



U.S. Fish & Wildlife Service

Plum Tree Island National Wildlife Refuge

*Draft Comprehensive Conservation Plan
and Environmental Assessment*

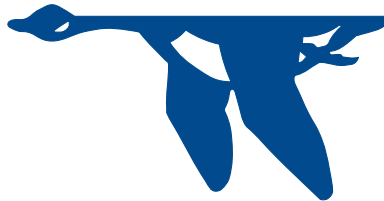
January 2017



Front cover:

Salt marsh

Jeff Brewer/USACE



*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 (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 National Wildlife Refuge System comprised of over 150 million acres including over 560 national wildlife refuges and thousands of waterfowl production areas. The Service also operates 70 national fish hatcheries and over 80 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 (CCPs) provide long-term guidance for management decisions on a refuge and set forth goals, objectives, and strategies needed to accomplish refuge purposes. CCPs also identify the Service's best estimate of future needs. These plans detail program levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. CCPs do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.



U.S. Fish & Wildlife Service

Plum Tree Island National Wildlife Refuge

Draft Comprehensive Conservation Plan and Environmental Assessment

January 2017

Draft Vision Statement

Plum Tree Island National Wildlife Refuge encompasses the largest contiguous salt marsh ecosystem in the lower Chesapeake Bay. Located along the Atlantic Flyway, the refuge offers diverse salt marshes, tidal streams, and wooded ridges that support fish, waterfowl, marsh and wading birds, and shorebirds. Serene shorelines offer secluded habitat for breeding and nesting wildlife, including the northern diamondback terrapin.

The refuge offers a rare opportunity for residents and visitors of the Hampton Roads area to safely enjoy expansive views of abundant wildlife thriving in these important, vulnerable, and scarce salt marshes. In partnership with others, the refuge's wildlife habitats support the rich traditions of hunting, fishing, and boating in the Chesapeake Bay.



U.S. Fish & Wildlife Service

Plum Tree Island National Wildlife Refuge

Draft Comprehensive Conservation Plan and Environmental Assessment

January 2017

Summary

Type of Action:

Administrative—Development of a Comprehensive Conservation Plan

Lead Agency:

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

Location:

Plum Tree Island National Wildlife Refuge
Poquoson, Virginia

Administrative Headquarters:

Eastern Virginia Rivers National Wildlife Refuge Complex
Warsaw, Virginia

Responsible Official:

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This draft comprehensive conservation plan (CCP) and environmental assessment (EA) analyzes two alternatives for managing the 3,502-acre Plum Tree Island National Wildlife Refuge (NWR, the 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:

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

Alternative B—Increased Ecosystem Monitoring, Partnerships, and Public Use: Alternative B is the U.S. Fish and Wildlife Service (Service)-preferred alternative. It combines the actions we believe would best achieve the refuge’s purposes, vision, and goals; address issues and concerns identified throughout the planning process; respond to public comments and inquiries; and is feasible to implement in accordance with applicable laws, regulations, policies, and guidance.

Under alternative B, we would emphasize the conservation, restoration, and monitoring of specific refuge habitats to support priority refuge species whose

habitat needs benefit other species of conservation concern in eastern Virginia, including those identified in the Virginia Wildlife Action Plan. We emphasize protecting the refuge's wildlife habitats by allowing natural processes to occur unimpeded. Our refuge management efforts would continue to focus on minimizing human-caused disturbance of refuge habitats and wildlife, while working with a greater diversity of partners to conduct biological research, inventory, and monitoring efforts. We are primarily interested in learning more about the presence and sustainability of priority wildlife species through inventories and the monitoring of climate change impacts and changes in habitat conditions over the life of the plan. Collecting this information would serve as the basis for future refuge management actions in the next CCP.

Under alternative B, we would evaluate opportunities to enhance and expand the waterfowl hunt program on Cow Island, with an emphasis on increasing adult and youth participation. Alternative B would also expand wildlife-dependent recreation on Cow Island by opening one designated location to recreational and commercial wildlife observation, photography, environmental education, and interpretation of natural and cultural resources. Access by canoe and kayak would complement the City of Poquoson's Blueway Trail surrounding the refuge. In partnership with other government agencies and adjacent landowners, we would investigate the potential to establish viewing platforms on the mainland overlooking the refuge.

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Chapter 1



Lauren Mowbray/USFWS

Crabs in the salt marsh

The Purpose of, and Need for, Action

1.1 Introduction

1.2 Purpose of, and Need for, Action

1.3 The Service and Refuge System Policies and Mandates Guiding Planning

1.4 Conservation Plans and Initiatives Guiding the Proposed Action

1.5 Refuge Establishment Authority and Refuge Purposes

1.6 The Comprehensive Conservation Planning Process

1.7 Issues, Concerns, and Opportunities

1.1 Introduction

A Comprehensive Conservation Plan (CCP) is a document that outlines and guides long-term management for a national wildlife refuge. This draft CCP details and evaluates two management alternatives for the Plum Tree Island National Wildlife Refuge (NWR, the refuge) over the next 15 years.

This draft CCP was prepared pursuant to the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd–668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) (Public Law 105–57; 111 Stat. 1253); in conformance with United States (U.S.) Fish and Wildlife Service (Service, USFWS, we, our) policy and legal mandates (see “The Service and Refuge System Policies and Mandates Guiding Planning,” below). The development of a CCP is also subject to the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.; 83 Stat. 852) because the adoption and implementation of management actions analyzed in a CCP have the potential to affect the natural and human environment.

In an effort to streamline the administrative requirements of the CCP development process and NEPA, this document combines required elements of a CCP and an Environmental Assessment (EA). This document has five chapters and additional supporting content:

- Chapter 1 explains the purpose of, and need for, preparing a CCP, and sets the stage for four subsequent chapters and the appendices. Chapter 1 also:
 - ❖ Defines the refuge’s regional context and planning analysis area;
 - ❖ Presents the mission, policies, and mandates affecting the development of the plan;
 - ❖ Identifies other conservation plans we used as references;
 - ❖ Clarifies the vision and goals that drive refuge management; and
 - ❖ Describes the planning process we followed, including public and partner involvement, in the course of developing this plan.
- Chapter 2, “Affected Environment,” describes the refuge’s regional and local setting, physical attributes, habitats, species, and other natural resources, and human-created environment of roads, trails, croplands, impoundments, and buildings.
- Chapter 3, “Alternatives,” presents two management alternatives and their objectives and strategies for meeting refuge goals and

addressing public issues. It also describes the activities that the Service expects to occur regardless of the alternative selected for the final CCP.

- Chapter 4, “Environmental Consequences,” assesses the environmental effects of implementing each of two management alternatives. It predicts the foreseeable benefits and consequences affecting the socioeconomic, physical, cultural, and biological environments described in chapter 2.
- Chapter 5, “Consultation, Coordination, and Preparation,” summarizes how the Service involved the public and our partners in the planning process. Also, it includes a list of Service and non-Service contributors to the planning effort.
- A bibliography, glossary, list of acronyms and abbreviations, list of species scientific names.

Six appendixes provide additional supporting documentation and references:

- Appendix A: Resources of Concern
- Appendix B: Findings of Appropriateness (FOAs) and Compatibility Determinations (CDs)
- Appendix C: Staffing Chart
- Appendix D: Refuge Operations Needs System (RONS) and Service Asset Maintenance Management System (SAMMS)
- Appendix E: Wilderness Review
- Appendix F: Federal Consistency Determination

Project Area

Plum Tree Island NWR is located in the southeastern most portion of the York–James Peninsula, bounded by the York and James Rivers, and located within the City of Poquoson, Virginia. The refuge is approximately 7 miles north of Hampton, Virginia. The regional context of the project area is defined by the interactions of the nearby metropolitan area and the lower Chesapeake Bay Estuary (maps 1.1 through 1.3).

The refuge encompasses 3,502 acres of salt marsh, marine shrubland and dune, sandy beaches and mudflats, and estuarine habitats in the lower Chesapeake Bay, near the mouth of the York River. The refuge is bordered by the Poquoson River to the north, lower Chesapeake Bay to the east, Back River to the south, and the undeveloped privately owned salt marsh to the southwest.



Brian Henderson

Saltmarsh sparrow

The Service, acting under the authority of the Migratory Bird Conservation Act (MBCA; 16 U.S.C. 715d), issued an administrative order (Wildlife Order 94) to establish Plum Tree Island NWR on April 24, 1972, for the following purposes:

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (MBCA, 16 U.S.C. 715d);

“...for the development, advancement, management, conservation, and protection of fish and wildlife resources...” (Fish and Wildlife Act of 1956, 16 U.S.C. 742f(a)(4));

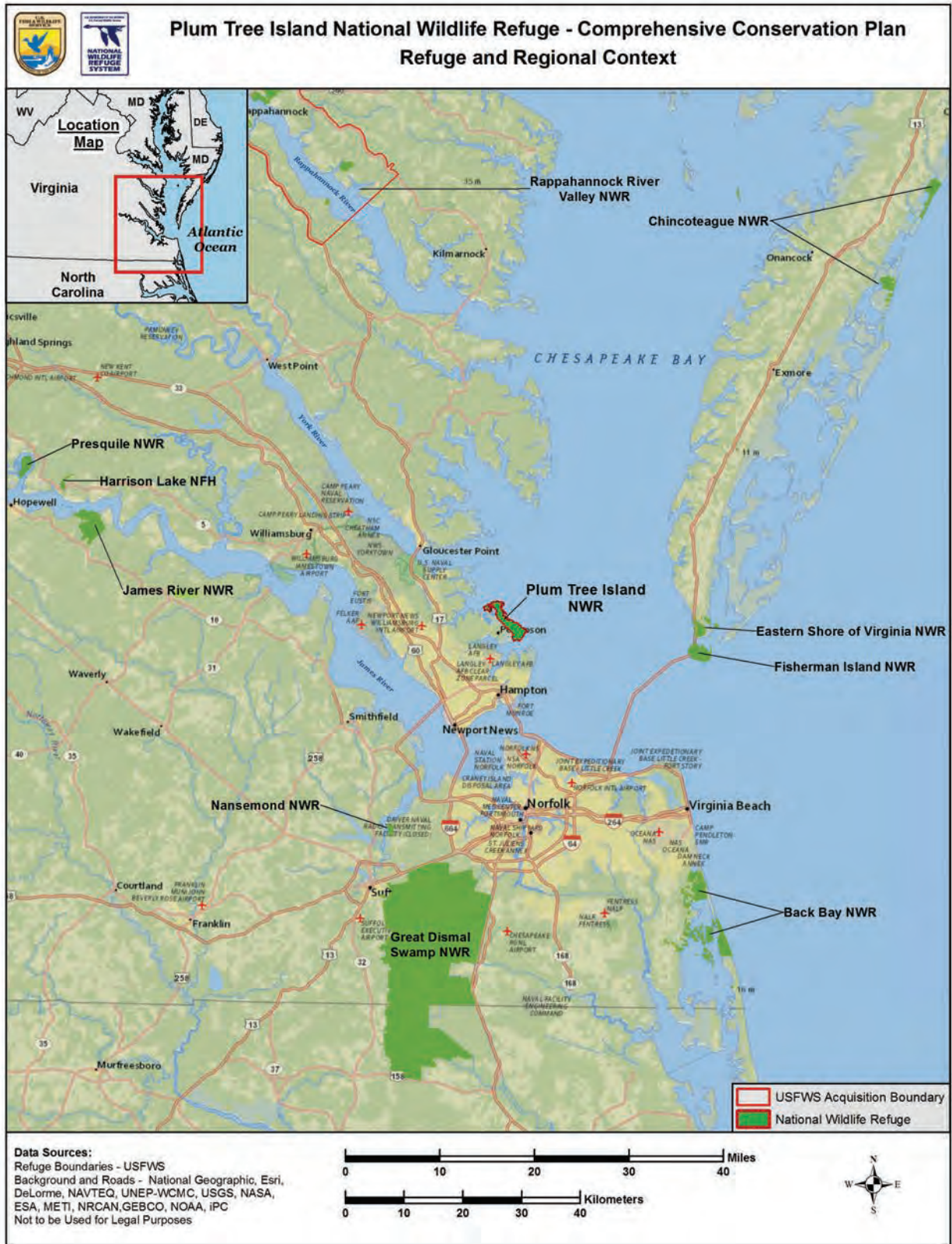
“...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude...” (Fish and Wildlife Act of 1956, 16 U.S.C. 742f(b)(1)); and

“... particular value in carrying out the national migratory bird management program.” (General Services Administration [GSA] Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes, 16 U.S.C. 667b).

It is one of many important migratory bird stopover sites along the Atlantic Flyway, providing protected breeding habitat for State-listed threatened and endangered species, as well as many neotropical migrant bird species.

Prior to 1972, the U.S. Air Force (USAF) used approximately 3,276 acres of the present-day refuge as a bombing and gunnery range. The Plum Tree Island Range (PTI Range) was actively used from 1917 until June 1971, at which time it was declared excess real property and was transferred to the Service for inclusion in the National Wildlife Refuge System (Refuge System) (U.S. Army Corps of Engineers [USACE] 1996). The PTI Range is one of the more than 2,700 properties nationwide that the Department of Defense (DOD) is responsible for cleaning up under the Formerly Used Defense Sites (FUDS) Program.

Map 1.1 Plum Tree Island NWR and Regional Context



Map 1.2 Refuge Location and Relation to Regional Conservation Lands



Map 1.3 Refuge Land and Approved Acquisition Boundary



1.2 Purpose of, and Need for, Action

The Service proposes to develop a CCP for the refuge that, in the Service's best professional judgment, best achieves the purposes and goals of the refuge; contributes to the mission of the Refuge System; adheres to Service policies and other mandates; addresses identified issues of significance; and, incorporates sound principles of fish and wildlife science. The CCP provides strategic management direction for the next 15 years. "Strategic" means we will implement approaches that are ecologically sound and sustainable in light of physical and biological change, and are also practical, viable, and economically realistic.

There are three primary reasons why each national wildlife refuge has a CCP. First, the Improvement Act requires that all refuges have a CCP in place to help fulfill the mission of the Refuge System by October 9, 2012. Although the final CCP for Plum Tree Island NWR did not meet this deadline, the Service identified that initiation of public scoping by that date was sufficient and that the refuge should continue toward generation of a final CCP.

Second, no management plan for this refuge has previously been developed. This CCP is designed to address management and protection of valuable natural resources into the future.

Third, refuge management should be consistent with current policies. The CCP will bring the refuge into conformity with all current law and policies. The CCP will also help the Commonwealth of Virginia's natural resource agencies, our conservation partners, local communities, and the public understand our priorities and work with us to achieve common goals.

1.3 The Service and Refuge System Policies and Mandates Guiding Planning

Several Service policies providing specific guidance on implementing the Improvement Act have been developed since the refuge was established. A CCP incorporates those policies and develops strategic management direction for the refuge for 15 years by:

- Stating clearly the desired future conditions for refuge habitat, wildlife, visitor services, staffing, and facilities;
- Explaining concisely to State agencies, refuge neighbors, visitors, partners, and other stakeholders 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 public uses are appropriate and compatible;

- Providing long-term continuity and consistency in management direction; and,
- Justifying budget requests for staffing, operating, and maintenance funds.

In addition to the laws already mentioned, this section highlights Service policy, legal mandates, and existing regional, State, and local resource plans that directly influenced development of this draft CCP.

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

The Service is a bureau within the U.S. Department of the Interior (DOI). The Service's mission is, "Working with others, to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people."

Congress entrusts to the Service the conservation and protection of these national natural resources: migratory birds and fish, federally listed endangered or threatened species, interjurisdictional fish, wetlands, certain marine mammals, and national wildlife refuges. The Service 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 (USFWS 2012a) contains the standing and continuing directives on implementing our authorities, responsibilities, and activities. 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 (<http://www.fws.gov/policy/>; accessed August 2016).

The National Wildlife Refuge System Mission

The Service administers the Refuge System, which is the world's largest network 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 (USFWS 2007a).

In 1997, President Clinton signed into law the Improvement Act. This act establishes a unifying mission for the Refuge System and 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 first. It also states that the mission of the Refuge System, coupled with the purpose(s) for which each refuge was established, will provide the principal management direction on that refuge. The mission of the

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” (Improvement Act; Public Law 105–57).

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, and plants and their habitats.



Refuge staff at a Poquoson event

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 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 components of the environment. 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 Coordination and Cooperative Work with State Fish and Wildlife Agencies

This policy (601 FW 7) establishes procedures for coordinating and working cooperatively with state fish and wildlife agency representatives on management of units of the Refuge System. Effective conservation of fish, wildlife, plants, and their habitats depends on the professional relationship between managers at the state and Federal level. We acknowledge the unique expertise and role of state fish and wildlife agencies in the management of fish and wildlife. It encourages Refuge Managers to invite, coordinate, cooperate, and collaborate with state fish and wildlife agencies in a timely and meaningful opportunity to participate in the development and implementation of programs conducted under this policy. This opportunity will most commonly occur through state fish and wildlife agency representation on the CCP planning team.

Policy on Refuge System Planning

This policy (602 FW 1, 2, 3) establishes the requirements and guidance for Refuge System planning, including CCPs and step-down management plans. It states that the Service 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 (NWPS) and the National Wild and Scenic Rivers System; and
- Conform to other applicable laws, mandates, and policies.

That planning policy provides step-by-step directions and identifies the minimum requirements for developing all CCPs. Among them, the Service is to review any existing special designation areas such as wilderness and wild and scenic rivers, specifically address the potential for any new special designations, conduct a wilderness review, and incorporate a summary of that review into each CCP (602 FW 3).

Policy on Appropriateness of Refuge Uses

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

- 1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
- 2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act became law.
- 3) The use is within the boundaries set by State regulations for the take of fish and wildlife.
- 4) The use has been found to be appropriate after concluding a specified findings process using 10 criteria.

Findings of appropriateness for specific public uses at Plum Tree Island NWR can be reviewed in appendix B of this draft CCP and EA.

Policy on Compatibility

This policy (603 FW 2) complements the appropriateness policy. Once a Refuge Manager finds a use appropriate, they conduct a further evaluation through a compatibility determination assessment. Compatibility determinations for those public uses determined to be appropriate are included in appendix B of this draft CCP and EA.

The direction in this policy provides guidelines for determining

compatibility of uses and procedures for documentation and periodic review of existing uses. Highlights of the guidance in that chapter follows:

- The Improvement Act and its regulations require an affirmative finding by the Refuge Manager on the compatibility of a public use before the Service allows it on a 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, photography, 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 a use at any time, including sooner than its mandatory date or even before the Service completes the CCP process, if new information reveals unacceptable impacts or incompatibility with refuge purposes (603 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.

