an AM frequency.

Certain areas on the refuge may be closed to public access at the Refuge Manager's discretion to protect sensitive habitats or species of concern, minimize conflicts with other refuge activities, or due to human health and safety concerns.

Occoquan Bay National Wildlife Refuge:

Priority public uses will normally occur along access roads, the Wildlife Drive, and the observation platform on Marumsco Creek. Parking currently occurs in the center of the refuge in the designated public parking lot. In addition, several parking locations are available throughout the Occoquan Bay Refuge for activities occurring under special conditions. Electronic lures/calls for birds and wildlife are not allowed for use on the refuge unless under educational or research permit.

Wildlife observation and photography will occur generally on access roads that have been designated as trails, the Wildlife Drive, or at developments such as photography blinds and observation platforms. Currently several access roads/trails are available for wildlife observation and photography. The following access roads/trails are open to foot traffic only, unless special conditions apply: Lake Drive (.39 miles), Deephole Point Road (2.14 miles), Fox Road (.43 miles), Bayview Road (.31 miles), Easy Road (.61 miles), Delta Road (.17 miles), and portions of Charlie Road (.36 miles) and Taylor Point Road (.35 miles). Each road features gravel paths and offer slightly different habitat types and viewing opportunities, including but not limited to grasslands, wet meadows, shrubland, bottomland hardwoods, open water marsh, and the Belmont and Occoquan Bays. Lake Drive features the Painted Turtle Pond with a ramp and dock that can be used for observation. Deephole Point Road features a wildlife observation blind, a migratory bird banding station that operates in the spring, and a gazebo with a spotting scope that overlooks Occoquan Bay. The Wildlife Drive (1.69 miles) travels through several different habitats and allows the visitor an opportunity to see the refuge from personal vehicles or bicycles. Parking on the Wildlife Drive is not allowed. Bicycles are only allowed on the entry road, Wildlife Drive, and the proposed road to the Visitor Contact Station. Future plans include but are not limited to, adding additional trails for increased opportunities. A connector trail featuring a boardwalk and an observation platform along a marsh edge will be constructed between Easy Road and Deephole Point Road. A trail will also be constructed in an area along side the Wildlife Drive to divert pedestrian traffic off of the road. Depending on the location of the Visitor Contact Station, trails may be included adjacent or near the Station to provide opportunities for visitors interested in short walks through refuge habitat.

On-refuge environmental education activities will occur year-round during daylight hours when the refuge is open; however most of the field programs will be associated with the fall and spring school year terms. The environmental education activities will primarily include teacher-guided field trips exploring topics requested by teachers, teacher workshops, and more structured curriculum-based topics. Opportunities to partner with Prince William County Schools will be sought. The environmental education site currently includes a pavilion, one unisex portalet, a small marsh with boardwalk, and a pond with a dock and ramp. The site will be improved to facilitate possible increased visitation. Improvements include, but are not limited to increasing quality sampling sites for environmental education activities and stabilizing access routes to each educational site.

On-refuge interpretation activities will occur generally on designated trails and access roads or at developments such as kiosks and viewing platforms. Currently interpretive sites include a kiosk site outside the gate, the Main Parking Lot Pavilion featuring 6 interpretive panels, an interpretive trail featuring 10 small signs developed by the Friends of the Potomac River Refuges, and several locations scattered throughout the refuge discussing topics such as, but not limited to, butterflies, the marsh/beaver lodge, the Harry Diamond Lab, birds, bird banding, and habitat management. As additional trails are added, the interpretive value of the area will be determined and developed as such. Future plans include updating and adding interpretive materials, waysides, kiosks, and/or other interpretive media formats where possible along these trails to facilitate the explanation of refuge resources, management, and to enhance self-guided opportunities.

Off- and on-site opportunities to support multi-agency interpretive efforts will be supported by the refuge.

Certain areas on the refuge may be closed to public access at the Refuge Manager's discretion to protect sensitive habitats or species of concern, minimize conflicts with other refuge activities, or due to human health and safety concerns.

Featherstone NWR:

Currently the Featherstone Refuge is closed to the general public and does not have the facilities to support priority public uses.

Discussions to provide safe public access and parking to Featherstone Refuge are in progress. The construction of two new trails on the refuge is dependent on the success of securing public access to the refuge. The Riverside Station Residential Development has proposed building a trail through their property to provide public access to the Refuge's western boundary, and the Potomac Heritage National Scenic Trail (PHNST) is proposed as an access route for the east side of the Refuge. The PHNST is a partnership to develop a network of locally-managed trails in a 425-mile corridor between the Chesapeake Bay and the Allegheny Highlands. The route for the trail is proposed to travel along a portion of the old railroad path that traverses the entire refuge from north to south. Provided these trails are built as proposed through Featherstone Refuge, activities associated with wildlife observation, photography, environmental education and interpretation could be facilitated. Additional trails will be added to facilitate access to Farm Creek, Neabsco Creek, and /or Occoquan Bay.

Wildlife observation, interpretation, and photography will occur along designated trails. Electronic lures/calls for birds and wildlife are not allowed for use on the refuge unless under educational or research permit.

On-refuge environmental education activities will occur year-round during daylight hours when the refuge is open; however most of the field programs will be associated with the fall and spring school year terms. The environmental education activities will primarily include teacher-guided field trips exploring topics requested by teachers, teacher workshops, and more structured curriculum-based topics.

Off- and on-site opportunities to support multi-agency interpretive efforts will be supported by the refuge. Future plans include updating and adding interpretive materials, waysides, kiosks, and/or other interpretive media formats where possible along these trails to facilitate the explanation of refuge resources, management, and to enhance self-guided opportunities.

Certain areas on the refuge may be closed to public access at the Refuge Manager's discretion to protect sensitive habitats or species of concern, minimize conflicts with other refuge activities, or due to human health and safety concerns.

(c) When would the use be conducted?

Elizabeth Hartwell Mason Neck NWR: Year-round, during refuge hours of operation (typically April 1- September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). A temporary closure to these activities would be implemented during scheduled Refuge hunt dates.

Occoquan Bay NWR: Year-round, during refuge hours of operation (typically April 1- September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). A temporary closure to these activities would be implemented during any scheduled Refuge hunt dates.

Featherstone NWR: Assuming trails have been developed and public access is available, year-round, during refuge hours of operation (typically April 1- September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). A temporary closure to these activities would be implemented during scheduled Refuge hunt dates.

(d) How would the use be conducted?

These four priority uses will be conducted much as they are conducted presently. Such activities would be allowed on established roads, trails, and in buildings that have been designed to accommodate such uses, in areas that are the least sensitive to human intrusion. Self-guided groups of 10 or more will be required to have permission to visit the Refuge for these activities.

Self-guided groups are those who wish to host their own wildlife-dependant activities. As stated above, groups of 10 or more are required to have permission for these activities. Each request must be presented in writing with details of who, what, where, when, why, and how the activity will be conducted. Each request has different logistics, and therefore, would be evaluated for impacts on the Refuge mission. Using professional judgment, as long as there is no significant negative impact to natural resources or visitor services, or violation of Refuge regulations, a Special Use Permit(SUP) will be issued outlining the framework in which this use can be conducted. Refuge staff will ensure compliance with the SUP.

There will be a mix of personal and non-personal program delivery, including interpretive signing, audio-visual presentations, brochures, special events, guided walks and talks, exhibits, web site information, and informal visitor information contacts. Electronic lures/calls for birds and wildlife are not allowed for use on the refuge unless under educational or research permit.

Elizabeth Hartwell Mason Neck NWR: Only foot travel is allowed on refuge trails (i.e., Woodmarsh and Joseph V. Gartlan Jr. Great Marsh Trails, and the proposed Treestand Trail and Sycamore Trail). During snow events on the refuge, cross-country skiing and snow shoeing will be allowed on all refuge trails that allow foot travel. Bicycling and other non-motorized pedestrian use will be allowed on the High Point Trail only. Motorized use and horseback riding are prohibited on the refuge. These uses would be conducted by the general public, as well as by organized groups, including schools, birding groups, and scout groups.

Occoquan Bay NWR: An entrance fee will be charged to all with the exception of school groups, scouts on merit badge projects assignments, or children under 16 years of age at Occoquan Bay Refuge. Only foot travel is allowed on Lake Drive, Deephole Point Road, Fox Road, Easy Road, Bayview Road, Delta Road, and portions of Charlie and Taylor Point Road. During snow events on the refuge, cross-country skiing and snow shoeing will be allowed on all refuge trails that allow foot travel. Vehicles and bicycles can utilize the Wildlife Drive (Dawson Beach Road, Locust Road, a small portion of Charlie Road, Bravo Road, and the portion of Taylor Point Road that is outside the gate as visitors exit the refuge). Horseback riding is prohibited on all trails. These uses would be conducted by the general public, as well as by organized groups, including schools, birding groups, and scout groups.

Featherstone NWR: Bicycles and other pedestrians will be allowed on the Potomac Heritage National Scenic Trail (PHNST). Only foot travel will be allowed on trails that spur off of the PHNST for additional access to other parts of the Featherstone Refuge. During snow events on the refuge, cross-country skiing and snow shoeing will be allowed on all refuge trails that allow foot travel.

(e) Why is the use being proposed?

Wildlife observation and photography, and environmental education and interpretation are four of the six priority public uses of the National Wildlife Refuge System. If compatible, they are to receive enhanced consideration over other secondary public uses.

AVAILABILITY OF RESOURCES

The resources necessary to provide and administer these uses, at current use levels, are available within current and anticipated Refuge budgets. Staff time associated with administering these uses relate to assessing and conducting maintenance, including kiosks and other facilities, gates, trails, parking areas, and signs; monitoring potential impacts of the use on Refuge resources and visitors; and providing information and visitor service use opportunities to the public. Facilitating the special use permit process for wildlife dependent self-guided groups will be addressed within available resources. Staff costs are incurred in the review of each request, the coordination of groups or event coordinators, and the actual writing of the writing of the permit. Enforcement of compliance with rules and regulations and special use permit terms will incur costs.

Costs associated with administering this use include:

- Visitor Services Park Ranger GS-09 – 38 weeks/yr. = **\$39,155**
- Deputy Refuge Manager (GS-11) – 3 weeks/yr. = **\$3,740**
- Refuge Manager (GS-14) - 1 week/yr. = **\$1,969**
- Law Enforcement Officer (GS-09) - 10 weeks/yr. = **\$10,304**
- Maintenance Worker (WG-10) - 10 weeks/yr = **\$11,416**
- Administrative Support Assistant (GS-7) – 1 week/yr. = **\$980**
- *In addition volunteer hours ranging from 400 to 650 hours contributing approximately \$10,400.00.*

Additional staff needs and costs are anticipated with the addition of trails and activities within the Complex. It will be necessary to hire a Visitor Services Manager (GS-11/12), Park Ranger (GS-5), Maintenance Worker (WG-9) and Maintenance Worker (WG-6) to compliment current staffing. The Visitor Services Manager will be available for public outreach and to facilitate the visitor services program on the complex. The Park Ranger will monitor visitor use and aide in facilitating visitor services opportunities. Maintenance staff will perform the regular maintenance duties and repairs that relate to visitor services.

Costs associated with administering additional uses include:

- Visitor Services Manager (GS-12) – 38 weeks/yr. = **\$53,245**
- Maintenance Worker (WG-9) - 10 weeks/yr. = **\$9,584**
- Maintenance Worker (WG-6) - 10 weeks/yr = **\$7,796**
- Park Ranger (GS-5) – 38 weeks/yr. = **\$24,229**

ANTICIPATED IMPACTS OF THE USE:

Wildlife observation, photography, environmental education, and interpretation 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 Refuge wildlife and habitats. That can translate into more widespread, stronger support for the Refuge, the Refuge System, and the Service.

Wildlife observation and photography have the potential of impacting shorebird, waterfowl, marshbirds and other migratory bird populations feeding and resting near the trails during certain times of the year. Use of upland trails is more likely to impact songbirds than other migratory birds. Human disturbance to migratory birds has been documented in many studies in different locations.

Direct Impacts

Direct impacts have an immediate effect on wildlife. We expect those impacts to include the presence of humans disturbing wildlife, which typically results in a temporary displacement without long-term effects on

wildlife 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. Overall, those effects should not be significant, because most of the Refuge will experience minimal public use.

Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). Response of wildlife to human activities includes: departure from site (Owen 1973, Burger 1981, Korschgen et al 1985, Henson and Grant 1991, Kahl 1991, Klein 1993), use of suboptimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Korschen et al. 1985, Morton et al. 1989, Ward and Stehn 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990). McNeil et al. (1992) found that many waterfowl species avoid disturbance by feeding at night instead of during the day. The location of recreational activities impacts species in different ways. Miller et al. (1998) found that nesting success was lower near recreational trails, where human activity was common, than at greater distances from the trails. A number of species have shown greater reactions when pedestrian use occurred off trail (Miller, 1998). In addition, Burger (1981) found that wading birds were extremely sensitive to disturbance in the northeastern U.S. In regard to waterfowl, Klein (1989) found migratory dabbling ducks to be the most sensitive to disturbance and migrant ducks to be more sensitive when they first arrived, in the late fall, than later in winter.

For songbirds, Gutzwiller et al. (1997) found that singing behavior of some species was altered by low levels of human intrusion. Pedestrian travel can impact normal behavioral activities, including feeding, reproductive, and social behavior. Studies have shown that ducks and shorebirds are sensitive to pedestrian activity (Burger 1981, 1986). Resident waterbirds tend to be less sensitive to human disturbance than migrants, and migrant ducks are particularly sensitive when they first arrive (Klein 1993). In areas where human activity is common, birds tolerated closer approaches than in areas receiving less activity.

Indirect Impacts

Laskowski et al. (1993), studied behavior of snowy egrets, female mallards, and greater yellowlegs. Behavior of snowy egrets was recorded during August and September 1992 to represent post-breeding marsh and wading birds. Mallards were monitored during migration (November 1992) and during the winter January (1993). Greater yellowlegs' behavior was observed during the northward shorebird migration (May 1993). Behavior was monitored during the typical public activities of walking, bicycling, and driving a vehicle past the sample sites.

The study found that snowy egret resting behavior decreased and alert behavior increased in the presence of humans. Preening decreased when humans were present, but this change was not significant. Feeding, walk/swim, and flight behaviors were not related to human presence. Female mallards in November increased feeding, preening and alert behaviors in the presence of humans. Resting, walk/swim, and flight behavior were not influenced by human presence. In January, female mallard resting and preening behavior were not influenced by the presence of humans. However, feeding, alert, walk/swim, and flight behaviors were related to human presence. Greater yellowlegs increased alert behavior in the presence of humans. No other behaviors were affected. Maintenance behavior (combined feeding, resting, and preening) decreased when humans were present for all study species. In addition, this decrease was accompanied by an increase in escape behavior by each species. Maintenance behavior of mallards in January decreased in the presence of vehicles and combined disturbance. Escape behavior increased when vehicles were present. Maintenance behavior of greater yellowlegs declined when bicycles and vehicles were present but was not influenced by pedestrian presence.

The presence of bicycles and vehicles increased escape behavior. Snowy egrets and female mallards increased movement between subplots and to areas within the study area but further from the disturbance.

During a five year study which involved nine different species of birds, researchers found only minimal evidence that intrusion affected bird distributions (Gutzwiller and Anderson 1999). This study also found that the species affected by intrusion were not consistent from year to year or within study areas and could be due to habituation of intrusion (Gutzwiller and Anderson 1999).

People can be vectors for invasive plants by moving seeds or other propagules from one area to another. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife. The threat of invasive plant establishment will always be an issue requiring annual monitoring and treatment when necessary. Our staff will work at eradicating invasive plants and educating the visiting public. Also, opening Refuge lands to public use can often result in littering, vandalism, or other illegal activities on the Refuge.

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. 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 priority public uses to discern and respond to any unacceptable impacts on wildlife or habitats. To mitigate those impacts, the Refuge will continue to close areas to the public to protect wildlife during critical life periods.

PUBLIC REVIEW AND COMMENT:

As part of the Elizabeth Hartwell Mason Neck/Featherstone CCP process, this compatibility determination will undergo extensive public review, including a comment period of 45 days following the release of the Draft CCP/EA.

DETERMINATION (CHECK ONE BELOW):

Use is not compatible

Use is compatible with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

No off-road or off-trail access will be permitted, except for emergency or administrative purposes, management actions, and for those who have obtained a Special Use Permit for a specific purpose that requires off-road/off-trail access.

Electronic lures/calls for birds and wildlife are not allowed for use on the refuge unless under educational or research permit.

For self-guided groups of 10 or more, each request must be presented in writing with details of who, what, where, when, why, and how the group activity will be conducted. Each request will then be evaluated for impacts to the Refuge. Using professional judgment, as long as there is no significant negative impact to natural resources or visitor services, or violation of Refuge regulations, a Special Use Permit will be issued outlining the framework in which this use can be conducted.

Elizabeth Harwell Mason Neck National Wildlife Refuge

Only foot travel is allowed on refuge trails (i.e., Woodmarsh and Joseph V. Gartlan Jr. Great Marsh Trails, and the proposed Treestand Trail and Sycamore Trail). During snow events on the refuge, cross-country skiing and snow shoeing will be allowed on all refuge trails that allow foot travel. Bicycling and other non-motorized pedestrian use will be allowed on the High Point Trail only.

Occoquan Bay National Wildlife Refuge

Only foot travel is allowed on Lake Drive, Deephole Point Road, Fox Road, Easy Road, Bayview Road, Delta Road, and portions of Charlie and Taylor Point Road. During snow events on the refuge, cross-country skiing and snow shoeing will be allowed on all refuge trails that allow foot travel. Vehicles and bicycles can utilize the Wildlife Drive (Dawson Beach Road, Locust Road, a small portion of Charlie Road, Bravo Road, and the portion of Taylor Point Road that is outside the gate as visitors exit the refuge).

Featherstone National Wildlife Refuge

Bicycles and other pedestrians will be allowed on the Potomac Heritage National Scenic Trail. Only foot travel will be allowed on trails that spur off of the PHNST for additional access to other parts of the Featherstone

Refuge. During snow events on the refuge, cross-country skiing and snow shoeing will be allowed on all refuge trails that allow foot travel.

JUSTIFICATION:

These four priority public uses will provide compatible educational and recreational opportunities for visitors to enjoy the Refuge Complex resources, and improve their understanding and appreciation of fish and wildlife, ecology, refuge management practices, and the relationship of plant and animal populations in the ecosystem. Visitors will better understand the Service role in conservation, and opportunities, issues, and concerns faced in management of our natural resources. Further, they will understand the impact that human presence, disturbance, and/or consumption can cause to these resources. Likewise, these four priority uses will provide opportunities for visitors to observe wildlife habitats firsthand, and learn about wildlife and wild lands at their own pace in an unstructured environment. Authorization of these uses will result in a wider constituency for achieving individual refuge goals, and, ultimately, the Service mission. These activities will not materially interfere with or detract from the mission of the NWRS or purposes for which Elizabeth Hartwell Mason Neck NWR, Occoquan Bay NWR, and Featherstone NWR were established.

SIGNATURE:

Refuge Manager _____ (Signature) _____ (Date)

CONCURRENCE:

Regional Chief _____ (Signature) _____ (Date)

MANDATORY 15 YEAR RE-EVALUATION DATE:

LITERATURE CITED:

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COMPATIBILITY DETERMINATION

USE:

Hunting

REFUGE NAME:

Elizabeth Hartwell Mason Neck and Occoquan Bay National Wildlife Refuges (Potomac River National Wildlife Refuge Complex)

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

The Potomac River National Wildlife Refuge Complex is composed of three nationally significant wildlife areas: Mason Neck, Featherstone, and Occoquan Bay National Wildlife Refuges.

Each National Wildlife Refuge (NWR) is established under specific legislation or administrative authority. Similarly, each refuge has one or more specific legal purposes for which it was established. The establishing legislation or authority and the purposes for each refuge in the Potomac River NWR Complex (Refuge Complex) are provided below:

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Date Established: 1 February 1969

Establishing Authorities: Elizabeth Hartwell Mason Neck NWR (Mason Neck Refuge) was established under the Endangered Species Act (16 U.S.C. 1534), the Refuge Recreation Act (16 U.S.C. 460[k] – 460[k][4]), an Act Authorizing the Transfer of Certain Property for Wildlife , or other purposes (16 U.S.C. 667b), and the Migratory Bird Conservation Act (16 U.S.C. 715d).

Occoquan Bay National Wildlife Refuge

Date Established: 28 June 1998

Establishing Authorities: Occoquan Bay NWR (Occoquan Refuge) was established under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes (16 U.S.C. 667b).

REFUGE PURPOSE(S):

Elizabeth Hartwell Mason Neck National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under the Endangered Species Act are “... to conserve (A) fish or wildlife which are listed as endangered species or threatened species Or (B) plants ...” (16 U.S.C. § 1534); lands acquired under the Refuge Recreation Act were found to be “... suitable for– (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ...” 16 U.S.C. § 460k-1 “... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ...” (16 U.S.C. 460[k] – 460[k][4]); lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife , or other purposes were established for their “... particular value in carrying out the national migratory bird management program.” (16 U.S.C. § 667b); and

lands acquired under the Migratory Bird Conservation Act were “... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” (16 U.S.C. § 715d).

Occoquan Bay National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes were established for their “... particular value in carrying out the national migratory bird management program.” (16 U.S.C. § 667b)

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 public use?

The use is the hunting of white-tail deer and turkey on the Potomac River NWR Complex. 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 (Public Law 105-57), identifies hunting as one of the six priority wildlife-dependent recreational uses to be facilitated within the National Wildlife Refuge System. The Act encourages the Service to provide opportunities for these uses when compatible with the purposes for which the refuge was established.

(b) Where would the use be conducted?

Elizabeth Hartwell Mason Neck NWR

The Mason Neck Refuge will be open for public hunting.

Deer hunting will take place within the refuge boundary. Buffer zones are included for all roads and refuge facilities. The refuge will be closed to all other public uses during scheduled deer (archery and shotgun) hunt days.

In the Draft Comprehensive Conservation Plan, we propose to expand hunting opportunities to include a youth turkey hunt. Turkey hunting will take place within the refuge boundary to the west of Sycamore Road. No public use trails will be closed during the turkey hunt. All hunting activities will take place on remote portions of the refuge with ample buffers to ensure the safety of the general public and the avoidance of encounters with individuals carrying firearms or carrying killed game.

Occoquan Bay NWR

The Occoquan Refuge will be open for public hunting.

Deer hunting will take place within the refuge boundary only from stationary hunt stands. The number of hunters permitted to occupy stands and the specific stand locations will be assessed after each hunting season and adjusted as necessary to meet deer management objectives.

(c) When would the use be conducted?

Dates would fall with Virginia’s regulated seasons for the species mentioned. Specific dates in a given year would be coordinated with VDGIF.

Elizabeth Hartwell Mason Neck NWR

The deer hunt (shotgun) is currently conducted over the course of two consecutive days in late November and a third day in early December. Hunting days will only occur during Virginia’s regulated seasons and hunt dates may vary annually based on management needs.

In our Draft CCP/EA, we propose to establish an archery deer hunt, which would be conducted during Virginia’s regulated archery hunting season.

In our Draft CCP/EA, we propose to establish a youth turkey hunt, which would be done in partnership with VDGIF and the National Wild Turkey Federation and occur on 3 days during the spring and/or fall, in accordance with Virginia’s regulated season dates.

Occoquan Bay NWR

The deer hunt is currently conducted for 3 days in December and 1 day in January; VDGIF conducts a deer hunt for youth on a Saturday in December. Refuge deer management hunts take place over the course of two additional days in December and a third optional day in January. Hunting days will always occurring during the VDGIF state-regulated seasons and hunt dates may vary annually based on management needs.

(d) How would the use be conducted?

Elizabeth Hartwell Mason Neck NWR White-tailed Deer Hunt (shotgun)

The Refuge permits hunting within state guidelines in compliance with a hunt program that is adjusted each year to ensure safety and sound wildlife management. The Mason Neck Refuge has held an annual deer hunt since 1989. The shotgun deer management program is a cooperative effort with the VDGIF and the State Department of Conservation and Recreation, Mason Neck State Park (MNSP).

The management hunt has an application process, an orientation and firearm certification requirement, and provides for a scouting day prior to selected hunt days. Applications will usually be available during the first week of July and due the first week of October. Once applications have been received and input into a lottery database, selections are made by computer and selection notices are sent out to all hunters. All hunters must certify firearms expected to be used during the hunt prior to attending the orientation session (online or in-person). Once the firearm certification is verified and the prospective orientation session has been attended, hunters will then be allowed to purchase a hunt permit. Scouting usually occurs the first Sunday in November. Hunters selected for the shotgun management hunt have the opportunity to visit their assigned parking lot and scout areas in the hunting area.

On each hunt day, a maximum of 57 hunters are allowed to park within ten available parking lots, the designated tree stand parking lot, and the mobility impaired hunting lots (1,730 acres). If a slot in a designated parking lot is not filled, a stand-by hunter (hunters that did not get selected for the current hunt day but have permits for other days of hunting) will be directed to those vacant parking slots on a first-come, first-serve basis.

This existing hunt is highly managed by Refuge and MNSP staff, and volunteers. On each day of the hunt, after identification and certification cards have been checked and hunters have been checked-in, the hunters drive to designated parking lots. If deer have been harvested, hunters drive to the deer check station for data collection on harvested game. At that time, the hunter, depending on the harvested game have an option to return to hunting or leave for the day. Throughout the day, until 3:00 PM, standby hunters have an option to fill vacant parking slots once a hunter has checked out.

Elizabeth Hartwell Mason Neck White-tailed Deer (archery)

The Refuge permits hunting within state guidelines in compliance with a hunt program that we will adjust each year to ensure safety and sound wildlife management. The Mason Neck Refuge has held an annual deer hunt since 1989. As in the past, future plans include an archery component. The deer management archery program will be a cooperative effort with VDGIF and other possible interested parties (e.g., Mason Neck State Park, Bureau of Land Management – Meadowwood Recreation Area).

The management hunt has an application process, an orientation and archery certification course requirement, and provides for a scouting day prior to selected hunt days. Applications will usually be available during the first week of July and due as early as August. Once applications have been received and input into a lottery database, selections are made by computer and selection notices are sent out to all hunters. All hunters must attend an archery certification course prior to attending the orientation session (online or in-person). Once the archery certification is verified and the prospective orientation session has been attended, hunters will then be allowed to purchase a hunt permit. Scouting will be allowed before the first day of hunting. Hunters selected

for the archery management hunt have the opportunity to visit their assigned parking lot and scout areas in the hunting area.

On each hunt day, a maximum of 30 hunters are allowed to park within the ten available parking lots, the designated tree stand parking lot, and the mobility impaired hunting lots (1,730 acres).

Elizabeth Hartwell Mason Neck NWR Wild Turkey Hunt

In our Draft CCP/EA, we propose to expand hunting opportunities to include a youth turkey hunt. This youth hunt will occur for 3 days in conjunction with the state hunting seasons in the spring and/or fall. Partnerships with VDGIF and the National Wild Turkey Federation will facilitate the program. This opportunity coincides with VDGIF's goal of introducing youth to hunting and the FWS's objectives of connecting children with nature. Expectations are that youth hunters and accompanying mentors will be selected for each hunt day. We will allow up to 10 hunters in total, with an expected maximum harvest of 8-10 turkeys annually. Efforts will be made to minimize conflicts between hunting, habitat management, migratory bird nesting, and other wildlife-dependent recreation by restricting the hunt area to portions of the refuge west of Sycamore Road thereby avoiding trails open to the public. State regulations related to turkey hunting and bag limits will be strictly enforced.

Occoquan Bay NWR White-tailed Deer Hunt

The Refuge permits hunting within state guidelines in compliance with a hunt program that is adjusted each year to ensure safety and sound wildlife management. The Occoquan Bay Refuge has held an annual deer hunt since 2001. The deer management program is a cooperative effort with VDGIF.

The VDGIF Generations Deer Hunting Workshop is coordinated and facilitated by VDGIF staff. The hunt has an application process which includes a written essay and a firearm certification requirement. Applications are due to VDGIF in October. Once applications have been received, selections are made based on submitted material. Emphasis is placed on encouraging youth with little to no hunting experience to participate. The hunt day involves a morning lecture on deer health and behavior and hunting safety; a mid-day break for lunch; and an afternoon of chaperoned hunting from deer stands.