Policy on Wildlife-dependent Public Uses

This policy (605 FW 1) of the Service manual presents specific guidance on implementing management of the priority public uses, including the following criteria for a quality, wildlife-dependent recreation program that:

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

dependent recreation;

- Minimizes conflicts with neighboring landowners;
- Promotes accessibility and availability to a broad spectrum of the American people;
- Promotes resource stewardship and conservation;
- Promotes public understanding and increases public appreciation of America's natural resources and our role in managing and conserving these resources;
- Provides reliable and reasonable opportunities to experience wildlife;
- Uses facilities that are accessible to people and blend into the natural setting; and
- Uses visitor satisfaction to help to define and evaluate programs.

Refuge System Vision—Conserving the Future (2011)

In July 2011, the Refuge System convened the “Conserving the Future—Wildlife Refuges and the Next Generation” conference to renew and update its 1999 vision document, originally called “Fulfilling the Promise.” After the conference and an extensive public engagement process, a renewed vision document was finalized in October 2011 (USFWS 2011). The document has 24 recommendations, covering a variety of topics from habitat and species management, visitor services, refuge planning, land conservation, communications, building partnerships, and urban refuges. Currently, implementation teams are developing strategies to help us accomplish the vision. We will incorporate implementation strategies as appropriate, in our step-down plans and refuge programs.

Other Mandates

Federal laws 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 Improvement Act requires that the CCP identify the refuge's archaeological and cultural values. In addition, we consult with the State Historic Preservation Officer (SHPO) on the draft and final CCPs. The following four Federal laws also cover historic and archaeological resources on national wildlife refuges:

- The Archaeological Resources Protection Act (ARPA; 16 U.S.C. 470aa–470ll; Public Law 96–95), approved October 31, 1979 (93 Stat. 721). The ARPA establishes detailed requirements for issuance of permits for any excavation for, or removal of, archaeological resources from Federal or Native American lands.

It also establishes civil and criminal penalties for the unauthorized excavation, removal, or damage of those resources; for any trafficking of those resources removed from Federal or Native American land in violation of any provision of Federal law; and for interstate and foreign commerce in such resources acquired, transported, or received in violation of any state or local law.

- The Archaeological 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). The Archaeological and Historic Preservation Act carries out the policy established by the Historic Sites Act (see below). It directs Federal agencies to notify the Secretary of the Interior whenever they find that a Federal or federally assisted, licensed, or permitted project may cause the loss or destruction of significant scientific, prehistoric, or archaeological data. The act authorizes the use of appropriated, donated, or transferred funds for the recovery, protection, and preservation of that data.
- The National Historic Preservation Act of 1966 (NHPA; 16 U.S.C. 470–470b, 470c–470n; Public Law 89–665), approved October 15, 1966 (80 Stat. 915), and repeatedly amended. The NHPA establishes the National Register of Historic Places (National Register). It requires Federal agencies like us to consider the effects of their activities on sites listed in or eligible for listing on the National Register. The Act and regulations require that the Service inventory its lands for archaeological sites and historic structures. Until sites and structures have been evaluated for Register eligibility, they are treated as if eligible. This requirement to consider eligible cultural resources in planning activities applies to activities using Federal funds, a Federal permit, or taking place on Federal land. Important regulations of this Act (36 CFR 800) define the roles of the SHPOs, the national Advisory Council on Historic Preservation, and Tribal Historic Preservation Offices. Under this Act and regulations, the Service is to consult with federally recognized tribes and the public about the effects of activities in relation to historic properties. The act created the Historic Preservation Fund, which partially funds State and Tribal Historic Preservation Offices. None of the refuges archaeological sites or historic structures have been evaluated for Register eligibility.
- The Native American Grave Protection and Repatriation Act (NAGPRA; 25 U.S.C. 3001 et seq., Public Law 101–601), approved November 16, 1990 (104 Stat. 3048) directs the Service to consider during project planning whether an activity is likely to expose human remains, funerary objects, sacred objects, or objects of cultural patrimony. If so, we are to consult with appropriate Tribes about developing a Plan of Action to manage the impacts. In

addition, such remains and objects, when inadvertently discovered, shall be repatriated to descendent tribes.

Under ARPA and NHPA, archaeological artifacts and site documentation such as field records must be preserved and made available for study. The Service also owns and cares for historic objects, environmental specimens, art, and historical documents as museum property at non-government repositories such as museums and at refuges. Each refuge maintains an inventory of its museum property. Our Regional Museum Property Coordinator in Hadley, Massachusetts, guides the refuges in caring for that property, and helps us comply with the NAGPRA and Federal regulations governing Federal archaeological collections. Our program ensures that those collections will remain available to the public for learning and research.

Other Federal resource laws are also important to highlight, as they are integral to developing a CCP.

- The Wilderness Act of 1964 (16 U.S.C. 1131–1136; Public Law 88–577) establishes a NWPS that is composed of federally owned areas designated by Congress as “wilderness areas.” The act directs each agency administering designated wilderness to preserve the wilderness character of areas within the NWPS, and to administer the NWPS for the use and enjoyment of the American people in a way that will leave those areas unimpaired for future use and enjoyment as wilderness. The act also directs the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 acres or more and every roadless island (regardless of size) within Refuge and National Park Systems for inclusion in the NWPS. Service planning policy requires that the Service evaluate the potential for wilderness on refuge lands, as appropriate, during the CCP development process. Our wilderness review is included in this document as appendix E.
- The Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et seq.; Public Law 90–542), as amended, selects certain rivers of the Nation possessing remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, preserves them in a free-flowing condition, and protects their local environments. Service planning policy requires that the Service evaluate the potential for wild and scenic rivers designation on refuge lands, as appropriate, during the CCP development process. Since no potentially eligible rivers or segments of rivers occur within the refuge’s boundary, a wild and scenic river review was not conducted for this refuge.

Our mandates also include orders and initiatives by the President, Secretary of the Interior, or Director of the Service. We highlight four

of those below.

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

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

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

- Secretarial Order 3289—Addressing the Impacts of Climate Change on America’s Water, Land, and Other Natural and Cultural Resources was issued on September 14, 2009. This order establishes a science-based approach for DOI 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 DOI manages. The order establishes a “Climate Change Response Council” that will execute a coordinated DOI 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 Initiative America's Great Outdoors was issued on April 16, 2010. President Obama launched the America's Great Outdoors (AGO) Initiative as a conservation and recreation effort that would help increase connections with American citizens and the outdoors. AGO takes as its premise that lasting conservation solutions should come from citizens who share in the responsibility to conserve, restore, and provide better access to our lands and waters.

In February 2011, a report was generated to lay the foundation for implementing this initiative

(<http://www.whitehouse.gov/administration/eop/ceq/initiatives/ago>; accessed August 2016). This report identifies 10 major goals and 75 action items to advance this initiative, from expanding youth programs to increasing public awareness about conservation to better managing our public lands. Among these are three major place-based goals to focus the collective conservation and recreation efforts of the Federal government: create and enhance urban parks and greenspaces, renew and restore rivers, and conserves large, rural landscapes.

During the spring and summer of 2011, the Secretary sought recommendations for two specific projects in each state that would highlight opportunities to support the three place-based goals of the AGO Initiative. In Virginia, the two projects identified are the Fort Monroe National Historical Park and the Captain John Smith Chesapeake National Historic Trail (NHT, the trail). The Captain John Smith Chesapeake NHT crosses much of eastern tidal Virginia, including a passage adjacent to Plum Tree Island NWR. Additional details on the trail are provided in section 2.9 of this draft CCP and EA.

- Presidential EO 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 DOI and the U.S. 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.

Chapter 4, “Environmental Consequences,” evaluates how well this plan complies with the acts noted above, and with the Clean Water Act of 1977 as amended (33 U.S.C. 1251 et seq.), the Clean Air Act of 1970 as amended (42 U.S.C. 7401 et seq.), and the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531–1544) as amended. Finally, the Service designed this draft CCP and EA to fulfill our obligations under NEPA and comply with the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500–1508).

Pursuant to the Federal Coastal Zone Management Act (CZMA; 16 U.S.C. 1451–1464), the National Oceanic and Atmospheric Administration (NOAA) approved the Virginia Coastal Zone Management Program in 1986. In accordance with the Virginia Coastal Management Program requirements, a Federal Consistency Determination was prepared for the proposed action and is included in appendix F of this document. We will share the results of that determination with our Regional Director for consideration while making a final decision regarding this EA.

While Service and Refuge System policies and each refuge’s purpose(s) provide the foundation for management, national wildlife refuges are administered consistent with a variety of other Federal laws, executive orders, treaties, interstate compacts, and regulations on the conservation and protection of natural and cultural resources. The “Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service” lists them and can be accessed at: <http://www.fws.gov/laws/Lawsdigest.html> (accessed August 2016).



Juan Emilio

Red knot

1.4 Conservation Plans and Initiatives Guiding the Proposed Action

Important guidance for habitat management and visitor service management at Plum Tree Island NWR has already been provided by a series of plans and their priorities. The following plans and initiatives were available early in the CCP and EA development phase.

National, Regional, and Local Plans and Priorities

Landscape Dynamics: Land Cover and Land Use

North Atlantic Landscape Conservation Cooperative Operations Plan (USFWS 2009a)

The Service is developing a coordinated network of landscape conservation cooperatives across the U.S., in part to address major environmental and human-related factors that limit fish and wildlife populations at the broadest of scales, including developing adaptation strategies in response to climate change. The landscape conservation cooperative is utilizing principles of strategic habitat conservation to develop and communicate landscape-scale scientific information to shape conservation across the northeastern U.S. This initial plan outlines the regional threats to conservation, priority species and habitats, as well as active regional partnerships.

Strategic Habitat Conservation (USGS and USFWS 2006)

Strategic Habitat Conservation (SHC) is the conservation approach the Service is using to achieve its mission in the 21st century. SHC is a framework that utilizes adaptive management to redefine broad-scale conservation. It departs from the general pursuit of conserving more habitat and species to a more planned approach based on scientific data, at a landscape level, and in cooperation with partners. Starting with explicit, measurable objectives that are based on testable assumptions that can be evaluated, it is enacted through an iterative process of biological planning, conservation design, conservation delivery, assumption-driven research, and outcome-based monitoring. The goal is to set specific population objectives for selected species of fish, wildlife, and plants, which become our conservation targets. We refer to this select group of species as surrogate species because they represent other species or aspects of the environment. Such identified species are used for comprehensive conservation planning that supports multiple species and habitats within a defined landscape or geographic area.

Some of the surrogate species that have been identified for the North Atlantic Landscape Conservation Cooperative (LCC), in which the refuge is located, include the marsh wren, black skimmer, least tern, American black duck, common merganser, red-shouldered hawk, eastern hog-nosed snake, northern diamond-backed terrapin, American eel, American shad, and horseshoe crab. Appendix A includes additional information about these and other species considered as potential resources of concern for the Plum Tree Island NWR CCP.

Through the SHC approach, we coordinate and link actions that various programs within the Service, other Federal agencies, and our State, nonprofit and private conservation partners take at individual sites, so the combined effort of all our work will enable the realization of biological outcomes at the larger landscape, regional, or continental scale. Inherent in the process is a continual evaluation of biological outcomes and approaches, with the intent to adapt the overall conservation strategy to respond to changing circumstances and new information.

The Nature Conservancy's Chesapeake Bay Lowlands Ecoregional Plan (Draft) (TNC 2003)

The Chesapeake Bay Lowlands ecoregion is centered on the Chesapeake Bay and includes most of Delaware, all of the coastal plain in Maryland and the District of Columbia, and coastal Virginia south to the James River. Five major types of conservation targets were identified in the Chesapeake Bay Lowlands ecoregion: matrix forest blocks; aquatic ecosystems; “significant conservation areas” in tidal waters (for estuarine, coastal, and marine targets); natural communities; and species. To the extent that some of these conservation targets overlap with the species and habitats found on Plum Tree Island NWR, they have been considered as part of this plan development.

The National Park Service's Captain John Smith Chesapeake National Historic Trail (NPS 2011)

The National Park Service (NPS) administers the Captain John Smith Chesapeake NHT, the first national water trail in the U.S. Established in 2006, the trail consists of a series of water routes extending approximately 3,000 miles along the Chesapeake Bay and its tributaries in the States of Virginia, Maryland, Delaware, and in the District of Columbia, tracing the 1607 to 1609 voyages of Captain John Smith to chart the land and waterways of the Chesapeake Bay. The trail complements the diverse resources of the Chesapeake Bay Gateways Network—a partnership of existing water trails, parks, museums, wildlife refuges, and other sites that provide interpretation and bay access—to make additional opportunities for education, recreation, and heritage tourism. As the Nation's first national water trail, the Captain John Smith Chesapeake NHT will be most fully experienced by watercraft and at water access sites. However, visitors will also be able to view the trail setting and learn the stories from land. Numerous existing land sites along the voyage routes will interpret Smith's explorations, native settlements and cultures, and the environment of the early 17th century.

Wildlife and Habitat

Virginia Wildlife Action Plan (VDGIF 2005)

The Virginia Wildlife Action Plan (WAP) was completed in 2005 (VDGIF 2005). This plan attempts to provide a Statewide perspective

on conservation, presenting geographic, species, and habitat priorities. Plum Tree Island NWR protects several habitats that support species determined to be of conservation need by the Commonwealth of Virginia. As such, species of conservation priority noted in the WAP were considered in identification and prioritization of the refuge's resources of concern in 2012 and 2013 (appendix A). We reviewed Virginia's recently approved 2015 WAP (VDGIF 2015) and determined that change in priority rankings did not warrant changing any of the refuge's resources of concern (Casey 2016 personal communication).

USFWS Birds of Conservation Concern (USFWS 2008)

This report identifies the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the Service's highest conservation priorities and draws attention to species in need of conservation action. The geographic scope includes the U.S. in its entirety, including island territories in the Pacific and Caribbean. Bird species considered for inclusion on lists in this report include nongame birds, gamebirds without hunting seasons, subsistence-hunted nongame birds in Alaska; and ESA candidate, proposed endangered or threatened, and recently delisted species. Assessment scores are based on several factors, including population trends, threats, distribution, abundance, and area importance.

USFWS Migratory Bird Program Strategic Plan (USFWS 2004a)

The Migratory Bird Program Strategic Plan provides direction for the Service's migratory bird management over the next decade (2004 to 2014). The plan contains a vision and recommendations for the Refuge System's place in bird conservation. It defines strategies for the Service, including the Refuge System, to actively support bird conservation through monitoring, conservation, consultation, and recreation. Considerations for, to the extent it is practical, standard monitoring protocols, habitat assessment and management, and promoting nature-based recreation and education to forward the vision of the Migratory Bird Program Strategic Plan have been incorporated into this plan.

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

Originally written in 1986, the North American Waterfowl Management Plan (NAWMP) describes a 15-year strategy for the U.S., 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 needs, priorities, and strategies for the next 15 years, and

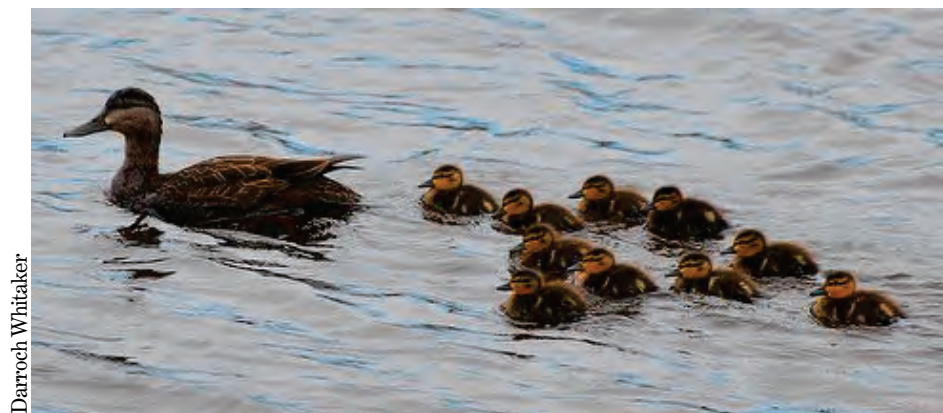
guides partners in strengthening the biological foundation of North American waterfowl conservation and stakeholder confidence in the direction of the plan. You may access the report at:

<https://www.fws.gov/birds/management/bird-management-plans/north-american-waterfowl-management-plan/plan-documents.php> (accessed August 2016).

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). Plum Tree Island NWR 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 (ACJV 2005). The refuge lies within the plan’s York/Poquoson River Focus Area for waterfowl and the Lower Chesapeake/Western Shore Focus Areas for shorebirds and waterbirds. You may view the focus area online at: <http://www.acjv.org> (accessed August 2016).

The waterfowl goal for the ACJV is to, “Protect and manage priority wetland habitats for migration, wintering, and production of waterfowl, with special consideration to black ducks, and to benefit other wildlife in the joint venture area.” The Black Duck Joint Venture plan also relates to our CCP. American black ducks use the refuge during the winter and migration, but are less common during their breeding season as their primary breeding grounds are in Canada. The Black Duck Joint Venture Final Draft Strategic Plan (USFWS/CWS 1993) resides online at: <http://www.pwrc.usgs.gov/bdjv> (accessed August 2016). We referred to both joint venture plans in developing the management objectives and strategies under goal 1.



Darroch Whitaker

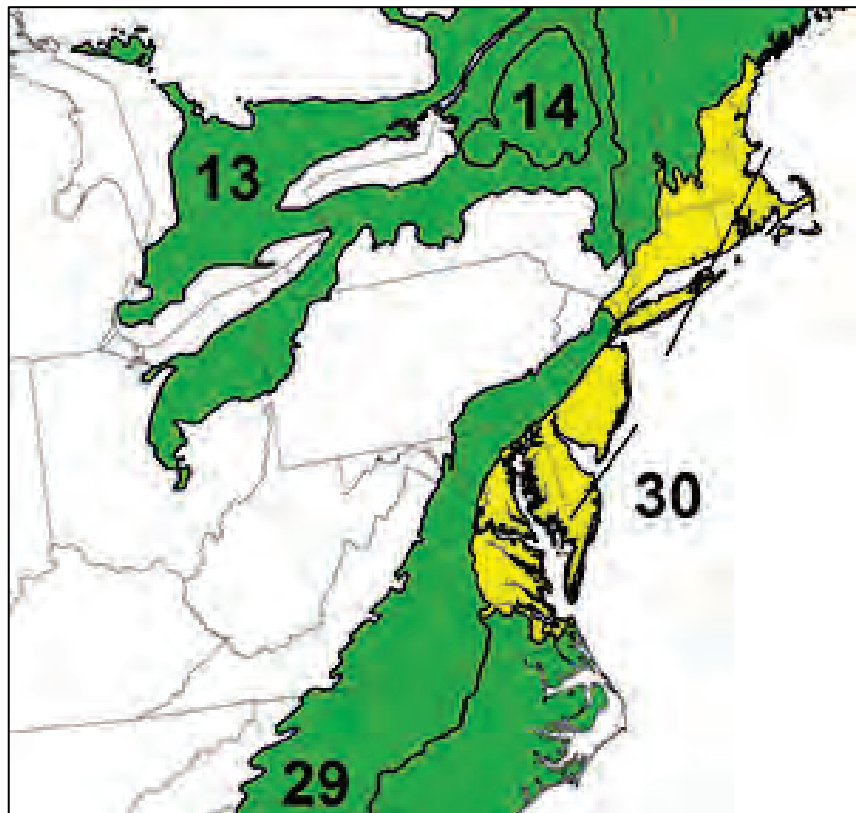
American black duck mother with brood

*Bird Conservation Plan for the Mid-Atlantic Coastal Plain
(Physiographic Area 44) (Watts 1999)*

Partners in Flight (PIF) is a partnership of government agencies, private organizations, academic researchers, and private industry throughout North America focused on coordinating voluntary bird conservation efforts to benefit species at risk and their habitats. Bird conservation regions (BCRs) have been developed to guide management on a regional scale. Version 1.0 of the Mid-Atlantic Coastal Plain BCR was completed in 1999. Plum Tree Island NWR is located within the Coastal Plain Physiographic Province and thus is considering the conservation priorities of this plan along with other conservation plans.