The FWS management hunt has an application process, an orientation and firearm certification requirement prior to selected hunt days. Applications will usually be available during the first week of July and due the first week of October. Once applications have been received and input into a lottery database, selections are made by computer and selection notices are sent out to all hunters. All hunters must certify firearms expected to be used during the hunt prior to attending the orientation session (online or in-person). Once the firearm certification is verified and the prospective orientation session has been attended, hunters will then be allowed to purchase a hunt permit.

On each hunt day, the number of hunters allowed on the refuge will be determined by the number of active stands deemed necessary to control the deer herd on 640 acres of the refuge. If hunt stands are not filled, the stand-by hunter (hunters that did not get selected for the current hunt day but have permits for other days of hunting) will be directed to vacant hunt stands on a first-come, first-serve basis.

This existing hunt is highly managed by Refuge and VDGIF staff, and volunteers. On each day of the hunt, after identification and certification cards have been checked and hunters have been checked-in, the hunters are dropped off at designated hunt stands. If deer have been harvested, hunters are picked up and brought back to the deer check station for data collection on harvested game. At that time, the hunter, depending on the harvested game have an option to return to hunting or leave for the day.

All Hunting Opportunities

All hunt zones and hunt boundaries will be posted with permanent and/or temporary markings including but not limited to orange carsonite posts, A-series refuge management personnel, and seasonally visible vinyl boundary flagging. Refuge and MNSP law enforcement personnel, along with VDGIF Game officials will monitor the hunts for compliance with State Game laws and hunt specific regulations. Organized drives by hunters to move deer into specific directions is deemed to be outside the spirit of the hunt. Hunts facilitated at the Occoquan Bay Refuge will be conducted using refuge stationary hunt stands. The use of hunt stands

during the Mason Neck hunt is optional. The use of dogs is not permitted during any of the managed deer hunts. In addition, the use of rifles or crossbows will not be allowed.

(e) Why is the use being proposed?

White-tailed deer have a high reproductive potential. This potential, coupled with the declining acreage of quality habitat for them on Mason Neck Peninsula, necessitates the use of hunting to control or reduce the population. Biological sampling conducted during these hunts has indicated that the population levels have been stabilized by the hunting and that the overall health of the deer has improved. Though formal vegetation studies have not been conducted to determine changes in habitat, visually, it is evident that the impacts attributed to the browsing of forest understory habitat by deer have decreased. The recovery of the understory has afforded certain wildlife with food and cover.

The shotgun deer hunts are conducted in the Fall and Winter when the neotropical migratory birds are absent and the northern migratory songbirds are not nesting. Any disturbances to these birds, waterfowl and other wildlife are outweighed by the overall improvements to habitat from reducing the deer herd.

Wild turkey hunting is a traditional outdoor pastime. When managed responsibly, it can instill a unique appreciation of wildlife, their behavior, and their habitat needs.

Providing hunting will support one of the “Big 6” activities of the Improvement Act (Public Law 105-57) and, if compatible, is to receive enhanced consideration in refuge planning.

AVAILABILITY OF RESOURCES:

The Potomac River NWR Complex incurs the bulk of the cost for implementing the hunt program in staff time to administer the hunt each day and to coordinate with our partners. To expand hunting opportunities proposed in the CCP, there will be increased costs to post hunt boundary and staff additional days; however, this cost (included below) is within the existing budget and staff resources of the Refuge.

Costs associated with administering this use include:

- Senior Refuge Biologist (GS-12) and/or GS-09 Refuge Biologist - 4 weeks/yr. = **\$6,954**
- Visitor Services Manager (GS-12) and/or GS-09 Refuge Operations Specialist – 2 weeks/yr. = **\$3,476**
- Deputy Refuge Manager (GS-11) – 8 weeks/yr. = **\$11,603**
- Refuge Manager (GS-14) - 2 weeks/yr. = **\$4,884**
- Law Enforcement Officer (GS-09) - 2 weeks/yr. = **\$2,398**
- Maintenance Worker (WG-10) - 4 weeks for new hunt opportunities = **\$4,408**; 2 week/yr. thereafter = **\$2,204**
- Administrative Support Assistant (GS-7) – 1 week/yr. = **\$980**
- *In addition volunteer hours ranging from 200 to 250 hours contributing approximately \$4,000.00.*

ANTICIPATED IMPACTS OF THE USE:

The management goals and objectives of Potomac River NWR Complex which include Elizabeth Hartwell Mason Neck NWR, Occoquan Bay NWR, and Featherstone NWR pertain to the preservation and enhancement of habitats for endangered species; management and protection of waterfowl and other migratory bird habitats, maintenance of a diversity of habitats for indigenous species; and to provide areas for environmental education, research and public use. Impacts from deer and turkey hunting and scouting

opportunities may include the temporary displacement of non-target wildlife and minor impacts to vegetation from foot traffic.

Based on a nationwide survey of all states (Krausman 1992), deer were effectively controlled with hunting and habitat manipulation in many areas where they were overpopulated. The remaining overpopulated herds were either not hunted, had an inadequate doe harvest, or an inadequate general harvest. Because the population of deer in the Refuge boundary area is open, with numerous tracts and corridors for movement and contact with other herds, it is unlikely that hunting will reduce the population to such low levels as to place it at risk of becoming genetically bottlenecked. Also, no prevention or control of epizootic hemorrhagic disease exists to date except by keeping populations below the carrying capacity of their habitats. In a 10-year study in northwestern Pennsylvania examining the impacts of varying densities of deer on deer health and habitat, starvation mortality resulted when densities reached higher than 25 deer per square kilometer (247 acres).

Species richness and abundance of shrubs and herbaceous vegetation was also shown to decline when deer densities reach between 4-8 deer/km² (deCalesta and Stout 1997). Habitats subject to deer damage include forest understory and shrub habitat that migratory songbirds depend on for food resources. Heavily-browsed vegetation leaves less food and cover habitat for neotropical migratory birds, a trust resource which the Refuge is charged with protecting. Controlled hunting keeps the deer population within the carrying capacity of the habitat. Modifying the hunt program to further reduce the deer population would then reduce the browse effects on vegetation. This would enable the forest understory to grow and produce more food and cover for neotropical migrants. It would also provide additional food and cover for species such as small mammals, reptiles and invertebrates.

The impacts of dense deer populations on forest regeneration and the composition and diversity of the herbaceous understory have been well documented (Tierson, et al., 1966; Behrend, et al., 1970; Tilghman, 1989).

At high densities, deer may act as a host reservoir for Lyme-disease bearing ticks (Jones et al. 1998). Reducing the deer population will reduce the potential for Lyme disease transmission. Based on these considerations, it is anticipated that hunting would have a positive impact on deer health and quality and habitat condition. Reducing the deer population will also benefit the surrounding human community by reducing damage on crops and residential landscape vegetation. No adverse impacts to vegetation from trampling from hunters are likely, as most species will have already undergone biological aging or become dormant. Soil and water quality are not expected to experience any negative effects under this alternative.

During the shotgun deer hunt timeframe, populations of most migratory birds are low. Some disturbance occurs to waterfowl, but it is offset by the benefits of a healthy deer herd that is smaller and is not consuming large quantities of waterfowl food plants. Disturbance to endangered species has not been noted in 18 years of hunting. A Section 7 consultation was prepared and approved on the hunt program in 1989. The deer hunt would occur outside of the breeding period of most species, thereby avoiding any potential disturbance. No adverse effects on migratory birds or inter-jurisdictional fishes are anticipated as a result of establishing a hunt program. Wintering or resident birds, small mammals, and reptiles may experience some flushing, but there is ample cover in the form of marsh, hedgerows, shrubland, and tall grasses for flushed wildlife to repair to, therefore it is expected that this disturbance will be temporary and normal use will resume shortly after the hunt closes each day.

Each refuge is completely closed to the public during the managed deer hunts. Though this is an inconvenience for the general refuge visitor, hundreds of individuals who do not visit the refuge on a regular basis are afforded an opportunity to participate in a wildlife dependent activity and expand their knowledge and skills in wildlife observation and biology.

No public use trails will be closed during the turkey hunt. All hunting activities will take place on remote portions of the refuge with ample buffers to ensure the safety of the general public and the avoidance of encounters with individuals carrying firearms or carrying killed game.

Hunters benefit from the harvesting of game for personal consumption. Hunters who come from outside the local area also contribute to the local economy by staying at local hotels and eating in local restaurants.

We do not expect a substantial increase in the cumulative effects of visitor use over the 15 year timeframe of this plan. Staff, in collaboration with volunteers, will monitor and evaluate the effects of these priority public uses to discern and respond to any unacceptable impacts on wildlife or habitats. To mitigate those impacts, the Refuge Complex will continue to close areas to the public to protect wildlife during critical life periods.

PUBLIC REVIEW AND COMMENT:

As part of the Elizabeth Hartwell Mason Neck/Featherstone CCP process, this compatibility determination will undergo extensive public review, including a comment period of 45 days following the release of the Draft CCP/EA.

DETERMINATION (CHECK ONE BELOW):

Use is not compatible

Use is compatible with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

The hunt program would be managed in accordance with Federal and State regulations. The deer hunt would be reviewed annually to ensure deer management goals are achieved. Both the deer and turkey hunts would be reviewed annually to ensure the program is providing a safe, high quality hunting experience for participants. The Annual Hunt Plan must be approved by Regional Office supervisors. Hunt season dates, limits and/or number of hunters per day would be adjusted as needed to achieve balanced wildlife population levels within carrying capacities.

Each refuge will be closed to all other public uses during the scheduled deer (shotgun and archery) hunt days. To mitigate user conflicts that arise when we close the Refuge to other public use, we would issue news releases and post information at the visitor center and informational kiosks to notify visitors of closings. We maintain safe deer and turkey hunts by limiting the number of hunters per day and by establishing a buffer zone around refuge residence buildings.

All hunters must follow the following stipulations for deer hunting:

1. You must possess and carry a refuge permit.
2. We select hunters by lottery using the Quota Deer Hunt Application Form. Contact the refuge office for information on application dates.
3. We send applicants an information packet detailing specific dates, details, and requirements for the hunt, including, but not limited to: hunt dates, hunt areas, bag restrictions, firearm certification requirements and locations, orientation dates/times, scouting date(s), check station location, and maps.
4. Hunters must certify/qualify weapons and ammunition and attend an orientation session or take the orientation session online prior to issuance of a permit. Please contact the Refuge for the online orientation web address.
5. Hunters must wear a minimum of 400 square inches of visible solid hunter-orange clothing and a hunter-orange hat.
6. We may close areas of the refuge to hunting. We will identify these areas on the maps in the information packet and review them during orientation.

JUSTIFICATION:

Hunting is a wildlife-dependent priority public use with minimal impact on Refuge resources. Hunting is consistent with current Service policy on hunting, the National Wildlife Refuge System Improvement Act of 1997, and the broad management objectives of the National Wildlife Refuge System. Hunting will not materially interfere with or detract from the purposes of the refuge or the mission of the National Wildlife Refuge System. The Refuge currently is meeting deer management and visitor services objectives.

CONCURRENCE:

Refuge Manager _____ (Signature) _____ (Date)

CONCURRENCE:

Regional Chief _____ (Signature) _____ (Date)

MANDATORY 15 YEAR RE-EVALUATION DATE: _____

LITERATURE CITED:

Behrend, D. F., G. F. Mattfield, W. C. Tierson and J. E. Wiley. 1970. Deer density control for comprehensive forest management. *J. Forestry*. 68:695-700.

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Jones, C.G., Ostfeld, R.S. Richard, M.P., Schaubert, E.M. and Wolf, J.O. 1998. Chain reactions linking acorns to gypsy moth outbreaks and Lyme disease risk. *Science* 279 (5353); 1023-1026.

Krausman, P.R., Sowls, L.K., Leopold, B.D. 1992. Revisiting overpopulated deer ranges in the United States. *California Fish and Game* 78(1); 1-10.

Tierson, W. C., E. F. Patric and D. F. Behrend. 1966. Influence of white-tailed deer on the logged northern hardwood forest. *J. Forestry*. 64:804-805.

Tilghman, N. G. 1989. Impacts of white-tailed deer on forest regeneration in northwestern Pennsylvania. *J. Wildl. Manage.* 53:524-532

COMPATIBILITY DETERMINATION

USE:

Fishing

REFUGE NAME:

Featherstone and Occoquan Bay National Wildlife Refuges (Potomac River National Wildlife Refuge Complex)¹

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

The Potomac River National Wildlife Refuge Complex is composed of three nationally significant wildlife areas: Mason Neck, Featherstone, and Occoquan Bay National Wildlife Refuges. This compatibility determination covers both Featherstone and Occoquan Bay National Wildlife Refuges.

Each National Wildlife Refuge (NWR) is established under specific legislation or administrative authority. Similarly, each refuge has one or more specific legal purposes for which it was established. The establishing legislation or authority and the purposes for each refuge in the Potomac River NWR Complex (Refuge Complex) are provided below:

Featherstone National Wildlife Refuge

Date Established: 23 February 1970

Establishing Authorities: Featherstone NWR (Featherstone Refuge) was established under Public Law 91-499 (1970).

Occoquan Bay National Wildlife Refuge

Date Established: 28 June 1998

Establishing Authorities: Occoquan Bay NWR (Occoquan Refuge) was established under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes (16 U.S.C. 667b).

REFUGE PURPOSE(S):

Featherstone National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under Public Law 91-499 (1970) were established to "... to protect the natural features of a contiguous wetland area." Public Law 91-499 (1970), dated Oct. 22, 1970.

Occoquan Bay National Wildlife Refuge

Purpose(s) for which Refuge was established: Lands acquired under the Act Authorizing the Transfer of Certain Property for Wildlife, or other purposes were established for their "... particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b)

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

¹ No fishing is allowed on Mason Neck refuge as per refuge regulations

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 this use? Is it a priority public use?

The use is freshwater fishing, which is a priority public use of the National Wildlife Refuge System under 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 (Public Law 105-57).

(b) Where would the use be conducted?

Featherstone NWR

Fishing is proposed as a use for the Refuge at designated fishing platforms along the shoreline on Farm Creek, Neabsco Creek and/or Occoquan Bay. It is proposed that up to 4 fishing platforms would be constructed in designated locations on the refuge. The platforms will be 16' x 20' and will be able to accommodate no more than 10 people per platform. Fishing is prohibited in the Refuge at any other area.

Occoquan Bay NWR

Fishing is proposed as a use for the Refuge at the Painted Turtle Pond location along the shoreline of the pond and the dock adjacent to the pond. The Painted Turtle Pond will serve environmental education, special event, and fishing uses. Environmental education and special events will have priority over fishing uses. In the event that an environmental education visit or special event is planned, the pond would be closed to fishing for its duration.

(c) When would the use be conducted?

Featherstone NWR

The Refuge is proposed to be open to public fishing during refuge hours of operation (typically April 1-September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). The process of opening each location will be phased-in as official fishing locations are designated, the appropriate signage is installed, and gates or other measures to control access and ensure safety, quality, and compatibility are implemented. If law enforcement problems arise or if litter and equipment debris issues become too great, we may limit hours or otherwise restrict access to specific fishing locations. A temporary closure to these activities would be implemented during any scheduled Refuge hunt dates.

Occoquan Bay NWR

The Refuge is proposed to be open to public fishing during refuge hours of operation (typically April 1-September 30 from 7:00 AM to 7:00 PM and October 1 – March 31 from 7:00 AM to 5:00 PM). The process of opening the pond as an official fishing location will be implemented. The pond will be available for use once the opening package has been completed. Other measures will be implemented to ensure safety, quality, and compatibility – signage installation and access control. If law enforcement problems arise or if litter and equipment debris issues become too great, we may limit hours or otherwise restrict access to the pond. A temporary closure to these activities would be implemented during any scheduled Refuge hunt dates.

(d) How would the use be conducted?

Featherstone NWR

Visitors are free to fish from designated platforms as this activity is deemed wildlife oriented and is promoted within the US Fish and Wildlife Service, nationwide. Visitors are required by Virginia regulations to maintain a current fishing license (unless exempt), except for the “Virginia Free Fishing Weekend,” and follow all Virginia fishing regulations. The Refuge will impose stricter regulations as deemed necessary to protect fish and wildlife populations on Refuge lands. Visitors may utilize a rod and reel or hook and line only when fishing. No lead sinkers will be permitted.

While the Refuge allows fish to be removed from these areas, catch and release will be promoted to the fisherman using these areas. Visitors will supply their own fishing gear, bait, and access to the open areas.

Occoquan Bay NWR

Visitors are free to fish the pond as this activity is deemed wildlife oriented and is promoted within the US Fish and Wildlife Service, nationwide. Visitors are required by Virginia regulations to maintain a current

fishing license (unless exempt), except for the “Virginia Free Fishing Weekend,” and follow all Virginia fishing regulations. The Refuge will impose stricter regulations as deemed necessary to protect fish and wildlife populations on Refuge lands. Visitors may utilize a rod and reel or hook and line only when fishing. No lead sinkers will be permitted. Live minnows or other small live fish will not be allowed as bait.

While the Refuge may allow some fish to be removed from the pond, largemouth bass will be catch and release only to maintain the existing health and productivity of the fisheries. Visitors will supply their own fishing gear and bait.

(e) Why is this use being proposed?

This use is being proposed by the refuge to accommodate one of the priority public uses of the Refuge System. There is a scarcity of public fishing opportunities in Northern Virginia and this coupled with an increasing demand for access to recreational waters are the reasons we are pursuing this opportunity at the refuge. The 2007 Virginia Outdoors Plan states that over 50 percent of Virginians felt the most needed outdoor recreation opportunities include public access to waters for fishing. It further states that fishing was ranked as the seventh most popular outdoor recreational activity in Virginia and expressed a need to increase access to fishing locales to address increases in demands.

Featherstone NWR

Fishing is currently taking place on the Refuge in an illegal manner. The use has been deemed appropriate on the Featherstone Refuge. The use will not be able to occur unless access issues can be worked out. The use is being proposed to address the needs of our constituency and enhance visitor experience. Refuge expenses would include infrastructure development, already existing standard law enforcement patrols to verify regulations are being followed, and additional signage for information purposes. This use supports wildlife dependent recreation as outlined in the Refuge System Improvement Act of 1997.

Occoquan Bay NWR

The use is being proposed to address the needs of our constituency and enhance visitor experience. Refuge expenses would include already existing standard law enforcement patrols to verify regulations are being followed and additional signage/brochures for information purposes. This use supports wildlife dependent recreation as outlined in the Refuge System Improvement Act of 1997.

AVAILABILITY OF RESOURCES:

Permitting the general fishing use is not within the resources available to administer our Visitor Services Program. The funding received by the Refuge is not adequate to administer this program and to ensure that the use remains compatible with the Refuge purposes. The use of the area specified for fishing is a small area, where cost effective administration of the program can occur after the infrastructure has been developed and constructed. Compliance with fishing regulations is handled within the regular duties of the Station Law Enforcement Officer.

The Visitor Services Manager is available for public outreach. A Park Ranger will monitor visitor use and user interactions. Maintenance staff performs the regular maintenance and repairs. Permitting the general fishing use is not within the resources available to administer our Visitor Services Program. The funding received by the Refuge is not adequate to administer this program and to ensure that the use remains compatible with the Refuge purposes. The use of the area specified for fishing is a small area, where cost effective administration of the program can occur after the infrastructure has been developed and constructed. Compliance with fishing regulations is handled within the regular duties of the Law Enforcement Officer.

Costs associated with administering this use include:

- Law Enforcement Officer (GS-09) - 2 weeks/yr. = \$2,398
- Trail and Platform development and construction = \$200K *est.*

Additional staff needs and costs are anticipated with the addition of trails and activities within the Complex. It will be necessary to hire a Visitor Services Manager (GS-11/12), Park Ranger (GS-5), Maintenance Worker (WG-9) and Maintenance Worker (WG-6) to compliment current staffing. The Visitor Services Manager will be available for public outreach and to facilitate the development of the fishing program on the refuges. The Park

Ranger will monitor visitor use and aide in facilitating the fishing program. Maintenance staff will perform the regular maintenance duties and repairs that relate to the fishing program.

Costs associated with administering additional uses include:

- Visitor Services Manager (GS-12) – 6 weeks/yr. = \$8,407.2
- Maintenance Worker (WG-9) - 4 weeks/yr. = \$5,750
- Maintenance Worker (WG-6) - 4 weeks/yr = \$4,677
- Park Ranger (GS-5) – 6 weeks/yr. = \$4,264

ANTICIPATED IMPACTS OF THE USE:

While the day-to-day activity of fishing does cause the death of fish if removed from the Refuge, there are still little significant impacts from the use. While some fish are lost to the system forever, they are renewable resources that reproduce on their own. There is also little significant impact on migratory birds due to the small number of fish that are removed from the Refuge through the public fishing program and while fishing may cause other wildlife disturbances; these impacts are minimal due to the stationary nature of anglers.

Foot travel to fishing areas will occur on established trails. Trail use can disturb wildlife outside the immediate trail corridor (Trails and Wildlife Task Force 1998, Miller et al. 2001). Miller et al. (1998) found bird abundance and nesting activities (including nest success) increased as distance from a recreational trail increased in both grassland and forested habitats. Bird communities in this study were apparently affected by the presence of recreational trails, where common species (i.e., American robins) were found near trails and rare species (i.e., grasshopper sparrows) were found farther from trails. Songbird nest failure was also greater near trails (Miller et al. 1998).

Humans walking off trail have been shown to cause greater disturbance (greater area of influence, flush distance and distance moved) to wildlife than walking within trail corridors (Miller et al. 2001). Predictability of disturbance (on trail vs. off trail) has been cited as a major factor in impacts to wildlife. Walking off trail is considered less predictable to wildlife and typically more disruptive (Knight and Cole 1991, Trails and Wildlife Task Force 1998, Miller et al. 2001). Requiring anglers to use designated public use trails to access fishing areas will help limit this type of disturbance.

Potential impacts to birds: An indirect benefit to upland habitats and associated species would derive from careful, strategic management of this fishing program. Public awareness and appreciation of the refuge, its habitats, and resources would inspire some to volunteer or in other ways support the refuge needs and conservation of resources on the landscape in general. Increases in annual visitor numbers during the daytime (public use sites would be open during refuge-specific operation hours) will surely result from constructing fishing piers, installing informational kiosks at Featherstone; opening Painted Turtle Pond at Occoquan Bay, and other planned activities described herein, although it is difficult to predict a frequency or rate. Visitors at these sites may flush rafting waterfowl or eagles hunting the marshes within view of a trail, launch or pier, although we anticipate that in the winter public use at these locations would be minimal, at least in the early years after opening.

Higher rates of public use would occur during the warmer months, when most waterfowl are on northern breeding grounds. Wetland species likely to be disturbed and flushed during the warmer months include bald eagle (fewer than in winter), belted kingfisher, mallard, great blue heron, and basking turtles. The sites are not particularly sensitive, rare, or in close proximity to nest areas, and there are protected and secluded areas nearby where disturbed wildlife can retreat to. Disturbance is therefore anticipated to be minor, temporary, and infrequent. Paths from parking areas to fishing access have the potential to disturb forest interior dwelling bird species at Featherstone.

Direct impacts on wildlife in the form of disturbance can be expected wherever humans have access to an area, and the degree may vary depending on the habitat type. In general, human presence disturbs most wildlife, which typically results in a temporary displacement without long-term effects on individuals or populations.

Some species, such as wood thrush, will avoid areas frequented by people, such as developed trails and structures, while other species, particularly highly social species such as eastern tufted titmouse, Carolina chickadee, or Carolina wren, seem unaffected or even drawn to a human presence. When visitors approach too closely to nests, they may cause the adult bird to flush exposing the eggs to weather events or predators. Provided that visitor use is confined to designated areas, disturbance during the breeding season will be limited to those areas.

Overall, direct impacts from access to fishing areas would be greatly reduced if facilities avoid area-sensitive habitats (interiors of grasslands and forests). A potential direct negative impact exists for wetland and open waterbird species (such as osprey, herons, and waterfowl) from lost fishing gear; specifically, hooks, lures, and litter, or becoming entangled in fishing line or hooks. Ingestion of lead sinkers is another source of concern throughout the region, but use of lead sinkers is not permitted at the refuge. The extent to which these bird species are impacted by fishing tackle currently is unknown. We will continue to work with our fisheries assistance office and the State in implementing a public education and outreach program on these issues. Increased law enforcement is also planned.

Potential impacts to threatened and endangered species: Despite their removal in 2006 from the Federal List of Endangered and Threatened Species, we included bald eagles in this section due to the fact they are a focal species within the region and because of the extra protection they are afforded under the Bald and Golden Eagle Protection and Migratory Bird Acts. Permitting public access to any waterfront or marsh managed by the refuge holds the possibility of impacting bald eagles. Impacts may either be displacement or temporary disturbance depending on extent of use of a given site by visitors and eagles. As trees mature and forest riparian buffers are improved, sites with low concentrations will likely increase in importance to bald eagles. We will avoid potential adverse impacts to bald eagles by strictly following the management guidelines developed by Federal and State agencies. These include sight and distance setbacks from nests and concentration areas, and time-of-year restrictions.

Potential impacts to wetlands: Potential adverse impacts to wetlands could arise if facilities were improperly placed in wetland habitats, if public use were allowed to occur directly in wetlands, or if erosion of sediments into wetlands was allowed to occur during facility construction. The only facilities proposed for construction in wetlands are the fishing docks at Featherstone. Construction of these facilities will cause temporary and minimal (less than 0.01 acre) impacts to wetlands. We will employ silt fencing and other best management practices during construction of any facilities in proximity of wetlands to avoid runoff of sediments. Many of our interpretive messages included on the kiosk panels remind visitors of the importance of wetlands and the many beneficial functions they provide to society, including wildlife habitat, flood protection, groundwater recharge and nutrient uptake.

Potential impacts to other fish and wildlife: Direct impacts on wildlife in the form of disturbance can be expected wherever humans have access to an area, and the degree may vary depending on the habitat type. In general, human presence disturbs most wildlife, which typically results in a temporary displacement without long-term effects on individuals or populations. Major concerns of any refuge fishing program are accidental or deliberate introductions of non-native fish (used for bait), accidental introduction of invasive plants, pathogens, or exotic invertebrates attached to fishing boats, and over-harvesting. The refuge does not permit use of live minnows in order to prevent the likelihood of introductions of non-native fish. Another common concern is the reduction or alteration of prey base important to fish-eating wildlife. Refuge-specific regulations address this concern by limiting bass fishing to catch and release only at Painted Turtle Pond on Occoquan Bay. The current fishing program of the refuge follows the Virginia state regulations and would adopt any State harvest limits that should become applicable to the fish species in this pond. These limits are set to ensure that harvest levels do not cumulatively impact native fish resources to the point they are no longer self-sustainable. We also follow recommendations of Service fisheries biologists who conduct periodic sampling of this refuge pond. We plan to continue to work with State conservation officers in implementing a public education and outreach program, and increased law enforcement is also planned to address the above concerns.

Mammals in Virginia occupy a diverse array of habitat types, including wetlands on Featherstone and Occoquan Bay refuges where fishing may occur. As a taxonomic group, mammals will also benefit from the refuge land protection and management actions relative to riparian habitats, forests, grasslands, shrub, and wetlands proposed for listed species, waterfowl, and migratory birds. Likewise, the refuge will benefit from careful attention to the impacts to mammals resulting from any of its activities. We evaluated the management actions proposed for this use for their potential to benefit or adversely affect large and small, aerial, terrestrial, and wetland mammals and believe that they should have no long-term impact on mammal use of the refuge.

Protection and good stewardship of the area's native mammals and herpetofauna is another priority of the refuge, and supports our goals and objectives for wetlands, uplands, and riparian habitats. We evaluated fishing for its potential to benefit or adversely affect mammals, amphibians, and reptiles or their habitats used for mating, reproduction, over-wintering, and foraging. Most of the mammal, amphibian, and reptile species that occur on the refuge are very common and widespread. However, one species of particular concern to us is the eastern box turtle. In addition, amphibians everywhere are considered to be experiencing a general decline. Our fishing programs would only occur in designated areas closely monitored to ensure no habitat degradation occurs. These designated areas would not be placed in or near any sensitive habitat areas, such as vernal pools, to reduce impacts to mammals, amphibians, reptiles and other native wildlife.