*New England/Mid-Atlantic Coast Bird Conservation Region
Implementation Plan (BCR 30) (ACJV 2008)*

The implementation plan for the BCR 30 combines regional plans, assessments, and research completed over the past two decades to develop continental-based bird conservation efforts. Plum Tree Island NWR is located within the southern extent of the Mid-Atlantic Coastal Plain. Many of the priority species listed for BCR 30 are also species of concern listed within the Virginia WAP. These rankings and the recommendations of the inventory have been considered along with other local and regional conservation priorities.



BCR 30

1.5 Refuge Establishment Authority and Refuge Purposes

The Service, acting under the authority of the MBCA, issued an administrative order (Wildlife Order 94) to establish Plum Tree Island NWR on April 24, 1972, for the following purposes:

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (MBCA, 16 U.S.C. 715d);

“...for the development, advancement, management, conservation, and protection of fish and wildlife resources...” (Fish and Wildlife Act of 1956, 16 U.S.C. 742f(a)(4));

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

“...particular value in carrying out the national migratory bird management program.” (GSA Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes, 16 U.S.C. 667b).

The refuge is one of many important migratory bird stopover sites along the Atlantic Flyway, providing protected breeding habitat for State-listed threatened and endangered species, as well as many neotropical migrant bird species.

Refuge-specific Plans

Existing refuge program-specific plans have been consulted either in their draft or final format to help guide decision making. These plans will also be maintained and updated as necessary to ensure accordance with the recommendations of the final CCP.

Refuge Operational Plans (Step-down Plans)

The chapter Refuge Planning Policy (602 FW 4) identifies more than 25 step-down management plans that may be completed for each refuge, and refuge management determines which of the 25 step-down plans should be completed for their refuge. Those plans provide the details necessary to “step-down” general goals and objectives to specific strategies and implementation schedules. Some require annual revisions; others are revised on a 5- to 10-year schedule. Some require additional NEPA analysis, public involvement, and compatibility determinations before they can be implemented.

The following step-down plans have been completed and will be updated in accordance with the Service’s revision schedule:

- Energy Management Plan

- Wildlife Disease Surveillance and Contingency Plan
- Fire Management Plan
- Safety Management Plan
- Migratory Bird Hunt Management Plan
- Hurricane Action Plan

The following step-down plans need to be prepared within 5 years of CCP approval:

- Habitat Management Plan
- Inventory and Monitoring Plan
- Visitor Services Plan

Refuge Vision

The CCP planning team developed the following vision statement to provide a guiding philosophy and sense of purpose for refuge management:

Plum Tree Island National Wildlife Refuge encompasses the largest contiguous salt marsh ecosystem in the lower Chesapeake Bay. Located along the Atlantic Flyway, the refuge offers diverse salt marshes, tidal streams, and wooded ridges that support fish, waterfowl, marsh and wading birds, and shorebirds. Serene shorelines offer secluded habitat for breeding and nesting wildlife, including the northern diamondback terrapin.

The refuge offers a rare opportunity for residents and visitors of the Hampton Roads area to safely enjoy expansive views of abundant wildlife thriving in these important, vulnerable, and scarce salt marshes. In partnership with others, the refuge's wildlife habitats support the rich traditions of hunting, fishing, and boating in the Chesapeake Bay.



Meghan Powell/USFWS

Marsh wildlife

Refuge Goals

The CCP planning team developed refuge goals after considering the vision statement, the purposes for establishing the refuge, the missions of the Service and the Refuge System, and the mandates, plans, and conservation initiatives noted above. These goals are intentionally broad, descriptive statements of purpose. They highlight elements that we will emphasize in its future management.

In developing and adopting a CCP for Plum Tree Island NWR, we wanted to accomplish the following goals:

- Goal 1. Conserve the coastal estuarine ecosystem to sustain high ecological integrity for the benefit of native flora and fauna, with emphasis on priority refuge resources of concern, within the lower Chesapeake Bay.
- Goal 2. Provide safe and compatible wildlife-dependent recreational opportunities for visitors to connect with nature and foster enhanced stewardship of the lower Chesapeake Bay and the Refuge System.
- Goal 3. Cultivate partnerships to further conservation, education, and interpretation of the refuge's natural and cultural resources, as well as the mission of the Refuge System.

1.6 The Comprehensive Conservation Planning Process

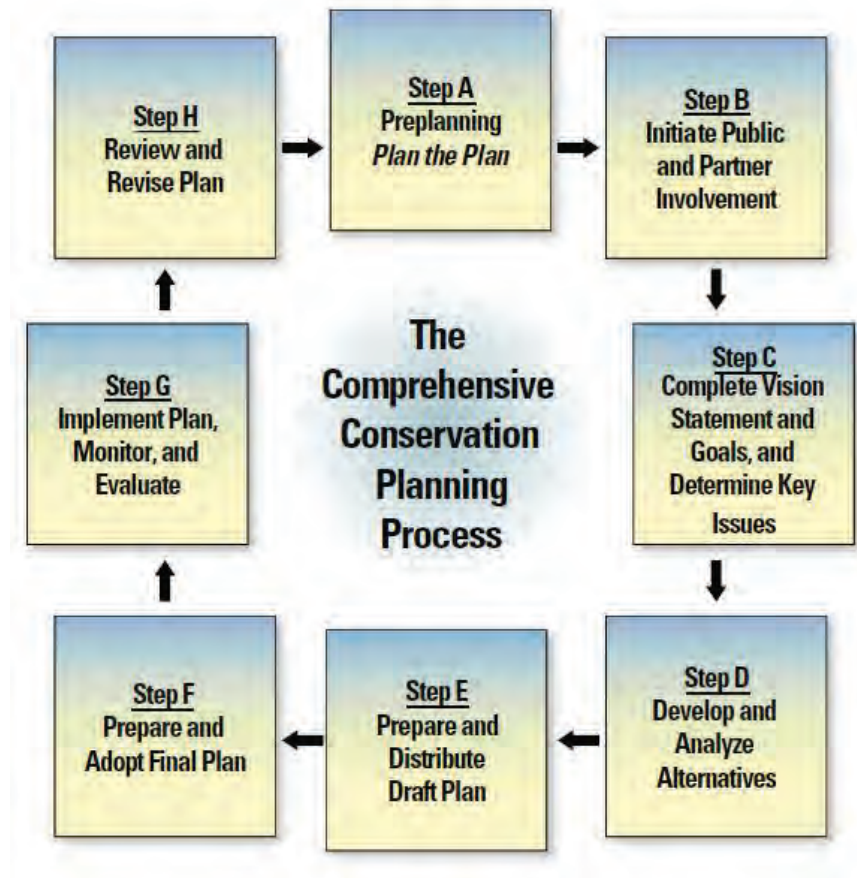
Service policy (602 FW 3) establishes a planning process that also complies with NEPA. The full text of the policy and a detailed description of the planning steps can be viewed at:

<http://policy.fws.gov/602fw3.html> (accessed August 2016). We followed the process depicted below in developing this draft CCP and EA. The planning process for the draft CCP and EA involved three primary steps: initial planning, public scoping, and plan development. These steps are described below in more detail and depicted in figure 1.1. Additional information regarding the preparation of this CCP and EA is detailed in chapter 5.

Step A: Initial Planning

We began preparing a CCP for Plum Tree Island NWR in January 2012. Initially, we focused on collecting information on the refuge's natural and cultural resources and public use program. The CCP core planning team included Service staff at the Eastern Virginia Rivers NWR Complex, Great Dismal Swamp NWR, and the Regional Office, as well as representatives from the USACE and their consultant (Shaw Environmental, Inc.), Virginia's Department of Game and Inland Fisheries (VDGIF), and Virginia Department of Environmental Quality (VDEQ).

Figure 1.1 The Comprehensive Conservation Planning Process



The CCP core planning team started meeting to discuss existing information, draft a vision statement, and prepare for the public scoping meeting and a technical meeting of State and Federal partners in June 2012.

Step B: Public Scoping

We initiated the public scoping process when the Notice of Intent to prepare a CCP for Plum Tree Island NWR was published in the *Federal Register* (FR) on January 10, 2012 (77 FR 1500). Our first planning newsletter was distributed in September 2012 to more than 400 parties on our mailing list (including media outlets) and posted announcements on the refuge website (http://www.fws.gov/refuge/Plum_Tree_Island/what_we_do/conservation.html; accessed August 2016). The planning newsletter included location, date, and time information about upcoming public scoping meetings which would serve to inform the public about current refuge management and elicit input on topics of interest to the public.

We hosted two public scoping meetings on September 13 and 14, 2012, in Poquoson, Virginia, at the Poquoson City Hall. The September 13

meeting was held from 6 p.m. to 8 p.m., and the September 14 meeting was held from 2 p.m. to 4 p.m. A total of 19 individuals from the surrounding communities attended these meetings. The CCP core planning team staff attended both meetings but were not included in the participant attendance total noted. Each meeting was videotaped by the City of Poquoson and made available for public viewing on the City's website. We provided viewing instructions on the refuge's planning website.

Steps C and D: Vision, Goals, and Alternatives Development

The CCP core planning team held an agency scoping workshop on September 13, 2012, from 10 a.m. to 3 p.m. The workshop was attended by 14 representatives from the City of Poquoson, State agencies, and Federal agencies. The CCP core planning team staff was also in attendance at this workshop but not included in the participant attendance noted. The purpose of the meeting was to identify issues, determine the significant resource values attributed to the refuge, and discuss resources of conservation concern in the refuge planning area that could be considered a management priority. We continued to consult with technical experts throughout the alternatives development process. Our CCP core planning team met regularly to develop and refine our draft vision, goals, and alternatives.

Step E: Draft CCP and NEPA Document

This draft CCP and EA represents planning step E to prepare a draft plan and NEPA document. We will publish a Notice of Availability in the *Federal Register* announcing our release of this draft for at least a 30-day period of public review and comment. During the comment period, we will also hold public meetings to obtain comments directly from individuals. We expect to receive comments by regular mail, by e-mail, or at the public meeting. After the comment period ends, we will review and summarize all of the comments received, develop our responses, revise the CCP as warranted based on the comments, and publish the comments and our responses in an appendix of the final CCP.

Step F: Adopt Final Plan

Once we have prepared the final CCP, we will submit it to our Regional Director for approval. The Regional Director will determine whether it warrants a Finding of No Significant Impact (FONSI) and may find its analysis sufficient to simultaneously issue a decision adopting a CCP. If the Regional Director has concerns, we may be required to revise the EA or complete an environmental impact statement (EIS). We will announce the final decision by publishing a Notice of Availability in the *Federal Register*, where we will also notify people of the availability of the final CCP. That will complete planning step F to prepare and adopt a final plan.

1.7 Issues, Concerns, and Opportunities

The Service defines an issue as “any unsettled matter requiring a management decision” (USFWS 2012a). Issues can include an “initiative, opportunity, resource management problem, threat to a resource, conflict in use, or a public concern.” Issues arise from many sources, including refuge 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.

From agency and public meetings and planning team discussions, we developed a list of issues, concerns, opportunities, and other items requiring a management decision. We placed them in two categories: key issues and issues outside the scope of this analysis in this EA.

Key issues—Key issues are those the Service has the jurisdiction and authority to resolve. The key issues, together with refuge goals, form the basis for developing and comparing the different management alternatives we analyze in chapter 3. The varying alternatives were generated by the wide-ranging opinions on how to address key issues and conform to the goals and objectives. We describe them in detail below.

Issues and concerns outside the scope of this analysis—One topic was identified that falls outside the jurisdiction and authority of the Service. We discuss it after “Key Issues,” below.

Key Issues

We derived the following key issues from public and partner meetings and further team discussions. How they are addressed and how well they support refuge goals distinguishes the two management alternatives in chapter 3.

Interagency Management and Jurisdiction

Since the Federal Government acquired property for the creation of the PTI Range in 1917, multiple agencies have been responsible for managing and overseeing the areas within and surrounding the present-day refuge. This has resulted in public confusion about resource management and public access in the refuge vicinity.

During the public scoping period, we received comments that identified development of the refuge’s CCP and EA as an important process for developing a shared understanding of interagency management and jurisdiction. We provide background information about the various agencies and land use history in section 2.3 of this draft CCP and EA. Determining how to leverage interagency partnerships in the management of Plum Tree Island NWR and the surrounding areas is an important issue we address in this CCP and EA.

Wildlife and Habitat Management

National wildlife refuges primarily propose the conservation of wildlife and habitats. This is our highest priority, and serves as the foundation for all that we do. Many refuges were established for specific purposes, such as protecting a particular species or habitat.

Based on the purposes of this refuge and the discussions that took place up to the time of its establishment, the primary justifications for creating it was to protect foraging and cover habitat for numerous waterfowl, marsh and water birds, and shorebirds. The refuge's location at almost the midpoint along the Atlantic Flyway makes it an exceptional rest stop for migratory birds. Protecting the ecological integrity of habitats supporting migratory birds, fish, and other species of conservation concern is a high priority goal for management of Plum Tree Island NWR.

During the public scoping period, we received comments identifying that acquisition of baseline natural resource information has been hampered by concerns for human health and safety. The unassessed threats posed by the presence and distribution of unexploded ordnance (UXO) on the refuge has hampered the Service's ability to safely conduct wildlife inventories and habitat condition assessments. All but 226 acres of the present-day refuge is within the PTI Range FUDS and presents hazards to human health and safety, as well as ecological risks associated with contaminants generated by the weathering of UXO. Determining how best to safely conduct future refuge surveys is an important issue we consulted the USACE about and address in this CCP. We also received inquiries about the status of State-listed wildlife of conservation concern and invasive plant infestations. During the CCP development process, we consulted with the VDGIF about wildlife and habitat protection, restoration, or enhancement opportunities.

Climate Change

A growing body of evidence indicates that accelerating climate change, associated with increasing global temperatures, is affecting water, land, and wildlife resources (Titus et al. 2009). Across the continental United States, climate change is affecting migratory phenology and body condition of migratory songbirds (Van Buskirk et al. 2009). Along our coasts, rising sea levels have begun to affect fish and wildlife habitats, including those used by waterfowl, wading birds, and shorebirds on our national wildlife refuges. Sea level rise (SLR), a manifestation of a warming climate, has been gradually occurring for thousands of years. SLR has the potential to significantly impact the refuge, Virginia's coastal resources and communities, and Virginia's overall economy over the next several decades. Because of higher sea levels, low-lying coastal communities are becoming more frequently inundated during storm events. As storm events are predicted to become more frequent and more intense, coastal erosion and flooding

events will likely be more severe than previously experienced. In addition to the volume of the ocean increasing, land in the mid-Atlantic region is sinking as a result of geologic changes near the surface and deep within the Earth (Holdahl and Morrison 1974); this is known as shallow and deep zone subsidence. Thermal expansion, melting of the polar ice caps, increased storm frequency, and subsidence will all have profound effects on the refuge.

During the public scoping period, we received comments suggesting that rising sea level due to climate change may be exacerbating shoreline erosion and land subsidence on the refuge, and that monitoring climate change impacts on the refuge would be valuable.

Successful conservation strategies recognize that climate change is a continuing, ongoing condition, so we need to understand how natural systems have evolved in this context and predict how those changes will affect fish and wildlife at multiple scales. We need to develop, test, and implement conservation strategies to cope with the physical changes in the coastal environment resulting from climate change. Some of the current and predicted impacts of climate change in the coastal zone include:

- Shoreline erosion and shoreline displacement.
- Displacement of wildlife (as critical habitats decline).
- Conversion of upland habitats to wetter habitats, freshwater habitats to saline.
- Conversion of forested areas to emergent wetlands.
- Conversion of tidal wetlands to mudflat or open water.
- Decreased water quality as a result of increased temperatures and runoff associated with stronger, more frequent storm events.
- Decreased groundwater availability due to changes in precipitation regimes.

This CCP considers to what extent refuge staff would increase cooperative efforts with science partners to research and monitor the current and likely physical and biological impacts of climate change, and to assess species and habitat vulnerabilities. This information will be used to formulate guidelines or thresholds to mitigate habitat losses and assist ecosystem adaptation to the refuge's changing environment.

Public Use

The Service has the sole responsibility and authority to determine the appropriate types and intensities of public uses that may occur on

national wildlife refuges. Currently, a limited public waterfowl hunt on Cow Island is the only public use allowed to occur on the refuge. The refuge remains closed to all other public uses.

During the public scoping period, we received comments requesting that we consider closing the refuge to waterfowl hunting, expanding the existing waterfowl hunting opportunities, and opening the refuge to a variety of new public uses.

In this CCP, we explore opportunities to allow new compatible public uses, meaning that such public use(s) will not materially interfere with or detract from the mission of the Refuge System or purposes for which this refuge was established. Additionally, we explore how the refuge can offer high quality visitor services programs off-refuge, while promoting stewardship of this refuge for the benefit of Chesapeake Bay wildlife and habitats, as well as the Refuge System.

Partnerships

The physical location and role of the refuge in the larger landscape or regional context is strongly considered during the planning process for the refuge. Local government, businesses, and organizations expressed concern during the public scoping period for this CCP that their interests in expanding public uses to support the local economy would not be taken into consideration as management priorities are identified for refuge management. Refuge management is driven by several Service policies and mandates (see section 1.3), along with the legislative acts used to create the refuge. Using these guidelines, management of the refuge will build on existing partnerships and explore additional opportunities in support of resource conservation and visitation at Plum Tree Island NWR and the surrounding area.