Sometimes maintenance actions for public use may involve preparations or outcomes that have direct negative impacts to native wildlife, including mammals, amphibians and reptiles. Mowing of grassy access roads and public use trails that lead to these proposed fishing areas occasionally destroys small mammals, turtles, snakes or frogs if conducted during times of movement (warm months). The best way to minimize this direct type of negative impact is to keep public use and access roads mowed short so that they do not become attractive habitat. However, in many cases it will be impossible to find a perfect time to carry out maintenance actions that will completely avoid conflict for wildlife. Construction of gravel parking areas and trails leading to the fishing areas pose the potential threat of blocking access between different habitat types, depending on the placement, length, width, and substrate material of the lot and trails leading to the fishing sites. Some salamander species will not cross openings that are too wide or dry, bare ground (Vinson 1998), thus earthen trails, if exposed to sunlight could become dry enough to form a barrier.

Gravel roads or trails, even though permeable, may also act as a barrier to salamander movement (Marsh et al. 2005). The planned graveled trails are for access and will therefore be located on level terrain, avoiding ravines which are home to amphibians and reptiles. At most these trails will be no more than 2 miles at length at Occoquan Bay and 4 miles at length at Featherstone, and their widths no more than six feet. Disturbance to basking or nesting turtles may occur where public use is concentrated at points where land and water interface. Other walking trails will be simple cleared paths and perhaps mulched in some locations, but these too will avoid moist ravines close to amphibian habitat.

Disturbance to basking or nesting turtles may occur where public use is concentrated at points where land and water interface. Fishing at Featherstone NWR will occur in areas such as these. Basking turtles can usually find alternate resting surfaces. Nesting turtles, once engaged in the act of digging usually will not allow their attention to be drawn to anything else, and at such time are vulnerable to predators. A turtle wishing to make landfall to attempt egg-laying however may be dissuaded by the presence of humans at the site. Because there will be ample wetland-forest-grassland interface elsewhere, we expect that the cumulative impact of parking lots, roads, and trails to amphibians and reptiles at the landscape scale will be insignificant.

We do not expect a substantial increase in the cumulative effects of visitor use over the 15 year timeframe of this plan. Staff, in collaboration with volunteers, will monitor and evaluate the effects of these priority public uses to discern and respond to any unacceptable impacts on wildlife or habitats. To mitigate those impacts, the Complex will continue to close areas to the public to protect wildlife during critical life periods.

PUBLIC REVIEW AND COMMENT:

As part of the Elizabeth Hartwell Mason Neck/Featherstone CCP process, this compatibility determination will undergo extensive public review, including a comment period of 45 days following the release of the Draft CCP/EA.

DETERMINATION (CHECK ONE BELOW):

Use is not compatible

Use is compatible, with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

- State and Refuge specific fishing regulations will apply.
- Cooperate with VDGIF to implement angling regulations and management actions.
- Maintain closed areas which allow for migratory birds to still feed.
- No motorized access for fishing will be allowed.

JUSTIFICATION:

Fishing is an appropriate wildlife-dependant use of Refuge resources. It has been a long standing tradition in the Region and while the Refuge is proposing to maintain areas open to public fishing, it still maintains certain areas will remain closed. These closed areas assist in providing the quality food source for migratory water birds that depend on fish for survival.

The U.S. Fish and Wildlife Service and Featherstone National Wildlife Refuge promote fishing as a viable wildlife oriented recreational activity. These propose areas will provide an opportunity to educate children on how to fish, provide for an opportunity to learn about nature, the Refuge system, and enhance ethical fish behavior at a young age. This activity can also build or strengthen a bond between friends and family and enhance both individual’s knowledge about the natural ecosystem provided and why it is important to protect them.

SIGNATURE:

Refuge Manager _____ (Signature) _____ (Date)

CONCURRENCE:

Regional Chief _____ (Signature) _____ (Date)

MANDATORY 15 YEAR RE-EVALUATION DATE:

_____ (Date)

LITERATURE CITED:

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Appendix C



Dave Menke

Northern flicker

Refuge Operations Needs (RONS) and Service Asset Maintenance Management Systems (SAMMS)

Refuge Operation Needs & Service Asset Maintenance Management Systems

The refuge’s budget requests contained in the Refuge Operating Needs System (RONS) and Service Asset and Maintenance Management System (SAMMS) databases include a wide variety of new projects and maintenance needs. The RONS and SAMMS lists are regularly updated to include priority projects. Contact the refuge for the most current RONS and SAMMS lists.

Table C.1. Projects* currently in, or planned for, the Refuge Operations Needs System database for Mason Neck and Featherstone NWRs

(While an individual refuge is identified in last column, the project may expand to other refuges in the Refuge Complex if funding and staffing allows. The list of projects incorporates those existing and proposed projects planned under the Draft CCP/EA Service-preferred alternative B)

Station Rank	Project Description (Projects currently in the RONS database)	Estimated Cost (\$1,000)/FTE*	Refuge
1	Develop a multi-refuge biological program (hire Wildlife Biologist GS-0486-11/12)	\$123/1.0	Mason Neck NWR
2	Develop Forest Management Plan	\$120/None	Mason Neck NWR
3	Expand the visitor services program (hire Park Ranger GS-0025-7)	\$83/ 1.0	Mason Neck NWR
4	Invasive species mapping	\$50/None	Mason Neck NWR
5	Archaeological site inventory	\$50/None	Mason Neck NWR
6	Provide Visitor, Resource, and Facility Protection (Law Enforcement GL-0025-9)	\$150/1.0	Mason Neck NWR
7	Improve condition of refuge habitat and facilities (hire Maintenance Worker WG-4749-6 PT)	\$30/0.5	Mason Neck NWR
8	Improve refuge operations and response to public contacts (hire Admin Support Asst GS-0303-5)	\$67/1.0	Mason Neck NWR
9	Improve refuge outreach and public communications Hire Park Ranger, Outreach Spec GS-0025-9/11/12)	\$147/1.0	Mason Neck NWR
1	Forest health and condition assessment	\$60/None	Featherstone NWR
2	Invasive species mapping	\$30/None	Featherstone NWR
3	Provide Visitor, Resource, and Facility Protection (Law Enforcement GL-0025-9)	\$150/1.0	Featherstone NWR

*Note: FTE= Full time equivalent (e.g. full-time staff position)

Table C.2. Projects* currently in, or planned for, the Service Asset Maintenance Management System (SAMMS) database for Mason Neck and Featherstone NWRs

(*incorporates all proposed projects planned under the Draft CCP/EA Service-preferred alternative B)

Project Description and Project Work # (Projects currently in the SAMMS database)	Estimated Cost (1,000s)	Refuge
Construct Connector Trail (#00123804)	\$260	Mason Neck NWR
Construct Refuge Housing (#15139890)	\$450	Mason Neck NWR
Rehabilitate Anchorage and Anchorage Fire Road (#88104920)	\$86	Mason Neck NWR
Rehabilitate Old Barn Road Connection (#98104914)	\$132	Mason Neck NWR
Replace Environmental Education Pavilion (#98104913)	\$33	Mason Neck NWR
Repair Damaged Boat Ramp at Shop (#00104819)	\$28	Mason Neck NWR
Replace Sycamore Road/trail Information Panels (#00104818)	\$16	Mason Neck NWR
Replace other Trail Information Panels (#98104919)	\$27	Mason Neck NWR
Rehabilitate Featherstone Access Road (#2009943799)	\$100	Featherstone NWR
Rehabilitate eroding shoreline and bulkhead 300 linear feet on Mason Neck refuge (Phase I) (#2007732574)	\$500	Mason Neck NWR
Rehabilitate eroding shoreline and bulkhead on Mason Neck refuge (Phase II) (#2007732576)	\$690	Mason Neck NWR
Total	\$2,322	
Project Description and Project Work # (Projects proposed for the SAMMS database based on Service-preferred alternative B in the Draft CCP/EIS)	Estimated Cost (1,000s)	Refuge
Construct trailer pad and facilities hook-ups for seasonal temporary volunteers	\$30	Mason Neck NWR
Upgrade water control structure to improve management capability	\$144	Mason Neck NWR
Improve Woodmarsh trail (trail realignment to higher ground) and reconfigure to bypass sensitive eagle area	\$25	Mason Neck NWR
Improve Woodmarsh trailhead and parking	\$200	Mason Neck NWR
Develop a trail from Woodmarsh trail to end of Sycamore Rd.	\$150	Mason Neck NWR
Install state highway directional Trailblazer signs to the refuge on I-95 and US Route 1 (Estimate of 4 signs)	\$20	Mason Neck NWR
Assist in installing interpretive panels at key locations	\$6	Featherstone NWR
Total	\$575	

Appendix D



Bill Wallen

Heron nests at Mason Neck Refuge

Wilderness Review

- Introduction
- Wilderness Inventory
- Summary of Wilderness Findings

Introduction

The purpose of a wilderness review is to identify and recommend to Congress lands and waters of the National Wildlife Refuge System (NWRS) that merit inclusion in the National Wilderness Preservation System (NWPS). Wilderness reviews are a required element of comprehensive conservation plans, are conducted in accordance with the refuge planning process outlined in the Fish and Wildlife Service Manual (602 FW 1 and 3), and include compliance with the National Environmental Policy Act (NEPA) and public involvement.

The wilderness review process has three phases: inventory; study; and, recommendation. Lands and waters that meet the minimum criteria for wilderness are identified in the inventory phase. These areas are called wilderness study areas (WSAs). In the study phase, a range of management alternatives are evaluated to determine if a WSA is suitable for wilderness designation or management under an alternate set of goals and objectives that do not involve wilderness designation.

The recommendation phase consists of forwarding or reporting the suitable recommendations from the Director through the Secretary and the President to Congress in a wilderness study report. The wilderness study report is prepared after the record of decision for the final CCP has been signed. Areas recommended for designation are managed to maintain wilderness character in accordance with management goals, objectives, and strategies outlined in the final CCP until Congress makes a decision or the CCP is amended to modify or remove the wilderness proposal.

Wilderness Inventory

Introduction

The wilderness inventory takes a broad look at each planning area (Wilderness Inventory Area [WIA]) to identify Wilderness Study Areas (WSAs). A WSA is an area of undeveloped Federal land that retains its primeval character and influence, without permanent improvements or human habitation, and further, meets the minimum criteria for wilderness as identified in Section 2(c) of the Wilderness Act.

Minimum Wilderness Criteria

A WSA is required to appear natural, provide for solitude or primitive recreation, and be either a roadless area that meets the size criteria, or an island of any size. Only Federal lands are eligible to be considered for wilderness designation and inclusion within the NWPS.

Roadless — Roadless refers to the absence of improved roads suitable and maintained for public travel by means of motorized vehicles primarily intended for highway use. A route maintained solely by the passage of vehicles does not constitute a road.

The following factors were the primary considerations in evaluating the roadless criteria.

- A. The area does not contain improved roads suitable and maintained for public travel by means of motorized vehicles primarily intended for highway use.
- B. The area is an island, or contains an island that does not have improved roads suitable and maintained for public travel by means of motorized vehicles primarily intended for highway use. A roadless island is defined as an area surrounded by permanent waters or that is markedly distinguished from the surrounding lands by topographical or ecological features.
- C. The area is in Federal fee title ownership.

Size — The size criteria can be satisfied if an area has at least 5,000 acres of contiguous roadless public land, or is sufficiently large that its preservation and use in an unimpaired condition is practicable.

The following factors were the primary considerations in evaluating the size criteria.

- A. An area of more than 5,000 contiguous acres. State and private lands are not included in making this acreage determination.
- B. A roadless island of any size.
- C. An area of less than 5,000 contiguous Federal acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition, and of a size suitable for wilderness management.
- D. An area of less than 5,000 contiguous acres that is contiguous with a designated wilderness, recommended wilderness, or area under wilderness review by another Federal wilderness managing agency such as the Forest Service, National Park Service, or Bureau of Land Management.

Naturalness — The Wilderness Act, Section 2(c), defines wilderness as an area that “generally appears to have been affected primarily by the forces of nature with the imprint of human work substantially unnoticeable.” The area must appear natural to the average visitor, rather than “pristine.” The presence of historic landscape conditions is not required.

An area may include some human impacts provided they are substantially unnoticeable in the unit as a whole. Significant hazards caused by humans, such as the presence of unexploded ordnance from military activity and the physical impacts of refuge management facilities and activities are also considered in evaluating the naturalness criteria.

An area may not be considered unnatural in appearance solely on the basis of the sights and sounds of human impacts and activities outside the boundary of the unit. The cumulative effects of these factors in conjunction with land base size, physiographic and vegetative characteristics were considered in the evaluation of naturalness.

The following factors were the primary considerations in evaluating naturalness.

- A. The area appears to have been affected primarily by the forces of nature with the imprint of human work substantially unnoticeable.
- B. The area may include some human impacts provided they are substantially unnoticeable in the unit as a whole.
- C. Does the area contain significant hazards caused by humans, such as the presence of unexploded ordnance from military activity?
- D. The presence of physical impacts of refuge management facilities and activities.

Solitude or Primitive and Unconfined Recreation—A WSA must provide outstanding opportunities for solitude or primitive and unconfined recreation. The area does not have to possess outstanding opportunities for both solitude and primitive and unconfined recreation, and does not need to have outstanding opportunities on every acre. Further, an area does not have to be open to public use and access to qualify under this criteria; Congress has designated a number of wilderness areas in the Refuge System that are closed to public access to protect resource values.

Opportunities for solitude refer to the ability of a visitor to be alone and secluded from other visitors in the area. Primitive and unconfined recreation means non-motorized, dispersed outdoor recreation activities that are compatible and do not require developed facilities or mechanical transport. These primitive recreation activities may provide opportunities to experience challenge and risk; self reliance; and adventure. These two elements—solitude and primitive recreation—are not well defined by the Wilderness Act, but can be expected to occur together in most cases. However, an outstanding opportunity for solitude may be present in an area offering only limited primitive recreation potential. Conversely, an area may be so attractive for recreation use that experiencing solitude is not an option.

The following factors were the primary considerations in evaluating outstanding opportunities for solitude or primitive unconfined recreation.

- A. The area offers the opportunity to avoid the sights, sounds and evidence of other people. A visitor to the area should be able to feel alone or isolated.
- B. The area offers non-motorized, dispersed outdoor recreation activities that are compatible and do not require developed facilities or mechanical transport.

Supplemental Values—The Wilderness Act states that an area of wilderness may contain ecological, geological, or other features of scientific, educational, scenic or historical value. Supplemental values of the area are optional, but the degree to which their presence enhances the area’s suitability for wilderness designation should be considered. The evaluation should be based on an assessment of the estimated abundance or importance of each of the features.