During the public comment period, we received extensive feedback providing examples of opportunities to collaborate with a broad array of organizations, both governmental entities and non-governmental organizations. Commenters recommended nurturing current partnerships and developing new partnerships to expand and improve biological resource management, visitor service opportunities, and cultural resource protection and interpretation.

Outside of Scope

During the public scoping phase for this CCP, we received numerous comments regarding PTI Range FUDS management that are outside the scope of this CCP. We shared all of these comments with the USACE and VDEQ. The comments focused on three topics:

- the boundaries and prohibited activities within the USACE Temporary Danger Zone, which lies below mean low water and is outside the jurisdiction of the Service;
- the relationship between the USACE Temporary Danger Zone

and the Virginia Marine Resources Commission's (VMRC) Restricted Area; and

- the frequency of USACE communications about the progress of their site investigations and remedies for the UXO hazards.

The Service does not have any legal authority or jurisdiction to direct the USACE or VMRC to alter the boundaries or prohibited activities in their closure areas. Similarly, the Service does not have any legal authority or jurisdiction to direct the USACE regarding the timing of communications with the public. Therefore, this CCP does not address these three topics of PTI Range FUDS management.

For the PTI Range FUDS, the USACE has the primary responsibility to identify hazards and implement clean up remedies to reduce or resolve human health and safety, as well as ecological risks associated with contaminants. The USACE is developing a proposed remedial action plan (the proposed plan) with input from a variety of stakeholders including, but not limited to, the Service, VDEQ, and the public. The proposed plan will identify actions to reduce risk to human health and the environment to an acceptable level as required by law.

Although the USACE planning process for the PTI Range FUDS is separate from the Service's development of a CCP, State and Federal agency representatives have been coordinating closely in recent years to ensure that the plans for the PTI Range FUDS are consistent with the refuge's purposes and management priorities for wildlife, habitats, cultural resources, and compatible public uses. Additional information about interagency coordination is provided in sections 2.3, 2.10, 3.2, and 3.3 of this draft CCP and EA.



Bomb crater in the salt marsh

USFWS

Chapter 2



Welcome to Poquoson roadside signs

Affected Environment

- 2.1 Introduction
- 2.2 Physical Landscape
- 2.3 Land Use History
- 2.4 Climate
- 2.5 Air Quality
- 2.6 Water Resources
- 2.7 Soundscape
- 2.8 Socioeconomic Landscape
- 2.9 Special Status Areas
- 2.10 Refuge Administration
- 2.11 Natural Resources
- 2.12 Cultural Resources
- 2.13 Public Uses

2.1 Introduction

This chapter describes the current and historic physical, biological, and socioeconomic landscape and resources of Plum Tree Island NWR that the proposed management alternatives could affect. We first describe the regional landscape, including its historical and contemporary influences, and then we describe the refuge and its resources.

2.2 Physical Landscape

Watershed Context

Plum Tree Island NWR is located in the southeastern-most portion of the York–James Peninsula, bounded by the York and James Rivers, and located within the City of Poquoson. The refuge is bordered by the Poquoson River to the north, lower Chesapeake Bay to the east, Back River to the south, and the undeveloped privately owned salt marsh to the southwest.

The 3,502-acre refuge is part of the greater Chesapeake Bay watershed, a drainage basin of 64,000 square miles that encompasses parts of the states of Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia, and the District of Columbia. Waters from this expansive area flow into the Chesapeake Bay, the Nation’s largest estuary. The watershed contains an array of habitat types including:

- Mixed hardwood forests, typical of the Appalachian Mountains;
- Grasslands and agricultural fields;
- Lakes, rivers, and streams;
- Wetlands and shallow waters; and
- Open water in tidal rivers and the estuary.

This diversity of habitat types in the watershed supports more than 2,700 plants and animal species, including Service trust resources such as endangered and threatened species, migratory birds, and migratory fish (USFWS 2011).

Geologic Development

Plum Tree Island NWR lies within Virginia’s Outer Coastal Plain Physiographic Province, as delineated by the U.S. Geological Survey (USGS). Physiographic provinces are broad-scale subdivisions based on terrain topography, rock type, and geologic structure and history. The Virginia Coastal Plain Physiographic Province consists of a series of terraces, or scarps, sloping downward toward the coast, with each terrace representing a former shoreline. It is the youngest physiographic province in the State and consists primarily of Holocene (11,700 years ago to present) and Pleistocene (2.6 million to 11,700

years ago) age sedimentary deposits of sand, clay, marl, and shell (USGS 1989). Its principle characteristics are a generally low topographic relief, extensive marshes, and tidally influenced rivers and creeks (USFWS 2007c).

The Virginia Coastal Plain Physiographic Province is separated on its western boundary from the Appalachian Piedmont Physiographic Province by the “Fall Line,” which is a low, east-facing cliff that parallels the Atlantic coastline from New Jersey to the Carolinas. It separates hard Paleozoic (542 to 251 million years ago) metamorphic rocks of the Piedmont to the west from the softer, gently dipping Mesozoic (251 to 66 million years ago) and Tertiary (65 million to 2.6 million years ago) sedimentary rocks of the coastal plain. This erosional scarp has many waterfalls, hosted flume- and water-wheel-powered industries in colonial times, and helped determine the location of such major cities as Philadelphia, Baltimore, Washington, and Richmond. Richmond marks the approximate Fall Line on the James River (USFWS 2007c). The coastal plain region is further subdivided into north and south of the James River; a far less well-defined elevation change on the York–James Peninsula, Middle Peninsula, and Northern Neck defines the boundary between inner and outer coastal plains (Wilson and Tuberville 2003). The refuge is within the outer coastal plain, characterized by its flat-lying forests, large complexes of marshes, and low elevation of less than 60 feet (18 meters).

A wedge of seaward thickening, unconsolidated to partly consolidated sediments underlies the Virginia Coastal Plain ranging in thickness from 0 feet at its western margin to more than 6,000 feet along the Atlantic coast (McFarland and Bruce 2006). In the refuge vicinity, the depth to bedrock was recently approximated at 2,250 feet (McFarland and Bruce 2006).

Geologic Processes and Contributing Factors

Natural coastal processes include accretion and erosion, which is the deposition and removal of sand along shorelines. Sand eroded from one beach is transported, or “down drifts,” and accretes on another. These processes are influenced by many factors, including ocean currents, tides, winds, sea floor bathymetry, and human modifications. The dynamic nature of these systems means that the same beach can both accrete and erode seasonally within a given year, and fluctuate between accretion and erosion over long periods of time. These processes provide continually changing coastlines and habitats for many species of wildlife.

Slow sea level rise and wave action, particularly during storms, are the two primary long-term processes that have caused shoreline changes in the past 18,000 years in Poquoson (Milligan et al. 2010). Relative sea level has risen 0.15 inches/year (3.8 millimeters/year) at the nearby

Gloucester Point and 0.17 inches/year (4.4 millimeters/year) at the nearby Sewells Point (Eggleston and Pope 2013). Based on an evaluation of annual aerial images since 1937, the refuge's shoreline has an average long-term erosion rate of 2.0 feet per year (Milligan et al. 2010). The shoreline erosion rate for Cow Island ranges from 2.0 to 10 feet per year (Milligan et al. 2010). The highest rate of erosion along the refuge's shoreline occurred at Plum Tree Island proper (southeastern point) at a rate of greater than 10 feet per year (Milligan et al. 2010).

Lands in the southern Chesapeake Bay subsided at an average rate of -0.12 inches/year (-3.1 millimeters/year) from 2006 to 2011 (Eggleston and Pope 2013). Two primary factors are causing land subsidence in the southern Chesapeake Bay: movement of the Earth's crust in response to ice loading or melting and groundwater withdrawals (Eggleston and Pope 2013). The ice sheet that previously weighed on Canada and the northern United States has melted and is no longer pushing the adjacent areas in the southern Chesapeake Bay upward. This means that the southern Chesapeake Bay is presently sinking. More recently, groundwater withdrawals from the Potomac aquifer system have increased and caused land subsidence throughout the Virginia Coastal Plain. Little or no evidence identifies any other causes for land subsidence in the southern Chesapeake Bay region.

2.3 Land Use History

Early American Indian and European Influences

Plum Tree Island NWR overlooks the Chesapeake Bay from a central location between the James River and the York River. Over thousands of years, the availability and variety of natural resources influenced the strategies used by Native Americans in their settlement and land use in this vicinity. During the late Pleistocene (18,000 years ago), sea levels were approximately 300 feet lower than they are today. In the early Holocene (between 10,000 and 7,000 years ago), sea levels rose rapidly as waters from melted ice sheets flowed into the Atlantic. Consequently, the valleys of the York and James 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 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 Chesapeake Bay's middle-western shore by the explorer John Smith in 1607 A.D. (anno domini or "in the year of our Lord") to 1608 A.D. have eroded as much as 300 feet inland over the ensuing centuries (Dent 1995).

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 boreal 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.

The successors to the Paleo-Indians were the Native Americans of the Early Archaic period (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 accompanied 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).

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. 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 tributary rivers, as the water level continued its rise in the river valleys, and the Chesapeake Bay came into being (Dent 1995). Within these river habitats, 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 1989).

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).

Between 5,000 and 3,000 years ago, sea levels stabilized and the coastline of the 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 broad



John White/Yale Center for British Art

Watercolor painting of Indians fishing

spear 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).

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).

The Late Woodland period (from 1,200 to 500 years ago) marked the final centuries before contact between Native Americans of the Northeast and European explorers. Starting about 900 A.D., 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 1300 A.D., the storage of surplus crops enabled the establishment of permanent hamlets and larger villages. An increase in the Native American population between 1300 A.D. and 1400 A.D. 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 16th and early 17th centuries (Turner 1992).

During the Contact period, the Powhatan chieftainship dominated the Virginia tidewater area. This grouping included approximately 30 tribes speaking the Algonquian language and was formed in the late 16th century when the sachem Wahunsunacock gained control of the coastal plain. He was referred to as "Powhatan," his title, and established a focal settlement called Werowocomoco, on the north bank of the York River in Gloucester County (Virginia Council on

Indians 2008, Wilford 2003). Powhatan had inherited the leadership of several tribes, and he enlarged his influence through political marriages, diplomacy, and possibly coercion. Settlements within his polity were led by chiefs, or werowances, who paid tribute to Powhatan in exchange for military assistance and access to resources (NPS 2011a).

When the English explorer John Smith made his initial exploration of the Chesapeake Bay in 1607, he described “A faire Bay compassed but for the mouth with fruitful and delightsome land.” Archaeologists estimate that about 75,000 Native Americans occupied the Chesapeake watershed at the time of European contact (Rountree et al. 2007). By 1609, John Smith mapped more than 200 Native American towns throughout the bay region occupied by the Algonquian-speaking tribes of the Powhatan Chiefdom. Further inland, there were Siouan- and Iroquoian-speaking communities as well (NPS 2011). Present-day Plum Tree Island NWR was within Powhatan’s sphere of influence and was part of a marshy zone for which the Native Americans used the term “pocosin,” meaning swamp on a hill. This term, with its varied spellings, was preserved in the name Poquoson, designating the present city (City of Poquoson 2011).

The first permanent European settlement in the southeastern Virginia region occurred in 1607 with the English settlement at Jamestown, located 25 miles west of Poquoson on the York–James Peninsula. From this settlement, the English colonists spread throughout the Chesapeake Bay area, particularly along the rivers and close to the mouth of the bay. Tobacco was introduced into the colony about 1612 and quickly became the primary export crop of the colony (USACE 2006).

Historic Occupation of Plum Tree Island NWR Over the Past 300 Years

The present-day City of Poquoson is part of a larger area known in the early 17th century as the New Poquoson Parish of the Church of England. This land was opened for settlement in 1628 and was occupied by people from the English settlement of the Virginia Colony, established in 1610 at Kecoughtan by Sir Thomas Gates (part of the current City of Hampton). In 1634, the eight original shires of Virginia were created. Poquoson was located in Charles River Shire. Between 1642 and 1643 the name was changed to York County. The York River was known earlier as the Charles River; its name was also changed about the same time (City of Poquoson 2011).

The land surrounding Amory's Wharf, located at the southern terminus of Poquoson Avenue on the Back River (map 1.3), is the original landing of the first English settlers of Poquoson, first mentioned in colonial records in a 1631 land grant. By 1635, Messick Point was an important shipping point for tobacco and other products from the plantations. After the Revolutionary War, the larger

plantations were divided into smaller farms and sold because they were no longer financially viable. For the next 150 years, most of the city's residents earned their living from farming and fishing. The lands that comprise present-day Plum Tree Island NWR were used for fishing, as well as hunting and grazing (USACE 2006).

Human Influences over the Past 100 Years

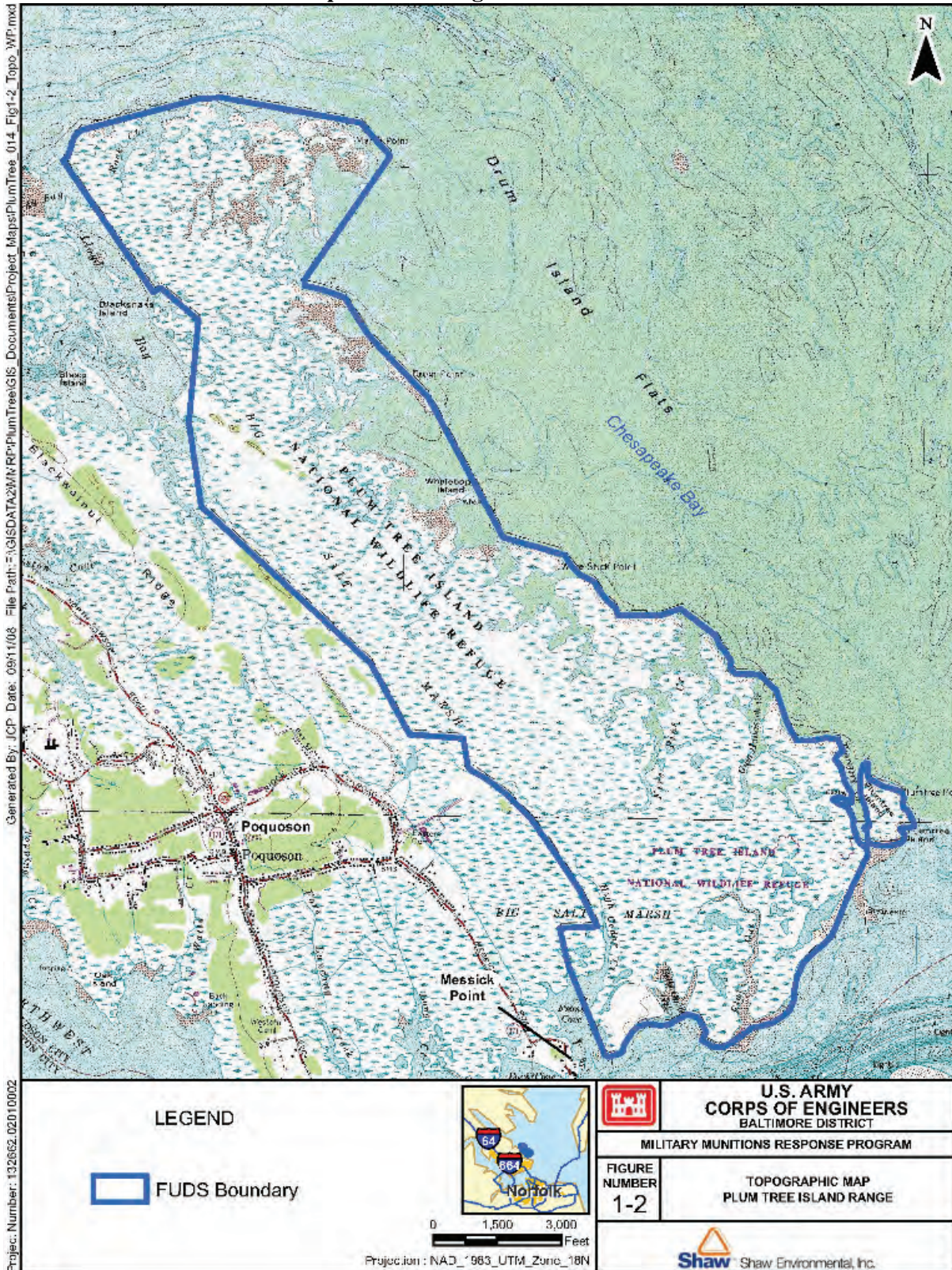
World War I and the construction of Langley Air Force Base (AFB) gradually changed the rural nature of Poquoson. World War II accelerated this change with a shift from the farming/fishing economy to one of services and retail trade. The PTI Range was created for military use. The population of Poquoson began to grow significantly, as it became a bedroom community for nearby military bases and defense industries. The community, which was part of York County for more than 300 years, became an incorporated town in 1952 and was chartered as an independent city in 1975 (USACE 2006).

1917 to Present: PTI Range FUDS

The DOD acquired three parcels of land in Poquoson, Virginia, for the creation of the PTI Range, to support nearby Langley AFB. In 1917, two of the parcels were conveyed from private individuals to the United States for an Army Aviation Experimental Station. The parcel descriptions include the creeks and marshes, the exterior boundaries of which are the mean low water line of the rivers and the Chesapeake Bay. The third parcel, which is the southeastern portion of the range and includes Plum Tree Island proper, was acquired in 1921 from the Arundel Sand and Gravel Company by condemnation, citing an act “*for support of the Army.*” The reported 3,276-acre size of the FUDS is based on historical property transfer documentation (USACE 2015; map 2.1). The FUDS outline used in today’s Geographic Information System (GIS) was digitized from hand-drawn historical maps and provides a slightly different area (3,256 acres).

The PTI Range was an extensively used practice bombing, gunnery, and rocket range for military training exercises. Eight individual sub-ranges were located on the PTI Range, primarily in the southern portion. Ordnance activity occurred on the PTI Range from 1917 until 1959. Bombs used during actual testing consisted of 25-, 230-, 250-, 300-, 550-, 600-, 1,100-, and 2,000-pound high-explosive bombs. Although the amounts of explosives used in training preparation bombs are unknown, practice bombs ranged from 100 to 2,000 pounds. As a rule, the local ordnance platoon filled empty practice bombs with a “spotting charge” of black powder and sand to achieve the desired weight (USACE 1996). Various structures were constructed on the PTI Range to support its operations, including several boardwalks, a wooden cargo pier, three observation towers, four concrete U-shaped shelters, machine gun targets, gunnery ranges, a concrete pier target, and a barbed wire fence (Shaw Environmental, Inc. 2013a).

Map 2.1 PTI Range FUDS Location



(<http://www.nao.usace.army.mil/Portals/31/docs/environment/PlumTopoMap.pdf>, accessed September 2016)

In May 1971, the USAF exceded the PTI Range. The Service's Bureau of Sport Fisheries and Wildlife expressed interest in the property for wildlife conservation, specifically for the creation of Plum Tree Island NWR. The refuge was established on April 24, 1972, and the property transfer from DOD to DOI was approved on May 22, 1972. On June 19, 1972, the property was transferred with existing reservations of rights for continued use of the area by the National Aeronautics and Space Administration (NASA) and the USAF (37 FR 10759). Each of these reservations of rights is detailed separately below.

Since its establishment, Plum Tree Island NWR has been closed to public use due to hazardous conditions resulting from its use as a bombing, gunnery, and rocket range. A September 1972 press release informed the public that the refuge would be used "as a refuge for migratory waterfowl, nesting shorebirds, and wading birds" and remain closed to public use. Today, Plum Tree Island NWR includes the PTI Range, 211 acres at Cow Island and 15 acres along Lloyd Bay. Neither Cow Island nor the area along Lloyd Bay was part of the former PTI Range. Details about refuge establishment and the current status of PTI Range structures on the refuge are provided in section 2.10.

Hazards Associated with UXO

On April 13, 1958, three children were seriously injured when trespassing on the PTI Range, ignoring warning signs and accidentally exploding a 25-pound practice bomb containing 10-pound of black powder charge (USACE 1996). One of the children almost died from his injuries, which included losing an eye; stomach split open; arm injuries; third degree burns and deep powder burns on his face and chest; and shrapnel in his neck. He spent 6 weeks in the hospital. The second child spent 2 months in the hospital after having one leg partially amputated and three eye surgeries. The third child suffered a punctured eardrum, resulting in lifetime deafness in that ear.

In June 1959, the USAF conducted a site clearance. The clearance included a visual surface inspection of all land above the high-water mark and the removal of all dangerous and/or explosive material reasonably possible to detect. Upon completion of this work, a Certificate of Clearance was issued and noted that subsurface explosive ordnance may still remain undetected. The Certificate of Clearance recommended that the area permanently remain as a conspicuously posted "Restricted Hazardous Area" and remain under government control (USACE 1996).

Archives, aerial photos, and interviews offer insights about use of the site (USACE 1996). Aerial photos of the PTI Range, taken in 1935 and 1995, show substantial bomb craters indicative of high-explosive

(demolition) bombs of various sizes. The Service maintains a collection of photos that also display numerous jet assisted take-off (JATO) items, some believed to be unknown types and sizes of bombs, that were discovered below the high-water mark at low tide. An additional photo depicts a possible item of ordnance that bears the characteristics of practice or high-explosive sea mines. In 1994, Poquoson Police reported finding an old style 100-pound demolition bomb casing, devoid of explosives or hazardous components, near the center of the property on the eastern shore.

In 1992, the USACE determined that the PTI Range was eligible for environmental cleanup and restoration in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 42 U.S.C. 9621(b)). The DOD is responsible for environmental restoration of properties that were formerly owned by, leased to or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense; such properties are known as FUDS. The U.S. Army is the executive agent for the FUDS program, and the USACE manages and directs the program's administration. The scope and magnitude of the FUDS program are significant, with more than 10,000 properties identified for potential inclusion in the program.

In 2013, the USACE completed a remedial investigation at the PTI Range FUDS to characterize potential explosive safety hazards on the surface and subsurface, characterize munitions constituents contamination, perform a Hazard Assessment for munitions and explosives of concern (MEC), and perform a baseline risk assessment for munitions constituents. The investigation concluded that risks to human health and safety vary throughout the lands and waters within

the FUDS (Shaw Environmental, Inc. 2013a). Explosive hazards present on the refuge are associated with bombs, rockets, bomb fragments, and jettisoned JATO bottles that contain propellant. Cumulative lifetime cancer risks exist for current and future refuge workers, future adult recreational visitors, and adolescent recreational visitors who may interact with elevated arsenic levels in surface water and sediment on the refuge. However, the risks associated with arsenic in sediment on the refuge was very similar to those for background samples taken outside of the FUDS.

The primary objective of the PTI Range FUDS investigations is to develop a reasonable and implementable remedy for the human and environmental health risks associated with UXO on the PTI Range FUDS. The range of reasonable and implementable remedial actions takes into consideration the current and anticipated use of the site by humans and wildlife. The USACE is currently preparing a feasibility study and proposed plan for implementation.



Cyrus Brame/USFWS



Cyrus Brame/USFWS

Refuge beach with MEC on surface (top); a pile of MEC extracted from the beach for onsite detonation (bottom)

The Service and State agency representatives have participated throughout the USACE site investigation process and will continue to participate in the long-term management and monitoring of the site. Although the USACE planning process is separate from the Service's development of a CCP, State and Federal agency representatives have been coordinating closely to ensure that the plans do not propose actions that are contradictory or would generate new conflicts.

With regard to migratory birds and implementing remedial actions, the Migratory Bird Treaty Act (16 U.S.C. 703–712) is an action-specific Applicable or Relevant and Appropriate Requirements (ARARs) that may affect remedial investigation and action at the PTI

Range FUDS. As part of the Migratory Bird Treaty Act, the Service has issued a non-jeopardy biological opinion for Army predisposal actions, including the remediation of MEC and/or munitions constituents. For example, vegetation clearance activities must occur outside the nesting seasons for migratory birds. Remedial alternatives involving clearing and grubbing may be subject to this ruling (USFWS 2009b).

USACE Temporary Danger Zone

In 2004, UXO was discovered in the shallow waters along the southern portion of the refuge, both on and off refuge lands. This discovery led to the USACE designation of a Temporary Danger Zone around a portion of the refuge's shoreline under the authority of the Rivers and Harbors Act (codified at 33 U.S.C. 1 and 33 U.S.C. 3). The Temporary Danger Zone covers the southern part of the old bombing range from Bells Oyster Gut to Whalebone Island and extends from the shoreline into the water approximately 300 feet, depending upon the extent of the shallows (map 2.2). The USACE installed Day Marker Danger Zone signs to warn the public of the presence of live bombs and declaring the area closed to the public.

The Temporary Danger Zone remains in place presently. No activities that disturb the sub-aqueous soil shall be conducted within the designated area. Prohibited activities include, but are not limited to, anchoring; clamming with rakes, shovels or hoes; dredging; prop dredging; the intentional/unintentional beaching or grounding of vessels; or walking on the bottom. The setting/hauling of crab pots, gill nets, and purse seining are exempt from these regulations.

VMRC Restricted Area

The VMRC approved a regulation to protect the citizens of the Commonwealth from dangers associated with UXO (4 VAC 20-1065; map 2.2). The regulation affords the Virginia Marine Police and the VDGIF the authority to enforce Virginia laws prohibiting entrance in to the restricted area. The regulation:

- a) prohibits any vessel or person from entering the restricted area without the permission of the USACE or persons or agencies authorized to act on their behalf, and
- b) stipulates that commercial or private interests having a need to operate within the restricted area must contact the USACE for additional guidance before entering this area.

1959 to 1994: NASA Model Drop Site

Following termination of ordnance activity on the PTI Range, the NASA Langley Research Center held a lease on the 260-acre site, located near the western border of the refuge, for conducting unpowered aircraft model flight testing. Testing operations were

conducted from July 16, 1959 until July 30, 1994. In August 1994, NASA proposed to close the model drop site, and their lease expired on September 30, 1994 (Ebasco Services Incorporated 1994). No aircraft model flight testing currently occurs on this site, and no activities are planned to occur in the future.

The NASA property contained limited infrastructure, including buildings, electric lines, gates and a road; the leased portion of the operations on present-day refuge property was solely for model aircraft recovery (Brame 2013 personal communication). During 1994, NASA worked with the Service to assess the feasibility of reuse of the existing structures. NASA was interested in leaving existing structures for possible adaptive re-use by future lessees/owners, such as the Service (for use as a visitor center) or an appropriate public entity. However, a title search identified concerns about the accuracy of surveys for each tract, location of tracts relative to each other, and tax parcel documentation. The title search company concluded that they could not locate where the parcels were situated on the ground.

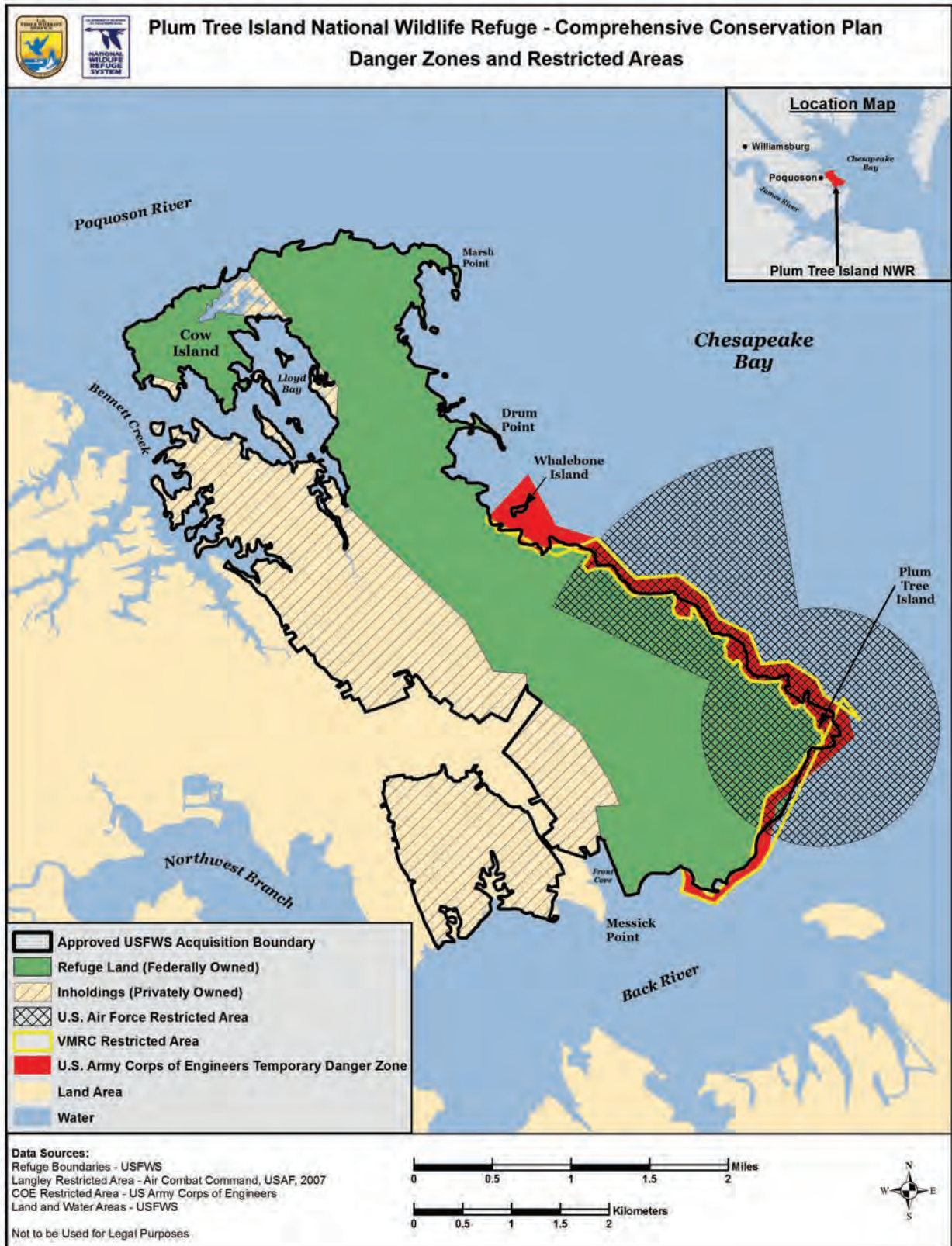
NASA developed a plan to remediate wetland areas on the site that were damaged from operation of the marsh-buggy, which was used to recover models and parachutes. The plan consists of replanting damaged areas and has been reviewed by the City of Poquoson, which has jurisdictional authority over the site.

1963 to Present: USAF Danger Zone

On February 5, 1963, the USAF reserved the right to use an area (danger zone) as an emergency jettison area and for ordnance disposal operations (28 FR 1106; codified at 33 CFR 334.340; redesignated at 50 FR 42696, October 22, 1985, as amended at 62 FR 17553, April 10, 1997; map 2.2). Real property transfer documentation from the USAF and GSA identifies that the USAF reserved the right to use this danger zone (USACE 1996).

The 2015 version of 33 CFR 334.340 details that the USAF may use this danger zone for no more than 4 hours per month, which would occur over the course of no more than 2 days per month (<http://www.gpo.gov/fdsys/pkg/CFR-2015-title33-vol3/pdf/CFR-2015-title33-vol3-sec334-340.pdf>, accessed September 2016). The Commander, Tactical Air Command, Langley AFB, Virginia, is responsible for publicizing in advance through the U.S. Coast Guard (USCG) “Local Notice to Mariners,” in the local press, and by radio from time to time the schedule of use of the area. Patrol boats are used to warn vessels during periods of use. No person or vessel shall enter or remain in the danger zone during periods of firing, bombing, or when the zone is otherwise in use.

Map 2.2 Danger Zones and Restricted Area



2.4 Climate

The climate of the lower Chesapeake Bay is humid subtropical, as determined by latitude, topography, prevailing westerly winds, and the influence of the Atlantic Ocean. Summer thunderstorms, nor'easters, and tropical storms produce rainfall in Poquoson. Heavy rain, high winds, and tidal flooding result from occasional hurricanes. Hurricane Isabel struck on September 18, 2003, resulting in extensive property damage and uprooting of trees throughout Poquoson (City of Poquoson 2008).

Average annual temperature fluctuations typically range from a high of approximately 87 degrees Fahrenheit (°F; 30.6 degrees Celsius [°C]) to a low of approximately 32 °F (0 °C)

(<http://weatherspark.com/averages/30719/Hampton-Virginia-United-States>; accessed August 2016). The average monthly temperature ranges from 40.2 °F (4.6 °C) in January to 78.7 °F (25.9 °C) in July.

Typically, relative humidity ranges from 43 percent to 91 percent throughout the year. Precipitation averages 43.59 inches (110.72 centimeters) annually, with peak rainfall occurring in the summer (see table 2.1). The average annual snowfall is 7.3 inches (18.54 centimeters) (Southeast Regional Climate Center 2012).

Table 2.1 Monthly Average Temperature and Precipitation for the Refuge Vicinity from 1918 to 2007 at Langley AFB (Station 444720)

Month	Average Temperature (in degrees Fahrenheit)	Average Precipitation (in inches)
January	40.2	3.49
February	41.7	3.35
March	48.7	3.84
April	57.4	3.06
May	66.2	3.63
June	74.6	3.62
July	78.7	4.68
August	77.5	4.66
September	72.0	4.38
October	61.2	2.82
November	51.5	2.94
December	43.2	3.14
	Annual Average: 59.4	Annual Total: 43.59

(Southeast Regional Climate Center 2012)

Based on historical records from 1974 through 2012, prevailing winds at the Langley AFB in Hampton, Virginia, are westerly with highest wind speeds in the spring

(<http://weatherspark.com/averages/30719/Hampton-Virginia-United-States>; accessed August 2016). Prevailing winds in the spring and summer are from the south-southwest, while those in the fall and winter are from the north-northwest. Throughout the year, wind

speeds range from 1 to 17 miles per hour (1.6 to 27.4 kilometers per hour) (<http://weatherspark.com/averages/30719/Hampton-Virginia-United-States>; accessed August 2016). Between 2000 and 2014, the growing season for the Williamsburg, Virginia, vicinity averaged 225 days (<http://www.nws.noaa.gov/climate>; accessed August 2016).

Global Climate Change

Global climate change is a significant concern to the Service and to its partners in the conservation community. Tidal marshes are among the ecosystems most susceptible to climate change, especially accelerated sea level rise. The Intergovernmental Panel on Climate Change (IPCC) Special Report on Emissions Scenarios suggested that global sea level would increase by approximately 12 to 40 inches (30 to 100 centimeters) by 2100. Other scientists suggest that this range may be too conservative and that a more likely range could be 20 to 55 inches (50 to 140 centimeters) by 2100 (Clough and Larson 2009). Spring and summer temperatures will rise with earlier spring snowmelt, wildfires will increase in number and will be larger and longer in duration, and tropical storms will increase in frequency and intensity (Scott et al. 2008).

At the regional level, the Hampton Roads Planning District Commission (HRPDC) is addressing the City of Poquoson's vulnerability to flooding and potential impacts of sea level rise. As one of 21 planning districts in Virginia, HRPDC's purpose is "...to encourage and facilitate local government cooperation and state-local cooperation in addressing on a regional basis problems of greater than local significance" (Code of Virginia, Section 15.2-4207). HRPDC represents more than 1.6 million people and includes 16 jurisdictions, among which is the City of Poquoson (<http://www.hrpdcva.gov/page/about>; accessed August 2016). HRPDC is working with the Virginia Coastal Zone Management Program to develop a framework for climate change response in Hampton Roads (City of Poquoson 2008). HRPDC's efforts, combined with the development of enhanced storm surge modeling for the Virginia coast, will help to inform responses to sea level rise. In September 2009, Poquoson updated its Multi-Hazard Mitigation Plan, which includes revised information on climate change and sea level rise (City of Poquoson 2008).

To address the potential effects of sea level rise on national wildlife refuges, the Service contracted the application of the Sea Level Affecting Marshes Model (SLAMM 5.1) for most Region 5 refuges. This analysis was performed to provide necessary information for CCPs for each refuge, along with other long-term management plans. The SLAMM accounts for the dominant processes involved in wetland and shoreline changes during long-term sea level rise. The SLAMM model is based on IPCC's A1B scenario of climate change. The A1 family of scenarios assumes rapid economic growth, a rapid population

growth that peaks mid-century and declines thereafter, and use of efficient technologies.

Due to the refuge's relatively low tidal elevation range and a high rate of historical sea level rise, Plum Tree Island NWR is considerably vulnerable to global sea level rise (Clough and Larson 2009).

Historical sea level rise at this site has been higher than global trends, likely due to the combination of land subsidence and other local effects such as regional heating, freshwater effects, and other mass adjustments (Clough and Larson 2009). Tide data collected at Sewells Point in Norfolk show that sea level has risen 0.17 inches/year or 1.45 feet/century (<http://www.co-ops.nos.noaa.gov>; accessed May 2014).

The historic trend for sea level rise was estimated to be 0.16 inches/year using the mean of the two nearest NOAA gages (8637624, Gloucester Point, Virginia; 8638610, Sewells Point, Virginia). This historical rate of sea level rise is more than twice the global average for the last 100 years (approximately 0.07 inches/year) (Clough and Larson 2009).