Mason Neck National Wildlife Refuge

The CCP planning team identified the entirety of Elizabeth Hartwell Mason Neck National Wildlife Refuge (Map D-1) as the only wilderness inventory area because there are no natural terrain barriers separating any portion of the refuge from any other portion. The Service does not own the entire 2,277-acre refuge in Federal fee title; a portion is leased from the Northern Virginia Regional Park Authority (Map D-2). The CCP Planning Team evaluated the refuge to determine if it retained its primeval character and influence, was without permanent improvements or human habitation, and further, met the minimum criteria for wilderness as identified in Section 2(c) of the Wilderness Act. Our findings are described below.

Does the wilderness inventory area:

- 1) *Have at least 5,000 acres of land, or is it of sufficient size to make practicable its preservation and use in an unconfined condition, or is it a roadless island?*

No. The refuge is only 2,277 acres in size and is surrounded by human development and high-use recreation features. The Federal government does not own the entire refuge in fee title; part of it is leased from the Northern Virginia Regional Park Authority. To the east of the refuge lies Gunston Road and the residential areas of Gunston Manor and Hallowing Point Estates. To the north, High Point Road leads visitors to the refuge and to Mason Neck State Park, which features a variety of popular recreational improvements. To the west and south lie Occoquan Bay and the Potomac River, which receive heavy recreational use.

2) *Generally appear to have been affected primarily by the forces of nature with the imprint of man's work substantially unnoticeable?*

No. Sycamore Road, Anchorage Road, and Little Marsh Road traverse the refuge effectively partitioning the refuge into smaller parcels. Great Marsh and Woodmarsh Trails are popular walking trails with interpretive kiosks and platforms for wildlife observation.

(3a) *Have outstanding opportunities for solitude?*

No. Roads and parking lots provide vehicle access to visitors; most visitors are confined to the two major interpretive trails. Hunters however, have wide access to the refuge on foot.

3b) *Have outstanding opportunities for a primitive and unconfined type of recreation?*

No. Off-road or off-trail access is not allowed except during the white tailed deer hunting season, which is highly regulated.

4) *Contain ecological, geological, or other features of scientific, educational, scenic, or historical value?*

Yes. The refuge supports numbers of nesting bald eagles and one of the largest colonial nesting bird rookeries in the region. However, these birds are protected from disturbance during their nesting seasons by a prohibition of public entry to their nesting areas.

Featherstone National Wildlife Refuge

The CCP planning team identified the eastern portion of Featherstone refuge (Map D-3) as the only wilderness inventory area because that is the largest contiguous portion of the refuge. The refuge is bisected into east and southwest sections by the CSX railroad right-of-way; the smaller southwest portion of the refuge is directly adjacent to a major high-density residential development. The Service owns in Federal fee title all of the refuge's 325 acres. The CCP Planning Team evaluated the refuge to determine if it retained its primeval character and influence, was without permanent improvements or human habitation, and further, met the minimum criteria for wilderness as identified in Section 2(c) of the Wilderness Act. Our findings are described below.

Does the wilderness inventory area:

- 1) *Have at least 5,000 acres of land, or is it of sufficient size to make practicable its preservation and use in an unconfined condition, or is it a roadless island?*

No. The refuge is the smallest of the Potomac River Refuge Complex refuges and small compared to other NWRS units at 325 acres. It is surrounded by human development and high-use recreation features. To the north lies the Featherstone Shores residential development, from which the single unimproved access right-of-way originates. To the west is the CSX railroad right-of-way, commuter terminal, and parking area. To the east lies Occoquan Bay and the Potomac River, which receive heavy recreational use.

- 2) *Generally appear to have been affected primarily by the forces of nature with the imprint of man's work substantially unnoticeable?*

No. Although the public is prohibited from access to the refuge, a considerable number of unauthorized users continue to illegally fish and camp there, causing an ongoing enforcement problem. Also, the remnants of an historic railroad right-of-way traverse a major portion of the refuge.

- (3a) *Have outstanding opportunities for solitude?*

No. The noise of the railroad and local traffic on the land side and of boat traffic on the water side routinely disrupt the refuge's otherwise relatively quiet ambient noise environment.

- (3b) *Have outstanding opportunities for a primitive and unconfined type of recreation?*

No. Although the refuge itself is not developed, the ambient noise environment and frequency of illegal visitation would generally prevent a primitive recreational experience. The small size of the refuge with impinging human development and recreation on all sides would prevent an unconfined type of recreational experience.

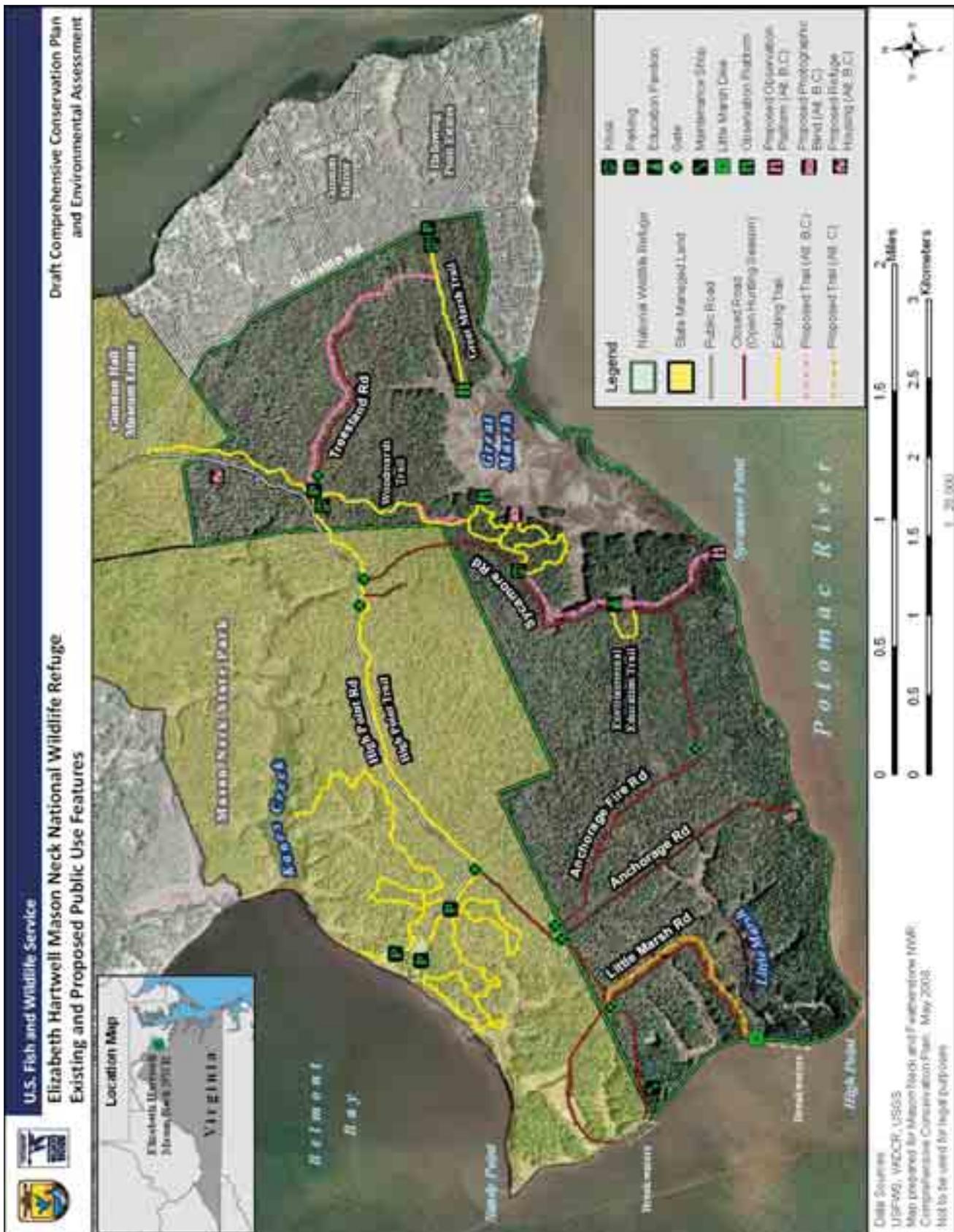
- 4) *Contain ecological, geological, or other features of scientific, educational, scenic, or historical value?*

Yes. The refuge has supported at least one pair of nesting bald eagles in the recent past and also provides upland forest, riverine forest and emergent wetland habitats for songbirds, raptors, and other wildlife species in an otherwise rapidly developing metropolitan region.

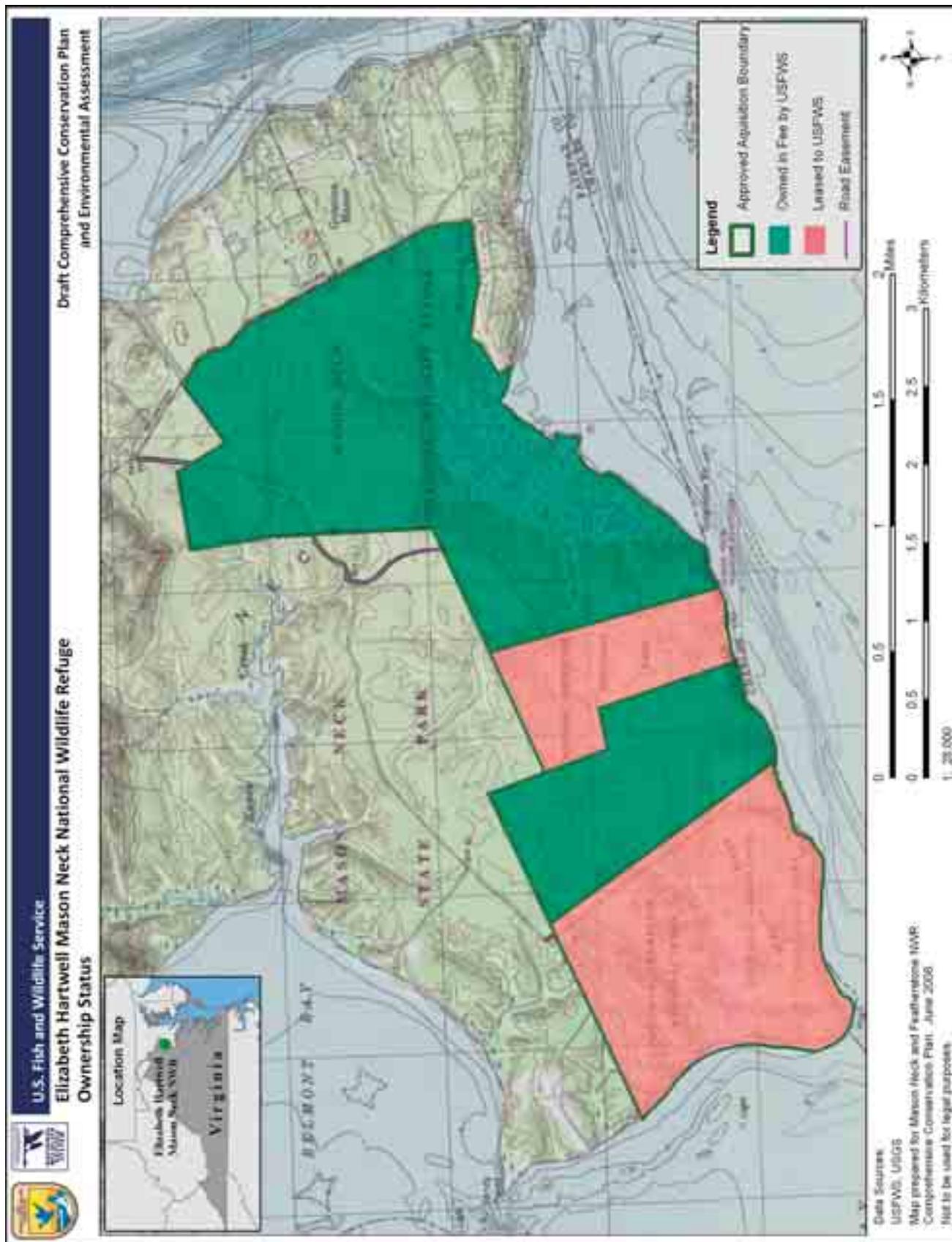
The CCP Planning Team found that neither Mason Neck refuge nor Featherstone refuge meets any of the minimum criteria for wilderness as identified in Section 2(c) of the Wilderness Act. While there are ecological and historic values on the refuge, these do not, in and of themselves, warrant wilderness recommendation. In summary, Mason Neck refuge and Featherstone refuge do not qualify as WSAs, and will not be considered further for wilderness designation in this CCP.