Under all SLAMM scenarios modeled, most of the area within the refuge's approved acquisition boundary is predicted to convert to open water by 2100 (Clough and Larson 2009). Salt marsh is predicted to be resilient to sea level rise up to 0.39 meters by 2100, at which point the vast majority will be lost. In scenarios of greater than 0.39 meters sea level rise by 2100, between 74 and 99 percent of the salt marsh within the refuge will become regularly flooded. The refuge's irregularly flooded, brackish marsh does not show much resilience to sea level rise in the long term; regardless of the sea level rise scenario used, between 62 and 99 percent of the present-day brackish marsh will be lost by 2100 (table 2.2, figure 2.1).

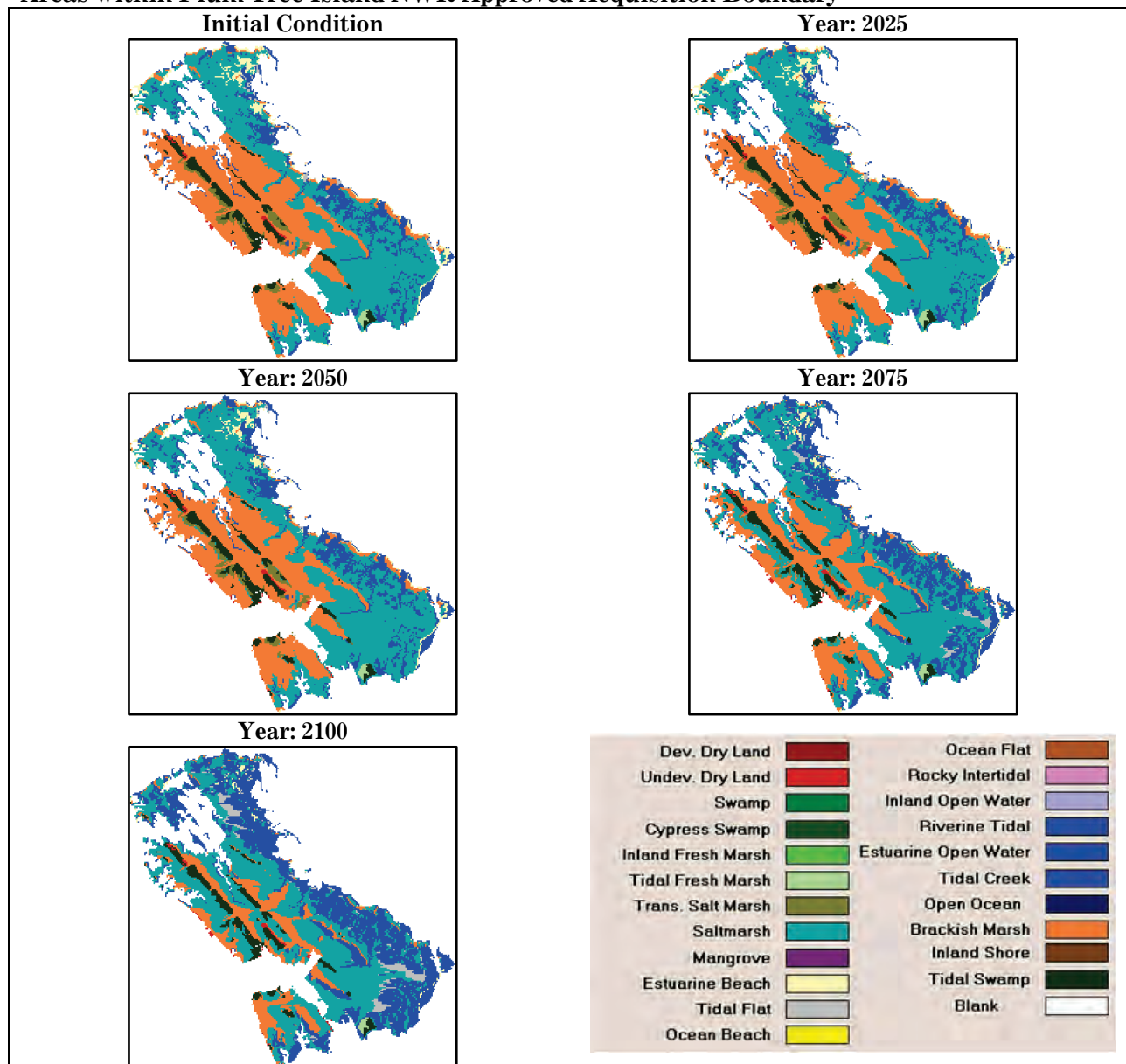
Table 2.2 IPCC Scenario A1B–Mean, 0.39-Meter Global Sea Level Rise by 2100 Results for Areas within Plum Tree Island NWR Approved Acquisition Boundary

Habitat Type	Area (acres) (percent of total acreage)				
	Year 2010	Year 2025	Year 2050	Year 2075	Year 2100
Saltmarsh	2,129.4 (43 percent)	2,110.7 (42 percent)	2,128.1 (43 percent)	2,191 (44 percent)	2,098.3 (42 percent)
Brackish Marsh	1,642.6 (33 percent)	1,629.9 (33 percent)	1,561.8 (31 percent)	1,084.4 (22 percent)	632.3 (13 percent)
Estuarine Open Water	630 (13 percent)	655.4 (13 percent)	765.7 (15 percent)	1,230.4 (25 percent)	1,780.6 (36 percent)
Tidal Swamp	238.4 (5 percent)	238.4 (5 percent)	237.7 (5 percent)	237.6 (5 percent)	237.5 (5 percent)
Estuarine Beach	175 (4 percent)	149.7 (3 percent)	118.2 (2 percent)	79.1 (2 percent)	45.7 (1 percent)
Transitional Salt Marsh	114.8 (2 percent)	114.8 (2 percent)	106.2 (2 percent)	31.5 (1 percent)	0.1 (0 percent)
Undeveloped Dry Land	25.4 (1 percent)	25.4 (1 percent)	25.4 (1 percent)	25.4 (1 percent)	25.4 (1 percent)

Habitat Type	Area (acres) (percent of total acreage)				
	Year 2010	Year 2025	Year 2050	Year 2075	Year 2100
Developed Dry Land	1.6 (0 percent)	1.6 (0 percent)	1.6 (0 percent)	1.6 (0 percent)	1.6 (0 percent)
Tidal Flat	0 (0 percent)	31.4 (1 percent)	12.5 (0 percent)	76.2 (2 percent)	135.7 (3 percent)
Total Acreage Including Water	4,968.9 (100 percent)	4,968.9 (100 percent)	4,968.9 (100 percent)	4,968.9 (100 percent)	4,968.9 (100 percent)

(Clough and Larson 2009)

Figure 2.1 IPCC Scenario A1B–Mean, 0.39-Meter Global Sea Level Rise by 2100 Results for Areas within Plum Tree Island NWR Approved Acquisition Boundary



(Clough and Larson 2009)

Climate Change Impacts on Vegetation

A significant increase in sea level rise without a commensurate increase in marsh accretion rate would convert high marsh to low marsh and low marsh to open water, resulting in the loss of habitat for salt marsh obligate species (e.g., saltmarsh sparrow). Excessive submergence drains carbon reserves from plants, thereby reducing peat formation and plant productivity. Marshes would be converted to unvegetated mudflats. Rise in ambient temperature would reduce oxygen concentrations in the water column of eroded marsh embankments, rendering them poor habitat for most fish species (USFWS 2007c). Furthermore, highly organic sediment resulting from eroding tidal marshes presents problems for submerged aquatic vegetation (SAV).

The full effects of climate change will take longer than the 15-year planning horizon of this document, and predictions at this point are largely speculative. However, there are still some generalizations that can be made. For example, increased sea levels will not only remove some wetland habitat but may also extend or create it elsewhere, depending on topography and prior manipulation resulting from human influences. Increased storm events, drought, and flooding will exert a form of natural selection on upland vegetation, creating greater age-class diversity than exists now, and promoting species structurally and physiologically able to withstand catastrophic events. We will likely see the rearrangement of vegetation communities according to their hydric (wet) or xeric (dry) affiliations.

Climate Change Impacts on Wildlife Resources

Climate change will have a range of effects on vegetation and ecological systems and, therefore, the wildlife that depend on them. It is expected that species ranges will shift northward or toward higher elevations as temperatures rise, but responses will likely be highly variable depending on species or taxonomic group. Under these rapidly changing conditions, migration, not evolution, will determine which species are able to survive. Species that cannot migrate will suffer the most.

The Virginia Climate Change Strategy for Species of Greatest Conservation Need predicts that there will be significant challenges for species of greatest conservation need (VDGIF et al. 2009). More than 60 percent of species of greatest conservation need are aquatic, and another 15 to 20 percent rely on riparian and wetland habitats.

Four types of responses by animal species are possible. First, the density of species may change locally, and their ranges may shift in response to the need to find areas within their range of tolerance. Second, there will likely be changes in phenology, or the timing of important life history events such as egg-laying or migration. Third, changes in body sizes and behaviors may occur. Fourthly, genetic

frequencies may shift. In a study that investigated 61 studies on phenology changes of 694 species over the past 50 years, a statistically significant shift toward earlier timing of spring events was evident (Root et al. 2003).

Birds and Climate Change

Waterfowl range contraction is anticipated as milder, warmer winters shift northward, reducing the need for waterfowl to migrate as far south. Fewer waterfowl now winter in the Chesapeake Bay area, attributed to climatic changes occurring in the breeding grounds of the Prairie Pothole region, milder winters further north, and decline of eelgrass in the bay (from warmer water temperatures, turbidity, and sea level rise) (VDGIF et al. 2009). With an increased rate of surface marsh flooding predicted from New Jersey to Virginia, annual fecundity of many state and Federal species of concern is jeopardized, including American black duck, saltmarsh sparrow, black rail, black skimmer, and American oystercatcher. Over the next few decades, vegetation changes and marsh erosion will reduce nesting habitat for these species but may enhance feeding habitat for migrant shorebirds and/or migrant or wintering waterfowl. An increase in open water habitat over the next 50 to 100 years will benefit species like the bufflehead and canvasback; will dramatically reduce marsh nesting habitats, fish, and invertebrate productivity; and will cause redistribution of waterfowl and shorebirds (Erwin et al. 2006). Climate change effects could indirectly affect piscivorous birds (such as osprey and bald eagle) because impaired water quality would adversely affect the fish they consume.

Aquatic Species and Climate Change

Mini estuaries and wetland vegetation comprise much of the shoreline of Plum Tree Island. Salt marsh, riverine tidal, tidal creek, estuarine open water, and transition zones are all interrelated habitats for fish and aquatic invertebrates as nursery, feeding, and protection areas. Though salt marsh is expected to remain resilient despite the submersion of other critical wetlands, productivity levels, energy dynamics, and environmental changes will affect aquatic species. Among them being dependent fisheries, including migratory fish that previously utilized habitat then submerged or transformed into mudflats. Important forage fish species and migratory larval fish utilizing inland and tidal freshwater marsh cannot successfully tolerate or adapt to increasingly saline and fluctuating environments, the result of saltwater intrusion brought on by climate change.

2.5 Air Quality

The EPA collects emissions data on three common air pollutants that can negatively affect human health and the environment: carbon monoxide, sulfur dioxide, and particulate matter. The EPA also collects data on three major promoters of these air pollutants: volatile organic compounds, nitrogen oxides, and ammonia. These data are

summarized in the Air Quality System database, EPA's repository of criteria air pollutant monitoring data. This database reports the number of days when air quality was good, moderate, or unhealthy for sensitive groups, by stationed county (counties with air quality monitoring stations).

The refuge is located in the Virginia Beach–Norfolk–Newport News, Virginia–North Carolina Core Based Statistical Area (CBSA), which identifies an area with population of 2.5 million by January 1, 2015. More localized air quality monitoring reports are available for the nearby City of Hampton, which is also located on The Peninsula and approximately 7 miles south of the City of Poquoson. During 2015, air quality in the refuge airshed was not unhealthy for sensitive groups (table 2.3).

Table 2.3 Air Quality Data from the EPA's Air Quality System Database for Two Areas near Plum Tree Island NWR, 2015

Geographic Area	Percentage of Days in 2015 When Air Quality Was		
	Good	Moderate	Unhealthy for Sensitive Groups
Virginia Beach–Norfolk–Newport News CBSA	77 percent	23 percent	0 percent
City of Hampton	84 percent	16 percent	0 percent

(https://www3.epa.gov/airdata/ad_rep_aqi.html; accessed August 2016)

The Virginia Beach–Norfolk–Newport News CBSA is in an attainment area for ground-level ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, as well as fine and coarse particulate matter (<http://www3.epa.gov/airquality/greenbook/>; accessed August 2016;).

There is one active air quality monitoring station within a 10-mile radius of Plum Tree Island NWR (http://www3.epa.gov/airdata/ad_maps.html; accessed August 2016). The station is located approximately 4 miles southwest of the refuge, at the NASA Langley Research Center (Air Quality System Site ID 51–650–0008). This station monitors ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide, as well as fine and coarse particulate matter. During the 2012 ozone season, two exceedances of the 2008 8-hour, ground-level ozone standard of 0.075 parts per million (ppm) were detected at this air quality monitoring site (range: 0.079 to 0.101 ppm). (http://www.epa.gov/reg3artd/airquality/o3_exceed.html; updated September 13, 2012; accessed December 2012). No exceedances of other air quality parameters were detected during 2012.

Real-time air quality information for air quality monitoring sites in the refuge vicinity is available on VDEQ's Web site (http://vadeq.ipsmtx.com/cgi-bin/aqi_map.pl?metro02_aqi.png; accessed December 2012).

Emissions

The EPA compiled information about the top eight major point-source sectors per pollutant in 2008 (table 2.4). Located within a 10-mile radius of the refuge are:

- Three airports, including the Newport News/Williamsburg International Airport and NASA Langley AFB Airport
- One fossil fuel electric power generator (Dominion–Yorktown Power Station)
- One petroleum refinery (Western Refining Yorktown)
- Eight other industrial sites, including the Hampton/NASA Steam Plant, a solid waste landfill, and an asphalt paving mixture and block manufacturing operation

Table 2.4 Point-source Pollution Emissions Generated in 2008 within a 10-mile Radius of Plum Tree Island NWR

Pollutant	Point-source Closest to Refuge (tons)	Greatest Emissions Point-source (tons)
Carbon Monoxide	10.01 from NASA Langley Research Center	24,570 from Western Refining Yorktown
Lead	none	none
Sulfur Dioxide	0.20 from NASA Langley Research Center	24,324 from Dominion–Yorktown Power Station
Nitrogen Oxides	15.41 from NASA Langley Research Center	5,160 from Dominion–Yorktown Power Station
Fine Particulate Matter (PM _{2.5})	0.95 from NASA Langley Research Center	256 from Dominion–Yorktown Power Station
Coarse Particulate Matter (PM ₁₀)	0.99 from NASA Langley Research Center	375 from Dominion–Yorktown Power Station
Volatile Organic Compounds	1.17 from NASA Langley Research Center	46 from Dominion–Yorktown Power Station

(<http://www.epa.gov/air/emissions/where.htm>; accessed December 2012)

2.6 Water Resources

Tide range is about 2.3 to 2.4 feet in Poquoson (Milligan et al. 2010). Tidal flooding, which occurs twice daily on approximately 1,000 acres of the refuge, also results in changes to the amount of water in the creeks and inlets (Shaw Environmental, Inc. 2013a). During storm surges, the entire refuge can be several feet under water (Shaw Environmental, Inc. 2013a). Salinity in the Poquoson River, Back River, and Mobjack Segment of the Chesapeake Bay ranges from 23 to 27 parts per thousand (Roberts et al. 2003).

Surface Water Quality

The Chesapeake Bay is one of the world's largest and most productive estuarine systems. It is the nation's largest and most diverse estuary, draining across more than 64,000 square miles of six states (Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia) and District of Columbia (USGS 2003). The Susquehanna, Potomac, Rappahannock, York, and James Rivers are the five largest rivers in the Chesapeake Bay watershed.

The refuge is located in a 3,592-square mile area referred to as the Chesapeake Bay/Atlantic Ocean and small coastal basins area (VDEQ 2012a). The combined basins encompass the small bays, river inlets, islands, and shoreline immediately surrounding the Chesapeake Bay and the southern portion of the Delmarva Peninsula. These basins also include the Chesapeake Bay itself.

The Chesapeake Bay/Atlantic Ocean and small coastal basins are defined by both hydrologic and political boundaries. The Chesapeake Bay/Atlantic Ocean and small coastal basins are divided into seven USGS hydrologic units. The seven hydrologic units are further divided into 24 waterbodies or watersheds and 73 sixth order sub-watersheds. Major tributaries flowing into the Chesapeake Bay from the western shore include the Poquoson River, Back River, and Lynnhaven River. The refuge is within the Lower Lynnhaven–Poquoson hydrologic unit (HUC 02080108), which drains 213 square miles from Lynnhaven, Virginia, south toward, and includes part of Virginia Beach.

Unfortunately, there are few monitoring stations in the Chesapeake Bay/Atlantic Ocean and small coastal basins, aside from the Virginia shellfish bacteriological monitoring program and citizen monitors. One tidal monitoring network station is located north of the refuge on the Poquoson River, and one tidal monitoring network station is located to the south of the refuge on the Back River (station codes WE4.3 and 4.4, respectively). Insufficient data are available to assess the health of freshwater streams in the City of Poquoson and vicinity (http://stat.chesapeakebay.net/?q=node/127&quicktabs_25=4; accessed May 2014). Although the Poquoson Citizens for the Environment has been conducting temperature, pH, and *Escherichia coli* sampling at 32 stations from January 2008 to December 2010, the VDEQ determined that the sampling methodology and/or data quality has not been approved for making a determination about the waters being suitable for a designated use (e.g., recreational waters for swimming) (VDEQ 2012a).

Impaired Waterways

Due to excess nutrients and sediment, in 2000 the Chesapeake Bay was listed as an impaired water body under the Clean Water Act (USGS 2003). It must meet Federal regulatory water quality standards. The EPA has divided the Chesapeake Bay watershed into 92 tidal water segments for water quality monitoring purposes (http://www.chesapeakebay.net/images/maps/cbp_28727.pdf; accessed August 2016); Plum Tree Island NWR is located within the Mobjack Bay segment (MOBPH).

Virginia's Phase I Watershed Implementation Plan (VDEQ 2010a) identifies five major source sectors responsible for water pollution in the Chesapeake Bay: wastewater treatment plant discharges; agricultural runoff; urban/suburban stormwater runoff; on-site

wastewater/septic systems; and atmospheric deposition (air pollution).

In December 2010, the EPA established a “pollution diet” known as the Chesapeake Bay Total Maximum Daily Load (TMDL). This “diet” sets limits on the amount of nitrogen, phosphorus, and sediment that is allowed to flow into the Bay each year. The TMDL is designed to ensure that all actions to control pollution entering tidal rivers and the Bay will be in place by 2025, with controls in place by 2017 that would achieve at least 60 percent of the reductions from 2009 necessary to meet the TMDL. When these measures are completed, the expectation is that the ecosystem’s health will improve. As part of this cleanup process, Chesapeake Bay Program partners are implementing and refining plans to reduce these pollutants over time.

In November 2010, VDEQ released the Final 2010 305(b)/303(d) Water Quality Assessment Integrated Report (VDEQ 2010b) that provides a summary of the water quality conditions in Virginia from January 1, 2003 to December 31, 2008. In March 2012, VDEQ released the Draft 2012 305(b)/303(d) Water Quality Assessment Integrated Report (VDEQ 2012a) that provides a summary of the water quality conditions in Virginia from January 1, 2005 to December 31, 2010. Each report combines both the 305(b) Water Quality Assessment and the 303(d) Report on Impaired Waters for each river basin. These reports are compiled by the VDEQ with the assistance of the Virginia Department of Conservation and Recreation (VDCR), and are submitted to EPA and Congress to satisfy the Federal reporting requirements under Section 305(b) of the Clean Water Act and the Virginia Water Quality Monitoring, Information and Restoration Act 62.1-44 19:4 through 62.1-44-19.8 of the Code of Virginia.

The reports describe segments of streams, lakes, and estuaries that violate water quality standards and detail the pollutant(s) responsible for these violations, as well as the cause and source of the pollutant(s), if known. Low dissolved oxygen and excessive bacteria are significant causes of designated use impairments in the water quality in the Chesapeake Bay/Atlantic and Small Coastal Basin estuaries. Sources suspected of causing these impairments are internal nutrient recycling, loss of riparian habitat, stormwater runoff, inadequate sewerage, atmospheric deposition of nitrogen, agriculture, industrial point source discharges, and sources outside state borders (VDEQ 2010b, VDEQ 2012a). Although data are presented in different formats in the 2010 and 2012 reports, we found no new noteworthy improvements or impairments in water quality. Results from the Final 2010 report are summarized in table 2.5 (VDEQ 2010b).

Table 2.5 Chesapeake Bay/Atlantic and Small Coastal Basin Impairment by Designated Use

	Number of Estuary Square Miles in Chesapeake Bay/Atlantic and Small Coastal Basin					
	Aquatic Life	Fish Consumption	Public Water Supply	Recreation	Shellfishing	Wildlife
Total Number of Estuary Square Miles Assessed	1,645	1,598	-	103	1,671	135
Number of Estuary Square Miles that Fully Supported the Designated Use	47	2	-	91	1,643	135
Number of Estuary Square Miles that have Total Impairment for the Designated Use	1,598	1,596	-	12	29	0
Number of Estuary Square Miles that have a Naturally Impairment for the Designated Use	3	0	-	0	0	0
Number of Estuary Square Miles that had Insufficient Data	17	0	-	45	0	3
Not Assessed	40	104	-	1,554	17	1,564

(VDEQ 2010b)

Only EPA-approved TMDLs for fecal coliform have been prepared for the Back and Poquoson Rivers (VDEQ 2006a, VDEQ 2006b). Virginia uses a staged implementation approach to reduce fecal coliform loads by evaluating the source(s) and opportunities to employ best management practices (e.g., livestock exclusion from streams, septic tank repair/replacement, and controlling urban stormwater) to reach the TMDL. Since the TMDL has not yet been achieved in the Back River, the shellfishing condemnation zone in Front Cove remains in place

(<http://www.vdh.virginia.gov/EnvironmentalHealth/Shellfish/closure/cond054-021.pdf>; accessed May 2014).

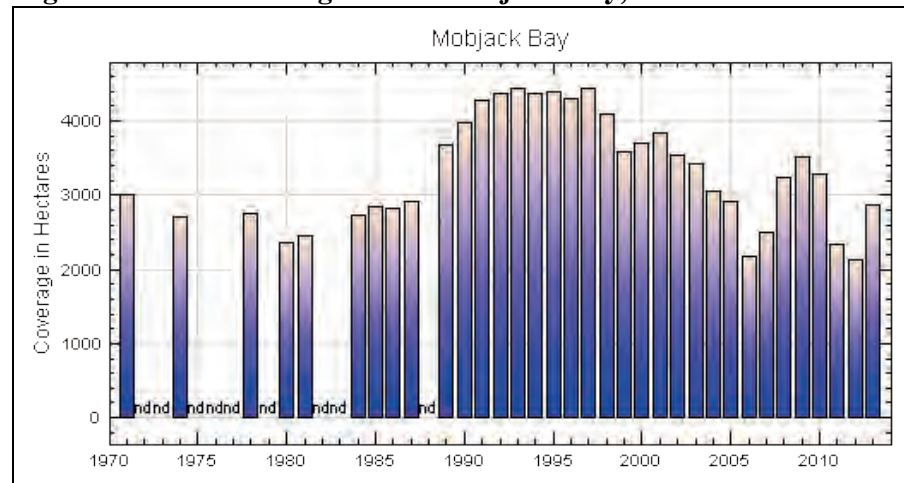
Submerged Aquatic Vegetation as an Indicator of Water Quality

SAV is a critically important component of the aquatic environment in the Chesapeake Bay, and its presence and condition are indicators of water quality. SAV is a major food source for wildlife, including migratory waterfowl; provides refuge for juvenile crabs and fish; stabilizes sediments preventing shoreline erosion and excessive suspended materials in the water column; and produces oxygen in the water column. SAV can thrive only in shallow depths where light reaches the benthic zone (i.e., bottom of the waterbody). The rooted aquatic beds provide shelter and food for numerous aquatic invertebrates and molting blue crabs that need the protective cover provided by SAV. A great number of waterfowl and aquatic mammals (e.g., muskrats) feed on SAV (USFWS 2007c). SAV beds are beneficial for aquatic life. Grass shrimp, sand shrimp, spot, croaker, and striped bass use SAV for cover and nursery areas.

The refuge is located in the southern portion of the MOBPH. Historically, the MOBPH had almost 6,440 hectares (ha) of SAV

(Moore et al. 2001). Since 1989, SAV coverage has been increasing (figure 2.2) (Orth et al. 2011). Between 2010 and 2011, SAV decreased by at least 20 percent and by at least 5 hectares in 9 of the 28 segments in the Lower Chesapeake Bay Zone (28 segments cover the region from the Rappahannock River and Pocomoke Sound to the mouth of the Bay). In MOBPH, a 29 percent decrease in SAV was detected (3,287 ha in 2010 and 2,333 ha in 2011). Losses in the Lower Bay zone reflect the dieback of eelgrass in 2010 due to the extremely high summertime temperatures that occurred after these areas were surveyed in 2010 (Orth et al. 2011).

Figure 2.2 SAV Coverage in the Mobjack Bay, 1970 to 2013



(Orth et al. 2013)

In 36 percent of the Mobjack Bay segment samples, the SAV habitat requirement of dissolved oxygen was not met between 1985 and 2004 (Dauer et al. 2005). SAV habitat requirements for nutrients (nitrogen and phosphorous), surface chlorophyll a, and surface total suspended solids were met; trends indicate improvement for these parameters in the Mobjack Bay (Dauer et al. 2005). Secchi depth failed to meet the SAV habitat requirement, and trends indicate long-term degradation for this parameter in the Mobjack Bay (Dauer et al. 2005).

The Chesapeake Bay Program committee established a goal to restore 185,000 acres of SAV within the Chesapeake Bay watershed. Of this amount, 15,901 acres are proposed for restoration within the Mobjack Bay (Murphy 2003). The restoration goal for this segment has not been met since the inception of the aerial survey for the Lower Chesapeake Bay in 1971 (Orth et al. 2011). Therefore, protection of existing SAV beds within and adjacent to the refuge is important. The refuge occurs within three sampling quadrangles (Poquoson West, Poquoson East, and Hampton), which generally accounts for between 32 and 38 percent of the SAV in the Mobjack segment, even though the sampling area accounts for 23 percent of the total area.

Pollution in Waters and Wildlife

Wildlife may be exposed to toxic contaminants by several pathways, including the ingestion of impacted sediment, surface water, or food while foraging; dermal absorption of chemicals from sediment or surface water; and inhalation of chemicals that have been wind-eroded from dried sediment or have volatilized from sediment or water. At the refuge, the greatest potential for exposure to chemicals is likely to result from the ingestion of chemicals in food and surface water. The incidental ingestion of impacted sediment during foraging is typically a less important exposure route, although some shorebirds have elevated incidental sediment ingestion rates (Shaw Environmental, Inc. 2012).

Exposure to toxic contaminants can result in adverse effects on biological resources within the Chesapeake Bay and its watershed. Seventy-two percent of the Chesapeake Bay's tidal water segments are fully impaired or partially impaired due to the presence of toxic contaminants (EPA et al. 2012). Within a 5-mile radius of the refuge, the following sites pose a potential for toxic pollution:

- Due to fecal coliform levels, the Virginia Health Department has condemned parts of the Poquoson's estuaries for commercial shellfishing. Only one of these sites, Front Cove (condemnation site 193A), is within the refuge's approved acquisition boundary. This site was found to be livestock dominated, with wildlife and human signatures of fecal coliform bacteria sources roughly equal (VDEQ 2006a).
- Langley AFB, which is located across the Back River from Poquoson in the adjacent city of Hampton, is designated as a Superfund site and in 1994 was formally added to the National Priorities List (<http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0303768#CleanupProgress>; accessed March 2013). Various organic, inorganic, and metal contaminants have been found in groundwater, surface water, sediment, and soils at locations including an on-site landfill, chemical waste pit, paint shop, warehouse, substation, and in storm sewers draining into waterbodies. The first cleanup action was initiated in 1997, remedial actions have been implemented as warranted, and 5-year reviews have been conducted to protect human health and the environment. The entire site is anticipated to be successfully cleaned up and ready for potential future use by September 30, 2015 (<http://www.epa.gov/superfund/sites/fiveyear/f2012030004419.pdf>; accessed May 2014).
- An inactive 40-acre landfill located northwest of Ridge Road in lower Poquoson was used from 1965 until its closure in 1985. This

is also a Superfund site, but it is not known to present a significant enough hazard to have warranted listing on the National Priorities List for remediation

(<http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0302799>; accessed March 2013). The site is listed as needing reassessment, according to the EPA.

- As noted previously in section 2.3, the PTI Range was used extensively as a bombing range. However, the PTI Range FUDS is not on the National Priorities List for remediation (<http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0304663>; accessed March 2013). The USACE is currently developing a Proposed Plan for the PTI Range FUDS, which will present preliminary recommendations concerning how to best address MEC at this site, summarize various alternatives that were evaluated, and identify the USACE's preferred alternative.

In accordance with CERCLA (42 U.S.C. 9621(b)), off-site transport and disposal of hazardous substances is not the preferred course of action. Due to the difficulties and hazards posed by transport of MEC, the USACE has determined that on-site disposal of MEC is generally the only option for the PTI Range FUDS (Shaw Environmental, Inc. 2013b). Consolidated detonation has been used previously in refuge areas where conditions were deemed to be favorable for site control, evacuation, access, and fire control.

Since the former bombing resulted in creation of craters on the refuge, these now serve as pools inhabited by shrimp, crabs, and fish that migratory birds feed on. As the bombs degrade in these conditions, they can release chemicals into the waters and sediments, which can then be taken up by wildlife inhabiting or feeding at these ponds. Copper was identified as the primary chemical of concern for wildlife. In 2011 and 2013, the USACE and its contractors collected fish, crabs, and shrimp from ponds for copper analysis (Shaw Environmental, Inc. 2014). Shrimp and crabs were found to have a much higher copper concentration than fish (mummichog). Shrimp and crabs in the bomb crater ponds have no more copper than the shrimp and crabs in the background ponds. The copper concentrations in fish, shrimp, and crabs collected from the bomb craters were similar to the concentrations found in those same organisms collected from the background ponds. The USACE, Service, and VDEQ concluded that the copper from the degrading bombs does not cause unacceptable ecological risk to predators who feed upon them at the portion of the PTI Range within the refuge. No further action was recommended for metal constituents at the refuge's portion of the PTI Range (Shaw Environmental, Inc. 2014).



Meghan Powell/USFWS

Refuge beach erosion

Natural processes (e.g., frost heave, erosion) are the primary means of transport for MEC at the PTI Range FUDS. Human activities may also result in the transport of MEC, including trespassing individuals on the refuge. Dredging of Back River or the Chesapeake Bay also could affect MEC on the refuge (Shaw Environmental, Inc. 2013b).

To ensure that human and environmental health are protected, the EPA will review the protectiveness of the selected remedy every 5 years if hazardous substances are left on-site at levels that will not allow unrestricted use and exposure.

- New human-caused hazards are authorized to accumulate on the refuge and in surrounding waters because the USAF has reserved the right to use an area as an emergency jettison area and for ordnance disposal operations (28 FR 1106; codified at 33 CFR 334.340; redesignated at 50 FR 42696, October 22, 1985, as amended at 62 FR 17553, April 10, 1997; map 2.2). Objects jettisoned by the USAF aircraft may be empty or contain materials, such as unused propellant. During the remedial investigations conducted at the PTI Range FUDS in 2009, six JATO bottles were found in good condition and full of an unidentified material that was assumed to be propellant. These six JATO bottles were detonated on March 25, 2009 (Shaw Environmental, Inc. 2013).
- The City of Poquoson's comprehensive plan notes that there are 24 registered underground storage tanks within the City limits. The plan also states that VDEQ documented 17 releases, reported to have occurred between 1989 and 2008 (City of Poquoson 2008).
- As of 2007, approximately 51 residences in the City were not connected to the city's sewer (City of Poquoson 2008).

No voluntary remediation program sites are known to occur within the City of Poquoson (VDEQ 2012b).

2.7 Soundscape

The landscape surrounding Plum Tree Island NWR is comprised of large tracts of salt marsh and open water. The dominant natural sounds are of water lapping against the shore, wind rustling through the marsh grasses, and a rich symphony of birds singing throughout the year, particularly in the spring and fall.

Noise has the potential to affect wildlife populations and the human experience on the refuge. The major human activities that contribute to the soundscape of Plum Tree Island NWR include Langley AFB aircraft jets flying overhead, recreational and commercial motorized boat traffic, and waterfowl hunting during the fall and winter on the refuge and adjacent to the refuge.

The USAF's Air Installation Compatible Use Zone (AICUZ) study of noise generated by flights associated with Langley AFB models the "average busy day" to recognize that the level of flight operations can vary over the course of a year (USAF 2007; table 2.6).

The orientation of the Langley AFB airfield is southwest–northeast, meaning that the departing and arriving aircraft flying low over Back River have the greatest potential to affect wildlife at Plum Tree Island NWR (map 2.3). The AICUZ update found that the day–night average A-weighted sound level (DNL) over the southwestern-most portion of the refuge was 65 to 70 decibels (shown in red on map 2.3) when aircraft are ascending or descending steeply between the ground, and more than 500 feet above sea level. Aircraft flying over the refuge are flying more than 500 feet above sea level (shown on map 2.3 as the area between the middle and outer ring of the imaginary airspace surface).

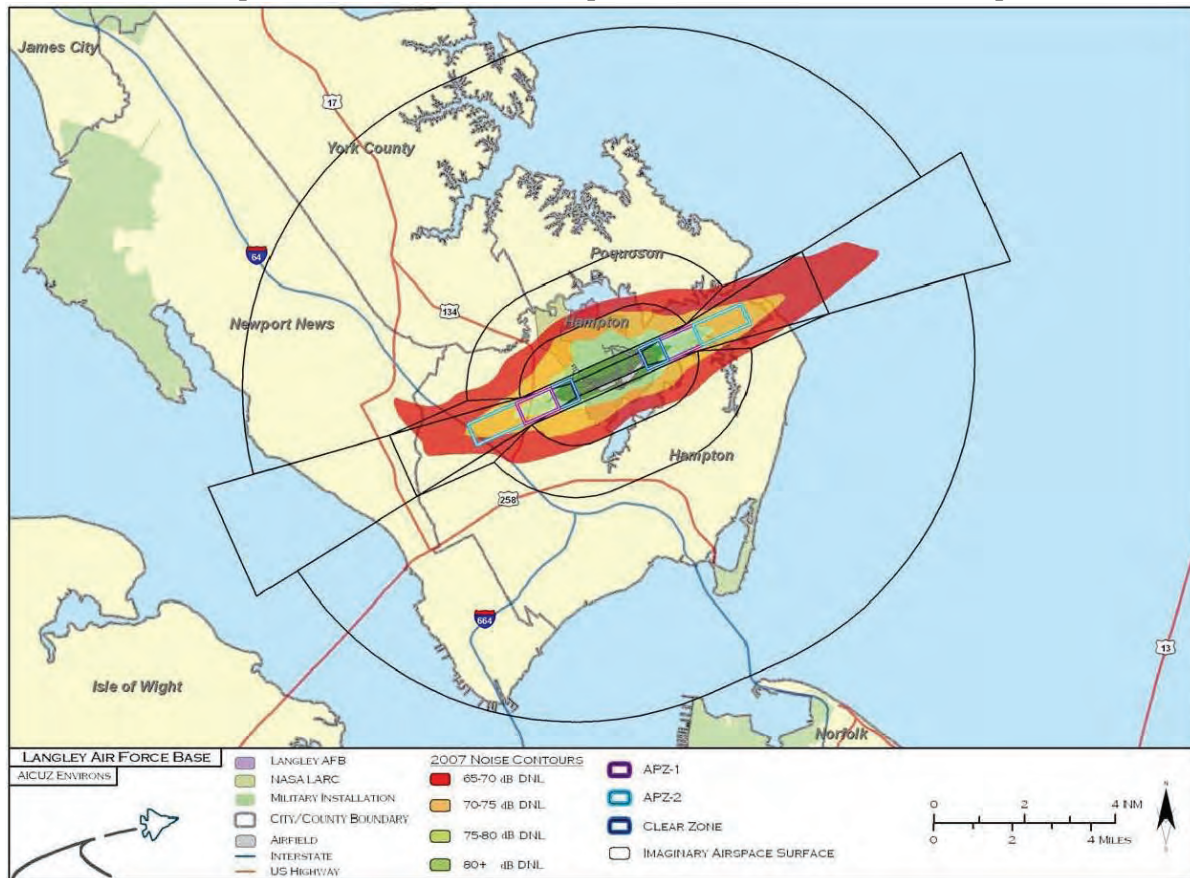
Species that occupy the interior of the refuge are likely buffered from any human sound sources that would have a negative effect on their lifecycle (Brame 2014 personal communication).