Summary of Wilderness Inventory Findings

Map D.1. Existing and Proposed Public Use Features at Mason Neck National Wildlife Refuge



Map D.2. Ownership Status of Mason Neck National Wildlife Refuge



Map D.3. Proposed Public Use Features at Featherstone National Wildlife Refuge



Appendix E



Donna Dewhurst

Bufflehead and Scaup

Staffing Charts

- **Current Staffing for Potomac River Complex**
- **Proposed Staffing for Potomac River Complex**

Figure E.1. Current Staffing for Potomac River Complex (Mason Neck, Featherstone and Occoquan Bay refuges): Alternative A

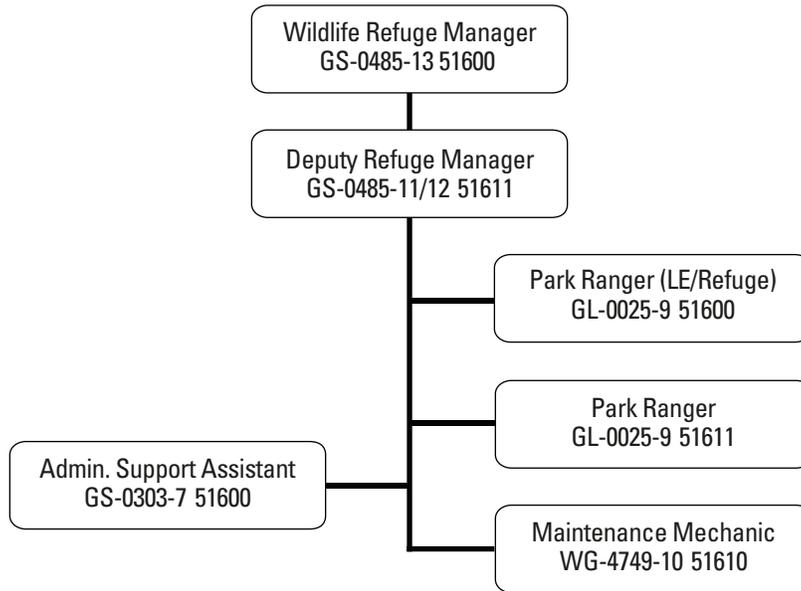
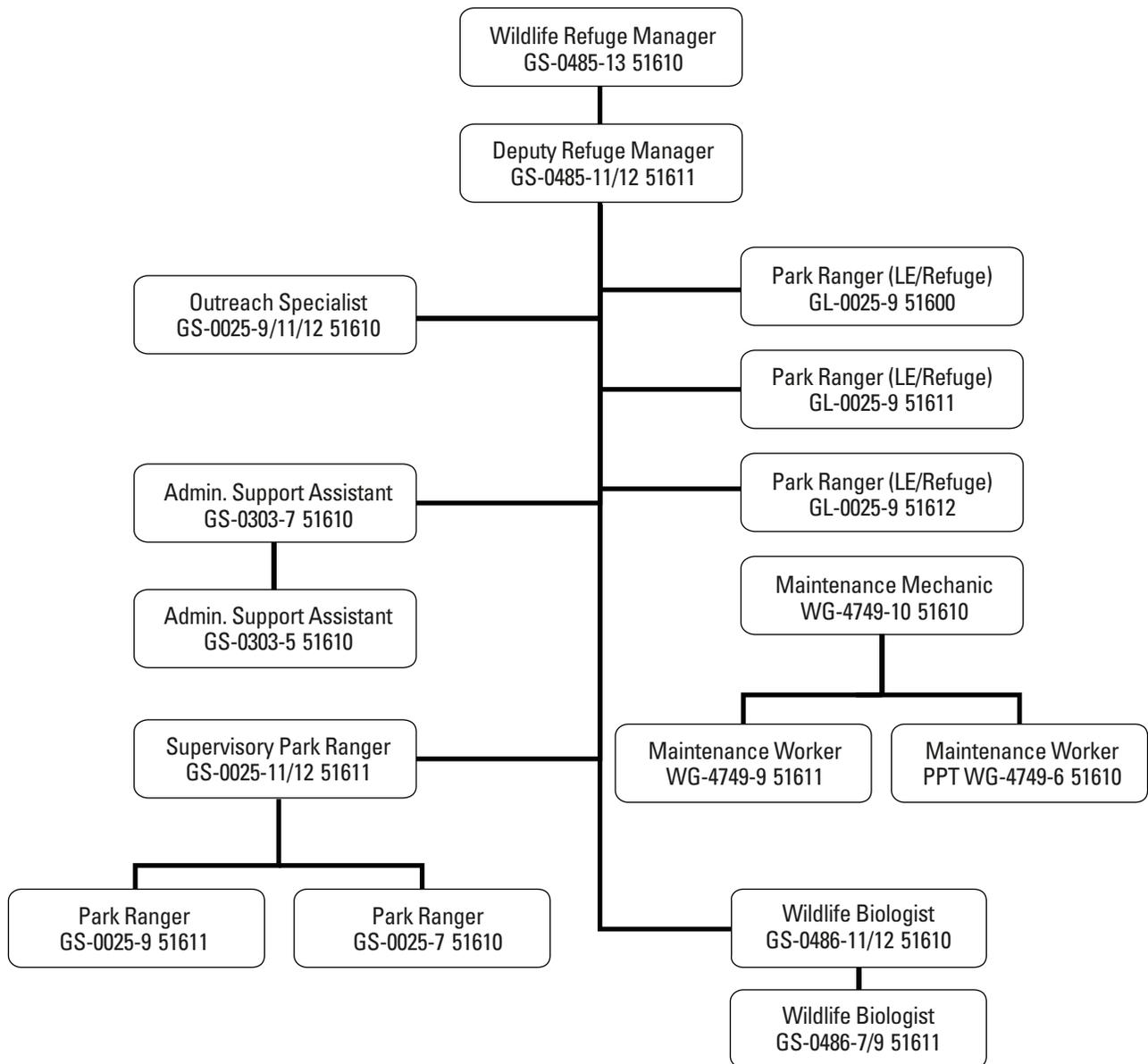


Figure E.2. Proposed Staffing for Potomac River Complex (Mason Neck, Featherstone and Occoquan Bay refuges): Alternatives B and C



Appendix F



Bill Wallen

Farm Creek on Featherstone Refuge

Archaeological and Historical Resources Overview

- Elizabeth Hartwell Mason Neck National Wildlife Refuge
- Featherstone National Wildlife Refuge

Archaeological and Historical Resources Overview: Elizabeth Hartwell Mason Neck National Wildlife Refuge

Compiled by Tim Binzen, U.S. Fish & Wildlife Service, Northeast Regional Historian

Archaeological and Historical Resources

Mason Neck NWR contains an unusually important and diverse archaeological record, which offers evidence of thousands of years of settlement by Native Americans, and of later occupations by Euro-Americans and African-Americans. The variety within this record is known although no comprehensive testing program has been completed at the Refuge. Archaeological sites in the current inventory were identified by compliance surveys in highly localized areas, or on the basis of artifacts found in eroded locations. The Refuge contains twenty-five known Native American sites, which represent occupations that began as early as 9,000 years ago, and continued into the mid-seventeenth century. There are fifteen known historical archaeological sites, which offer insights into Euro-American settlement that occurred after the seventeenth century. The small number of systematic archaeological surveys that have been completed previously at the Refuge were performed in compliance with Section 106 of the National Historic Preservation Act (NHPA) and focused on specific locations within the Refuge where erosion control activities were considered (Wilson 1988; Moore 1990) and where trail improvements were proposed (GHPAD 2002; Goode and Balicki 2008). In 1994 and 1997, testing was conducted at the Refuge maintenance facility (USFWS Project Files). A recent reconnaissance study assessed the serious effects of erosion on shoreline sites to assist with obligations under Section 110 of NHPA, and resulted in the identification of fourteen Native American sites that had not been previously recorded (Johnson 2005). The Refuge does not contain any significant historical structures.

Native American Archaeological Resources

The availability of natural resources influenced Native American settlement on Mason Neck. The combination of resources was shaped over time by patterns in the geology and ecology of the Chesapeake Bay region. In geological terms, Mason Neck has not been a riverine peninsula for very long. During the late Pleistocene, 18,000 years ago, sea levels were approximately 300 feet lower than they are today, and Mason Neck was an inland ridge. The Potomac River was a narrow channel, which carried glacial meltwater from inland areas to the coastal edge of the Continental Shelf, located many miles to the east of its modern location. Between 10,000 and 7,000 years ago, in the early Holocene, sea levels rose rapidly as waters from melted ice sheets flowed into the Atlantic. Consequently, the valleys of the Potomac, James, and Susquehanna Rivers were inundated under hundreds of feet of water, and the approximate outlines of Chesapeake Bay were formed. Notably, it was not until 3,000 years ago that sea levels stabilized, and the shorelines of the Bay and its tributary rivers and promontories (including Mason Neck) took the forms that are recognizable today. During the historical period, notable changes to the shorelines of the Bay have continued. The cliffs seen on the Bay's middle-western shore by the explorer John Smith in A.D. 1607-8 have eroded as much as 300 feet inland over the ensuing centuries (Dent 1995). Shoreline erosion poses a major concern at Mason Neck today.

The first human inhabitants of the Chesapeake Bay region were the Paleo-Indians, who reached the Eastern Seaboard approximately 11,500 years ago. Organized in small bands, the Paleo-Indians were highly mobile people who used a specialized toolkit of fluted spear points and distinctive scrapers. The environment that they knew was cool and dry. Their landscape was vegetated in a spruce-pine forest, and was populated by temperate terrestrial animals, which included many species still seen in the region today. Some displaced boreal species may have been present, as well. Archaeologists have found no evidence that the Paleo-Indians coexisted with mammoths or mastodons in the Northeast, prior to the extinction of those species in the region. While no Paleo-Indian sites are known in the direct vicinity of Mason Neck, two such occupations have been reported less than twenty-five miles to the north (Dent 1995). During the Paleo-Indian period, Mason Neck was a high bluff overlooking the valley of the ancient Potomac River, which flowed hundreds of feet below.

The successors to the Paleo-Indians were the Native Americans of the Early Archaic period, which occurred between about 9,500 and 8,000 years ago. These people knew a climate that was increasingly warm and humid,

and an environment where woodlands dominated by beech, hickory, hemlock, birch, and oak replaced open conifer-dominated parkland (Dent 1995). This change in vegetation was accompanied by shifts in animal populations in the Chesapeake Bay region. The Native Americans modified their technologies in response, adopting new forms of corner-notched and side-notched spear points, and using spear-throwing devices to launch projectiles over greater distances than was possible by hand (Egloff and McAvoy 1990). As forests of deciduous trees closed in over the landscape, previously barren zones offered attractive resources, such as hazelnuts, hickory nuts, butternuts, and some tuberous plants. The innovative subsistence strategies practiced by the people of the Early Archaic led them to adjust their system of settlement, as they used longer-term occupations, and took advantage of resources that were seasonally available and found in a wider variety of locations (Dent 1995). Mason Neck was still an elevated bluff, not yet a peninsula, although sea levels (and the level of the Potomac) rose steadily throughout the Early Archaic period. An Early Archaic spear point has been recovered from an archaeological site in the southeastern part of the Refuge, overlooking the Great Marsh (Goode and Balicki 2008). This indicates that Native Americans were attracted to Mason Neck as early as 9,000 years ago.

During the Middle Archaic period, between 8,000 and 5,000 years ago, a climatic warming trend prevailed, marked by sub-episodes that were moister or drier. Oak and hickory became the dominant tree species, and by the end of the period, mixed deciduous forests prevailed, similar in composition to those seen in the region today. Mast products, such as acorns and nuts, were both nutritious and easily stored, and became a key source of food for Native Americans (Dent 1995). Another ecological trend with major implications for Native American settlement was the development of estuarine conditions along the shorelines of the Potomac River, as the water level continued its rise in the river valley, and the Chesapeake Bay came into being (Dent 1995). The effects of tidal action on the Potomac reached as far upriver as Mason Neck (Wilson 1988). Within the Potomac, freshwater fish were joined by marine species that had left their natural predators behind in the open sea. Abundant resources were available for all fish in these newly formed estuarine habitats, resulting in great species diversity (Dent 1995). The seasonal migrations of anadromous fish, and the greater availability of shellfish, waterfowl and terrestrial species, did not escape the attention of Native Americans who lived near the Bay and its tributaries during the Middle Archaic period. This was reflected in their settlement system, which was oriented around a seasonal system of floodplain base camps and smaller settlements located near wetlands in upland areas (Gardner 1987). The Fall Zone of the Potomac offered hundreds of locations for seasonal fish harvesting (Dent 1995).

Native Americans of the Middle Archaic period devised a variety of contracting-stem and side-notched projectile points that were suitable for hunting and fishing, and supplemented their tool kits with grinding and milling stones, ground-stone axes, drills, and wood-working tools such as adzes and celts (Dent 1995). Evidence of Middle Archaic settlement has been reported from two sites on the Refuge (USFWS Site Files; Goode and Balicki 2008).

Between 5,000 and 3,000 years ago, sea levels stabilized and the coastline of Chesapeake Bay took the form that is recognizable today. Native American populations grew in size and social complexity, and the settlement system became more sedentary. There was a profusion of artifact styles, as projectile points included broadspear variants, notched broad spears, and narrow-bladed, stemmed forms. Stone bowls were fashioned from steatite. Distinct cultural groups, or traditions, emerged throughout the region during the Late Archaic, and the people of these traditions adopted contrasting settlement systems, focusing variously upon the vast woodlands beyond the Fall Line, or upon the riverine and estuarine resources of the Fall Zone and Coastal Plain (Dent 1995).

Formerly an elevated bluff standing hundreds of feet above the Potomac, Mason Neck became a riverine peninsula, defined by the confluences of the Occoquan River and Pohick Creek with the larger river. The interior of Mason Neck featured loamy, well-drained soils (USDA 1963) and gentle terrain crisscrossed by creeks. A variety of wetland, estuarine, and mast forest resources became easily accessible to the Native American inhabitants of the area. From the southern escarpment of Mason Neck, there was a commanding view for miles down the middle Potomac River. Archaeological evidence from three sites on the Refuge suggests that Native Americans settled Mason Neck more intensively during the Late Archaic period (USFWS Site Files).

The greater Woodland period, which archaeologists divide into three sub-periods, began approximately 3,000 years ago and continued until the era of first contact with Euro-Americans. It is clear from the archaeological record that by the onset of the Woodland period, Mason Neck had become an important focus of Native American settlement on the Potomac.

The Early Woodland period, between about 3,000 and 2,300 years ago, saw the introduction of fired clay pottery and the Native American occupation of large villages located in the floodplains of major rivers. The use of storage pits and larger habitation structures indicates that these larger settlements supported long-term occupations. People evidently used smaller sites in upland settings for specialized and seasonal purposes, such as hunting for deer and turkey, and harvesting nuts and wild plant foods. The consumption of shellfish became an increasingly important element of Native American subsistence. There was considerable continuity in settlement locations between the Early Woodland period and the Middle Woodland period, which occurred between about 2,300 and 1,200 years ago, indicating that Native American subsistence strategies and settlement systems persisted during a time of climatic stability (Dent 1995). According to archaeological evidence, these regional patterns were reflected on Mason Neck, where artifacts of the Early Woodland and/or Middle Woodland periods have been reported from at least seven sites on the Refuge (USFWS Site Files).

The Late Woodland period, from 1,200 to 500 years ago, marked the final centuries before contact between Native American of the Northeast and European explorers. Starting about A.D. 900, maize horticulture was adopted by Native American societies in the Middle Atlantic. Hunting, gathering, and fishing remained important subsistence activities, which shaped the annual cycle (Dent 1995). After A.D. 1300, the storage of surplus crops enabled the establishment of permanent hamlets and larger villages. An increase in the Native American population between A.D. 1300 and 1400 may have led to competition between neighboring groups. Nucleated settlements were frequently enclosed in palisades, indicating that territorial conflicts may have flared. Village sites were marked by deep cultural deposits and many storage pits, suggesting the accumulation of surplus crops and increased sedentism. The factors of population growth, food surpluses, and permanent villages may have led to the development of complex social and political structures, and the emergence of the ranked chiefdoms that the first Europeans encountered in the late sixteenth and early seventeenth centuries (Turner 1992).

No sites representing large, Woodland-period villages have been recorded to date on the Refuge, but it is possible that evidence for long-term settlement during the late pre-Contact period may yet be found. Between 1991 and 1993, investigations were conducted at the Hartwell Site (State Number 44FX1847), located outside the Refuge on the shoreline of upper Mason Neck, near Colchester. The site included extensive shell midden deposits, and produced Late Woodland projectile points, pottery, and a soapstone animal effigy (VA DHR Site Files). Early European accounts provide strong indications that Mason Neck and the Occoquan River confluence area were a focal Native American settlement locale on the Potomac (Barbour 1969). Given the rate of shoreline erosion since the seventeenth century, it is possible that some large sites at Mason Neck may have already been lost.

In summary, the inventory of pre-Contact Native American settlement locations at the Refuge includes twenty-five sites, with evidence of occupation as early as 9,000 years ago. Several of the sites were re-occupied multiple times during different time periods, suggesting that they offered access to natural resources that remained important over time. Remarkably, one Refuge site (the Great Marsh site, State Number 44FX410) produced an assemblage of projectile points that date to the Early Archaic, Middle Archaic, Late Archaic, Early Woodland, and Middle Woodland periods (Goode and Balicki 2008). Only two of the Native American sites on the Refuge are well understood archaeologically (the Great Marsh Site, state number 44FX410, and the Little Marsh Creek Site, state number 44FX1471). Most of the sites represent occupations of undetermined period (Johnson 2005), and have never been subject to subsurface testing, so their dimensions, integrity, and levels of significance are unknown. All but one of the known Refuge sites is located on the modern shoreline or next to an estuary or marsh. While this likely reflects a Native American preference for such locations, as of 2010 no archaeological survey has investigated the margins of creeks or the interior upland zones of Mason Neck. It is very likely that additional sites await discovery in such interior settings.

For historians and archaeologists alike, Mason Neck belongs to an elite group of places for study of the Contact period (A.D. 1500-1600) and of seventeenth-century cultural dynamics in the Chesapeake Bay region. This high level of research value can be attributed to several factors. First, Mason Neck was the main settlement location for the Native American tribe (known as the Dogue) that held sway over the middle Potomac during the Contact period (Moore 1990c). Second, this prominent Dogue settlement was documented in the accounts of the area's first European explorers and early colonists, linking the location to the documentary record (Moore 1990c). Third, much of the landscape within the Refuge and in adjacent portions of Mason Neck has been spared intensive development, resulting in a greater likelihood that Contact-period archaeological resources may be preserved (erosion of shoreline sites notwithstanding).

During the Contact period, the Powhatan chieftanship dominated the Virginia tidewater area. One of several Potomac River groups, the Dogue were a large tribe, with subgroups in Virginia and Maryland (Johnson 1986). The name “Dogue” may have been derived from the Powhatan word “taux” (Harrington 1955), which was subject to numerous alternative spellings in early colonial records. Their language may have been Siouan, and not Algonquian as was the case with many of the neighboring tribes in the region (Moore 1990c). Their way of life was similar to other Chesapeake tribes of the period, which included the Potomac tribe further up the river and the Piscataway of the western shore of Maryland. The Dogue occupied large focal settlements and used small satellite camps for seasonal resources, following an annual cycle of hunting, fishing, gathering of plant foods, and maize horticulture (Moore 1990b). They may have been less amenable to close relations with Europeans than other tribes (Moore 1990c).

When John Smith voyaged up the Potomac in 1608, he mapped the village of the “Tauxenent” near the mouth of the Occoquan River (Barbour 1969), and noted that the settlement featured a “king’s house” defended by forty “bowmen,” and a population of 135-170 people, who occupied as many as twenty longhouses enclosed within a palisade (Johnson 1986). The Dogue settlement at Mason Neck was called “Moyumpse,” and was visited by the sachem Powhatan in 1617 (Kingsbury 1933), and by Henry Fleet in 1632 (Neil 1876). It has been suggested that this main village may have been located in upper Mason Neck, near Colchester; while the Dogue maintained smaller villages and seasonal encampments on the lower part of the peninsula (Wilson 1988). According to documentary sources, the area that is south of Kanesh Creek and west of Great Marsh within the Refuge was termed “Dogues Island” in early deeds related to the general vicinity, and the tribe cultivated fields of maize in an area separated from the mainland by a swamp (Moxham 1975; Moore 1990c). The Dogue may have relocated their main village several times on Mason Neck during the period between 1608 and 1654. After the latter date, colonial settlement increased in the Mason Neck vicinity and the Dogue likely discontinued settlement there at that time (Moore 1990c).

By 1658, relations between the Dogue and the colony of Virginia had deteriorated, as the tribe and colonists on the frontier became increasingly antagonistic. In 1666, the colony slated the Dogue for complete annihilation, but the directive was not carried out. Members of the Dogue joined their Susquehannoc counterparts in frontier raids in 1675. Bacon’s Rebellion in 1676-1677 was a colonial protest against the colony’s handling of Native American raids, in which the Dogue had played a central role. The Dogue population was reduced by warfare and disease, and after 1681 many survivors joined members of other tribes who sought refuge at the large and densely vegetated Zachiah Swamp in Maryland. By the early 1700s, documentary sources ceased to refer to the Dogue as a distinct tribal group (Moore 1990c).

Notably, an archaeological site at the Refuge (the Little Marsh Creek Site, state number 44FX1471) has provided evidence of seventeenth-century Dogue settlement (Moore 1989). It is the only conclusively Dogue site known to exist in Virginia, and one of only two that have been identified, the second being in Maryland (Moore 1990b). The artifact assemblage from the site includes chipping debris of various materials, forms of Potomac Creek pottery and small triangular projectile points that date to the Late Woodland or Contact period, and three gunflints that were manufactured by Native Americans using both domestic raw materials and European flint (Moore 1989). Cumulatively, the artifacts suggest that the Little Marsh Creek Site was occupied by members of the Dogue between A.D. 1625 and 1650 (Moore 1990a).

Unfortunately, the Native American archaeological record at the Refuge is under imminent threat from shoreline erosion. Numerous sites literally are vanishing, as artifacts fall out of eroding banks and are exposed to visitors who may be tempted to remove them. Archaeological resources are finite and unique, and much important information may be lost if action is not taken (Johnson 2005).

Historical Archaeological Resources

Even as Mason Neck had figured prominently in the Native American settlement systems of the Potomac, it was also significant in the geography of the Euro-American occupations that followed. The first colonial land patent in Fairfax County involved property on Mason Neck, and was granted to Richard Turney in 1651 (GHPAD 2002). Soon thereafter, the Dogue vacated the locale (Moore 1990c). In 1690, George Mason II started acquiring lands on Mason Neck, including Turney’s Patent (GHPAD 2002). By 1704, he had a house on the western shore (Wilson

1988). The tobacco port of Colchester was established on the Occoquan River shore of western Mason Neck in 1753. Six years later, George Mason IV established the Gunston Hall Plantation in the eastern part of lower Mason Neck (GHPAD 2002). An American patriot and statesman, George Mason IV served as a delegate from Virginia to the U.S. Constitutional Convention. Along with James Madison, he is called the “Father of the Bill of Rights” and is considered one of the “Founding Fathers” of the United States (Heymsfeld and Lewis 1991).

While the main house (Gunston Hall) and its associated complex of structures and outbuildings were situated in the southeast corner of Mason Neck, outside the current Refuge boundary, the plantation as a whole encompassed an area of 5,500 acres in the southern part of the peninsula (GHPAD 2002), much of it within the current boundaries of the Refuge. The Mason family owned dozens of slaves, who lived on the plantation in quarters near the mansion, and also under overseers in four outlying hamlets at Mason Neck (Mitchell 1987; Wilson 1988). After 1750, soil depletion led Virginia plantation owners to phase out labor-intensive hoe tobacco cultivation in favor of wheat production (Copeland and McMaster 1975). This may have affected the number of slaves owned by the Mason family in the later eighteenth century (Wilson 1988). Approximately one quarter of Mason Neck was still wooded during that period (Wilson 1988). Several parcels of land were occupied by tenant farmers, who also owned slaves (Copeland and McMaster 1975).

In 1775, George Mason IV apportioned 1,000 acres in the west-central part of Mason Neck to create the Lexington Plantation, which he gave to his eldest son, George V. During the nineteenth century, the Mason descendants sold off the holdings in parcels, and after the Civil War the family no longer owned any land on Mason Neck (GHPAD 2002).

Commercial fishing, logging, and farming were the main enterprises at Mason Neck in the late nineteenth century. Hunting and fishing camps were used seasonally, and a few summer homes were built. Between 1900 and 1960, logging continued, but there was very little development in the lower section of Mason Neck, where the Refuge is located. A small number of seasonal dwellings were built along the shoreline. The lands narrowly avoided development in the mid-1960s, and the National Wildlife Refuge was established in 1969. The dwellings dating to the first half of the twentieth century were demolished (Wilson 1988; GHPAD 2002).

Fifteen historical archaeological sites have been recorded at the Refuge (USFWS Site Files). As with possible Native American resources, it is likely that a program of systematic survey that addresses the Refuge as a whole will identify numerous additional sites. No Euro-American sites dating to the Contact period or to the seventeenth century are known, but there are five eighteenth-century sites. Two of them (the Moore’s Farmstead Site and the Bronaugh’s Landing Site) are located in the eastern extremity of the Refuge, near Gunston Hall, while the other three (the Maill’s Landing Site, the Dogues Neck Site, and the Crawford’s Landing Site) are on the south-central shoreline. Six of the known sites include evidence of nineteenth-century land use, and six have components that date to the first half of the twentieth century.

The Gunston Hall historical museum, located to the east of the Refuge, has sponsored archaeological research programs to better understand the heritage of the Mason family. John Mason, the fourth son of John Mason IV, wrote a set of boyhood “recollections” that described the eighteenth-century layout of buildings, grounds, and landscape features at the plantation (Mason 2004). In addition to the mansion house of Gunston Hall with its lawns and gardens, buildings included the slaves’ quarters, stables, a corn house and granary, and outbuildings. Agricultural facilities featured a hay yard, cattle pens, and agricultural fields. Extensive orchards were planted with fruit and nut trees. Hundreds of ornamental trees were planted in carefully designed rows in order to screen the slaves’ quarters and agrarian structures from line of sight from the mansion.

Archaeological research undertaken by the museum has not yet identified the locations of the slaves’ quarters or other structures and landscape features that may have been located beyond the immediate mansion grounds. It is possible that most, if not all, of these historical features were concentrated to the east of Gunston Road, in proximity to the mansion, and thus are located outside the Refuge boundary. However, some eighteenth-century features related to the plantation, such as agricultural fields or outbuildings, may have been located west of the road, and thus may have resulted in archaeological resources that await discovery within the Refuge. Other possible sites on the Refuge may contain evidence of the outlying slave hamlets, tenant farmers’ properties, landings, fishing stations, logging camps, and nineteenth-century seasonal homes.

Much of the land in the eastern section of the Refuge was cleared and used for agricultural cultivation during the historical period. If useable farmland was abundant in the southeastern part of Mason Neck, the southwestern area (which constitutes the western half of the Refuge) may have been used primarily for logging and not for cultivation after the early nineteenth century. Notably, a recent archaeological investigation of a Native American site located in a wooded area overlooking Great Marsh encountered a natural soil profile, indicating that the landform had never been plowed (Goode and Balicki 2008). This unusual circumstance is favorable for the preservation of archaeological resources that are not deeply stratified or buried. Possibly the Mason family or their successors intentionally maintained a strip of woodland along the southern shoreline of Mason Neck, perhaps to screen the view of their holdings from the Potomac, or to inhibit erosion.

In summary, the inventory of archaeological resources at the Refuge currently includes fifteen historical sites, representing settlement and land use that occurred between the early eighteenth century and the mid-twentieth century. Euro-American resources dating to the second half of the seventeenth century may exist, but none has been identified yet. The archaeological record of the Refuge may have particular research value for advancing knowledge concerning the agrarian lifeways of the early colonial period on the Potomac.

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Archaeological and Historical Resources Overview: Featherstone National Wildlife Refuge

Compiled by Tim Binzen, USFWS, Regional Historian

Archaeological and Historical Resources

Two archaeological sites have been recorded at Featherstone NWR, each on the basis of artifacts that were visible on the ground surface. No professional archaeological surveys involving subsurface testing have been conducted at the Refuge. One of the sites is Native American in origin, and is located in the northern part of the Refuge. Its condition is unknown, and its period of occupation has not been established. One historical site was recorded in the southern part of the Refuge, and contained materials dating to the late nineteenth and early twentieth centuries. The Refuge does not contain any significant historical structures.

Native American Archaeological Resources

Featherstone NWR has much in common with neighboring Mason Neck NWR in terms of its geological and paleoenvironmental history. Consequently, it can be expected that there are parallels regarding the forms of Native American settlement that were seen in both refuges prior to European contact. The landform at Featherstone offered gentle terrain and access to the estuarine environment, just north of the confluence of Neabsco Creek, Occoquan Bay, and the Potomac. The density of sites and the duration of occupations likely were much less complex at Featherstone than has been recognized at Mason Neck, but landscape settings like that of Featherstone nonetheless figured significantly in Native American land use practices. One Native American site of undetermined age has been recorded at the Refuge. It is likely that systematic testing at Featherstone would result in the identification of additional Native American archaeological resources.

Historical Archaeological Resources

Little is currently known about possible historical resources at Featherstone NWR. One historical site has been recorded on the basis of artifacts observed on the ground surface. Deeds dating to the late seventeenth and early eighteenth centuries suggest that the lands within the Refuge, along with other areas on the west side of the Occoquan River, were part of the extensive holdings of the historic Deep Hole Farm. Given the mainly estuarine environment of the Refuge, it is not likely that extensive agriculture or domestic settlement occurred there prior to the mid-1800s, when the railroad corridor for the Richmond, Fredericksburg & Potomac Railroad was constructed. The railroad bed, with its cinder and coal slag, is still a prominent feature that traverses the Refuge from north to south, following the west shore of the Potomac. For the residents of the nearby community, the presence of the railroad line inhibited access to the lands now within the Refuge. Thus, it can be expected that any unrecorded historical resources are low in density, and may be related to seasonal fishing and hunting camps of the late nineteenth and early twentieth centuries.

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