Table 2.6 Average Busy-Day Aircraft Operations at Langley AFB, Fiscal Year 2006

Aircraft Type	Average Daily Operations	Average Annual Operations
F-15C	26.6	6,916
F-22A	59.4	15,444
F-16	5.6	1,956
NASA	1.07	278
Transient	12.92	3,928
Aero Club	20.88	7,621
TOTAL	126.5	35,643

Note: An operation is one departure (take-off) or one arrival (landing). A closed pattern consists of two operations (i.e., one departure and one arrival). Additionally, calculations are based on a 260-day per year flying schedule for F-15C, F-16A, and F-22A (Average Busy Day) and on a 365-day per year flying schedule for NASA, transient, and Aero Club aircraft.

Map 2.3 Air Installation Compatible Use Zone Environs Map



(USAF 2007)

dB = decibel; DNL = day-night average A-weighted sound level

2.8 Socioeconomic Landscape

Regional Socioeconomic Setting

Regional Demographics

According to the U.S. Census Bureau, Plum Tree Island NWR is located in the Virginia Beach–Norfolk–Newport News Metropolitan Statistical Area (MSA). As the name suggests, the MSA includes the cities of Virginia Beach, Norfolk, and Newport News, as well as Hampton, Suffolk, Poquoson, Portsmouth, and Williamsburg. The MSA includes Isle of Wight, James City, Matthews, Surry, and York Counties in Virginia, and Currituck County, North Carolina. It is the fifth largest MSA in the southeastern U.S. and is the largest MSA between Washington, DC, and Atlanta, Georgia.

To understand the constituency that comprises the urban refuge area, table 2.7 provides the regional population demographics. Table 2.8 describes the racial, economic, and linguistic characteristics for the adjacent jurisdictions.

Table 2.7 Regional Population Demographics, 2010

Region	Population	Population Density (people per square mile)	Median Age	Population Change Between 2000 and 2010
Commonwealth of Virginia	8,001,024	203	37.5	+ 1.2 percent
Virginia Beach–Norfolk– Newport News MSA	1,671,683	2,647	35.4	+ 6.2 percent
City of Poquoson	12,150	793	43.5	- 1.2 percent

(USCB 2012)

¹Population change from 2000 to 2010 is derived by dividing the difference between the population in Census 2010 and the Census 2000 estimates base by the Census 2000 estimates base.

Table 2.8 Regional Racial, Economic, and Linguistic Demographics, 2010

Region	Majority Race Population	Minority Population ¹	Low-income Population ²	Linguistically Isolated Population ³
Commonwealth of Virginia	White 71.0 percent	28.7 percent	10.3 ± 0.2 percent	5.7 ± 0.1 percent
Virginia Beach–Norfolk– Newport News MSA	White 62.4 percent	37.6 percent	10.1 ± 0.3 percent	2.8 ± 0.1 percent
City of Poquoson	White 95.1 percent	4.9 percent	4.9 ± 1.5 percent	2.2 ± 0.9 percent

(USCB 2010)

¹Minority population includes persons who identified themselves and members in their households as members of the following groups:

One Race: American Indian and Alaska Native; Asian; Black or African American; Hispanic; Native Hawaiian and Other Pacific Islander; White; or some other race.

Two or More Races: Any combination of two or more of these race categories.

²Low-income population includes the percentage (and percent margin of error) of people whose income over the past 12 months is below the poverty level.

³Linguistically isolated population, defined as persons who indicated that they speak English less than “very well,” is based on the percentage (and percent margin of error) of households.

Land Use and Zoning

Poquoson is comprised of approximately 10,000 acres of land (City of Poquoson 2008). The City is divided into three Planning Districts, each of which has unique land use characteristics (City of Poquoson 2008). The presence of low-density, single-family homes and large tracts of developable land characterize the Western Planning District. The Central Planning District is more densely populated, with multi-family housing units and commercial development. The Eastern Planning District has extensive marshlands, including all of the lands within the refuge’s approved acquisition boundary zoned as conservation lands. Development in this planning district is limited, and past development trends reflect only minor infill development and family subdivisions. Overall the Eastern Planning District has a low population density, with development concentrated mainly along roadways.

Employment

Virginia's well-developed transportation system and central location along the Atlantic Coast provide access to major markets throughout the U.S. More than 60 percent of the Nation's population is within 750 miles of Hampton Roads, the world's largest natural deep-water harbor. The integrated transportation network of interstate highways, air, rail, and sea services facilitates connection with the world's markets. The VDEP (2013a) identified that the strong and stable economy of the Virginia Beach–Norfolk–Newport News MSA is attributed to low business costs, attractive and skilled workforce, and superior economic climate. Four Fortune 500 companies are headquartered in Hampton Roads.

The VEDP (2013a) also noted that few other areas in the nation offer such a large pool of skilled workers, primarily attributed to the large military presence in Hampton Roads. Healthcare service providers, shipbuilding and repair companies, and the Norfolk Naval Shipyard are among the area's largest employers (VEDP 2013a). Langley AFB employees and their families account for a large number of families in Poquoson. Within Poquoson, the major employers are its public schools and city government (VEDP 2013b). Table 2.9 describes the major employment sectors in communities near the refuge.

Table 2.9 Percentage of Civilian Workforce Over 16 Years or Older by Industry, 2010

Industry	Commonwealth of Virginia	Virginia Beach–Norfolk–Newport News MSA	City of Poquoson
Agriculture, forestry, fishing and hunting, and mining	1.1	0.4	1.8
Construction	7.1	7.2	7.2
Manufacturing	7.9	8.8	13.8
Wholesale Trade	2.1	2.3	3.5
Retail Trade	10.9	12.4	8.8
Transportation, warehousing, and utilities	4.2	4.5	2.3
Information	2.4	2.1	0.7
Finance, insurance, real estate, leasing, and rental	6.6	5.9	4.1
Professional, scientific, management, administrative, and wastes management services	14.4	11.1	14.9
Educational services, health care, and social assistance	20.8	21.7	21.0
Arts, entertainment, recreation, accommodation, and food services	8.1	9.4	8.1
Public administration	9.2	9.2	8.7
Other services	5.2	4.9	5.1

(USCB 2012)

Fishing Grounds and Shellfish Areas

Nearly all waters around Poquoson are public or leased commercial shellfishing grounds

(<http://webapps.mrc.virginia.gov/public/maps/condemnation.html>; accessed February 2015). The VMRC has granted many private

offshore shellfish leases in Poquoson. Other areas have been set aside for public shellfish harvest. All commercial fish, crabbing, and shellfish processing at the Messick Point Marina and Poquoson Marina are monitored by the Virginia Department of Health (<http://www.vdh.virginia.gov/EnvironmentalHealth/Shellfish>; accessed February 2015).

Refuge Contributions to the Local Economies

Plum Tree Island NWR contributes to the regional economy through direct expenditures and refuge revenue sharing payments to the City of Poquoson. Direct operational expenditures include those made for supplies, services, and utilities required for the refuge, and are designated within a 50-mile radius of the refuge. The Federal government does not pay property taxes on acquired refuge lands; the Revenue Sharing Act (16 U.S.C. 715s) requires that payments are made to affected local governments based on the greater of either (a) three-quarters of 1 percent of the market value, (b) 25 percent of the net receipts, or (c) 75 cents per acre (USFWS 2002). Annual revenue sharing payments have been made to the City of Poquoson, based on a maximum of 0.75 percent of the fair market value of refuge lands, as determined by appraisal every 5 years. The actual amount varies each year and is based on Congressional appropriations. Table 2.10 provides the amounts contributed to the City of Poquoson between 2007 and 2015.

The refuge also contributes indirectly to the economy of the City of Poquoson and the Virginia Beach–Norfolk–Newport News MSA by protecting wildlife habitat, or open space, in perpetuity. Other public recreational lands near Plum Tree Island NWR include Grandview Nature Preserve, Sandy Bottom Nature Park, Virginia Living Museum, Mariners’ Museum Park, Fort Monroe National Memorial, and Colonial National Historical Park. In addition, the Newport News Park is less than 15 miles away from the refuge and is the second largest municipal park in the country (<http://www.nnparks.com>; accessed April 2014).

Table 2.10 Revenue Sharing Payments to the City of Poquoson, Fiscal Years 2007 to 2015

Year	Acres	Full Payment	Actual Payment	Percent of Full Payment
2007	3,502	\$10,950	\$4,717	43.1
2008	3,502	\$10,950	\$4,562	41.7
2009	3,502	\$10,950	\$3,539	32.3
2010	3,502	\$10,950	\$3,326	30.4
2011	3,502	\$10,950	\$2,343	21.4
2012	3,502	\$10,950	\$2,511	22.9
2013	3,502	\$10,950	\$2,359	21.5
2014	3,502	\$10,950	\$2,769	25.2
2015	3,502	\$10,950	\$2,592	23.6

2.9 Special Status Areas

Federally Designated Special Status Areas

Federally designated special status areas include wilderness areas, national natural landmarks, research natural areas, experimental research areas, world heritage sites, biosphere reserves, wild and scenic rivers, national trails, national marine sanctuaries, Class I and Class II clean air areas, and critical habitat for endangered, threatened, and rare species management.

Wilderness Areas

As part of the planning process, we evaluated all the federally owned (in fee title) lands on the refuge for their possible inclusion into the NWPS. We completed a wilderness review for this CCP, with the recommendation that we not proceed further with a wilderness study because we determined that refuge lands do not meet the criteria for eligibility. Please refer to appendix E for the results of our assessment.

The closest designated wilderness area is the Swanquarter Wilderness, located 125 miles south of the refuge in Hyde County, North Carolina.

National Estuarine Research Reserve System

The National Estuarine Research Reserve System (NERRS) is a partnership program between NOAA and coastal states to promote informed management of the Nation's estuaries and coastal habitats. Reserve programs integrate innovative science and environmental monitoring with general education and professional training programs, and resource stewardship. The Chesapeake Bay National Estuarine Research Reserve is one of the 28 protected areas within the NERRS.

Plum Tree Island NWR is not within the Chesapeake Bay National Estuarine Research Reserve. However, Goodwin Islands (Site CLP06), located approximately 3 miles northwest of Plum Tree Island NWR, is part of the Chesapeake Bay National Estuarine Research Reserve.

National Wild and Scenic Rivers

The National Wild and Scenic Rivers Act (16 U.S.C. 1271–1287) established a process for identifying free-flowing rivers deserving of Federal protection, to preserve them and their immediate environments for the use and enjoyment of present and future generations.

We did not conduct a wild and scenic river review for Plum Tree Island NWR because there are no rivers or segments of rivers that qualify for review within the refuge boundary. The nearest river segment with a hydrologic connection to the refuge and potential for

national wild and scenic river designation is located 20 miles up the York River, between James City and Gloucester Counties (NPS 2009).

National Parks

The Yorktown Battlefield portion of Colonial National Historical Park is located approximately 8 miles northwest of the refuge. This is the site of the last major battle of the American Revolutionary War. The Revolution secured independence for the United States and significantly changed the course of world history.

National Trails

Plum Tree Island NWR is located on the Chesapeake Bay portion of the Captain John Smith Chesapeake National Historical Trail (NHT), within the Chesapeake Bay Gateways and Watertrails Network (CBGN). In October 2010, the Service and NPS signed a Memorandum of Understanding (MOU) regarding cooperation and collaboration on a variety of efforts within the Chesapeake Bay Watershed, including the Captain John Smith Chesapeake NHT and CBGN.

Captain John Smith Chesapeake NHT

Between 1607 and 1609, Smith made six trips up the York River to the Mattaponi and Pamunkey Rivers, first as a prisoner of Powhatan in the winter of 1607 and later seeking food for the colonists. In addition, Smith and a crew of eight veterans and four new recruits began the second voyage to “finish the discovery” of the Chesapeake Bay on July 24, 1608. During his second voyage, Smith was intent on exploring the head of the Chesapeake Bay and the Rappahannock River, hoping to find minerals and to meet the Massawomeck, who could tell him how far to the west the larger rivers led.

A segment trail plan for the York River has not yet been developed. The lack of key visitor amenities at Plum Tree Island NWR and low visitation compared to other refuges would likely disqualify it from being considered among the first focus areas of the plan (Powell 2014 personal communication).

Chesapeake Bay Gateways and Watertrails Network (CBGN)

Established by Congress in 1998, the CBGN is a partnership of parks, wildlife refuges, historic sites, museums, historic vessels, environmental education centers, information centers, byways, and water trails that provides people with opportunities for meaningful Chesapeake Bay experiences. The primary goal of the CBGN as envisioned by Congress is to foster citizen stewardship of the Chesapeake Bay. The Chesapeake Bay Office of the NPS administers the CBGN program, officially designating gateways, and providing technical and financial assistance. If the refuge were to provide additional visitor services, it could become a new site in the CBGN.

National Marine Protected Areas

In May 2000, President Bill Clinton issued EO 13158: Marine Protected Areas to help protect the significant natural and cultural resources within the marine environment for the benefit of present and future generations by strengthening and expanding the Nation's system of marine protected areas (MPAs). An expanded and strengthened comprehensive system of MPAs throughout the marine environment would enhance the conservation of our Nation's natural and cultural marine heritage and the ecologically and economically sustainable use of the marine environment for future generations. A MPA is “...*any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.*”

Plum Tree Island NWR was listed as an MPA on April 22, 2009 because of its contributions to the program's cultural heritage, natural heritage, and sustainable production conservation goals.

State or Local Government Designated Areas

Virginia Scenic Rivers

The Virginia Scenic Rivers Act of 1970 created a Statewide program to protect and preserve rivers, or sections of rivers, having natural or scenic beauty and cultural and historic interest. The Code of Virginia (Section 10.1–402) provides that the VDCR may fully review and make recommendation to Federal, State, and local agencies regarding the planning for use and development of water and related land resources so that scenic rivers resources are protected.

Since 1975, more than 529 river miles on 24 rivers have been recognized (VDCR 2010). In recent years, 13 additional rivers have been found to qualify for scenic river designation. Plum Tree Island NWR is not located on or adjacent to a river.

Chesapeake Bay Preservation Areas

The VDCR Division of Stormwater Management, Local Implementation administers the coastal lands management enforceable policy of the Virginia Coastal Program, which is governed by the Chesapeake Bay Preservation Act (Bay Act) (Virginia Code Section 10.1–2100—10.1–2114) and Chesapeake Bay Preservation Area Designation and Management Regulations (9 VAC 10–20 et seq.). Under the Bay Act, localities within the State's coastal zone have enacted programs designed to improve water quality in the Bay through the mitigation of impacts of development and redevelopment on sensitive environmental features, such as streams, wetlands, floodplains, highly erodible soils, and highly permeable soils.

Resource protection areas (RPAs) and resource management areas (RMAs) have been designated in each locality; these areas consist of

groupings of sensitive environmental features. RPAs (tidal wetlands, certain non-tidal wetlands, tidal shores, and buffer areas) are the most sensitive; in general, only water-dependent uses may be constructed in a RPA. RMAs (highly erodible soils, highly permeable soils, and certain non-tidal wetlands) are less sensitive than RPAs. Development in a RMA requires that activities meet certain performance criteria designed to mitigate negative environmental impacts.

The City of Poquoson adopted a Chesapeake Bay Preservation Area Overlay District Ordinance (Ord. No. 1187, Section 1, adopted May 24, 2004, amended article XI.IV, Sections 11.4-1—11.4-15), which regulates the use, management, and protection of sensitive and unique lands that contribute to the economy of the regional and environmental quality of the City and Chesapeake Bay. Pursuant to the requirements of the Code of Virginia, Section 10.2-2100 et seq., and the Bay Act designation and management regulations (9 VAC 10-20-10 et seq.), the City of Poquoson has designated RMAs and RPAs.

The entirety of Plum Tree Island NWR is a RPA.

Natural Heritage Conservation Sites

State designated natural heritage conservation sites include areas of habitat supporting rare, threatened, or endangered plant and animal species; having unique or exemplary natural communities; or with significant geologic formations (http://www.dcr.virginia.gov/land_conservation/tools02c.shtml; accessed March 2015).

The refuge is located within the Back River Marshes Conservation Site, which has a high biodiversity significance ranking of B3. The natural heritage resources of concern associated with this site and located within the refuge are the northern harrier, sedge wren, and pretty dodder (historic) (VDCR 2012). Additional natural heritage resources of concern associated with this site and the refuge are black skimmer, bald eagle, least tern, piping plover, Marl pennant dragonfly, northeastern beach tiger beetle, and S-banded tiger beetle.

Natural Area Preserves

The Grafton Ponds Natural Area Preserve is the only Natural Area Preserve within a 5-mile radius of the refuge. It is located approximately 3 miles northwest of the refuge and represents Virginia's best remaining example of a coastal plain pond complex.

Anadromous Fish Use Area

According to VDGIF, the anadromous fish use areas in the James and York Rivers are within a 10-mile radius of the refuge. Six anadromous fish species occur in each of these rivers: alewife, American shad, striped bass, blueback herring, yellow perch, and hickory shad. Striped anchovy, bay anchovy, spotted sea trout, gizzard shad,

sheepshead minnow, mummichog, striped killifish, naked goby, Atlantic silversides, and inshore lizardfish are known to use the estuarine habitat at and surrounding the refuge during larval, juvenile, and adult life stages. Migratory striped bass, silver perch, spot, Atlantic croaker, Atlantic menhaden, gizzard shad, white mullet, and summer flounder depend on refuge habitat to spawn (Galvez and Swihart 1996).

Other Special Status Areas

Western Shore Marshes Important Bird Area

In 2007, the National Audubon Society designated the largest concentration of salt marsh habitat within the lower Chesapeake Bay and the largest in Virginia outside of the Eastern Shore as a State Important Bird Area (IBA). The 12,590-acre area supports significant populations of marsh-nesting species, migrant shorebirds, and wintering waterfowl. The marshes also serve as nursery ground for fish and shellfish.

Plum Tree Island NWR encompasses 3,502 acres of the 12,590-acre Western Shore Marshes IBA

(<http://web4.audubon.org/bird/iba/virginia/Documents/Western%20Shore%20Marshes.pdf>; accessed March 2013).

Grandview Nature Preserve

Located approximately 1 mile southeast of Plum Tree Island NWR, the City of Hampton manages Grandview Nature Preserve along the Chesapeake Bay and Back River. Grandview Nature Preserve covers more than 475 acres of salt marsh, tidal creeks, and Chesapeake Bay beachfront. It includes an area known locally as Factory Point.

Open year-round from sunrise to sunset daily, some areas within Grandview Nature Preserve are closed to the public and pets April 1 to September 15 to protect nesting birds and the federally threatened northeastern beach tiger beetle

(<http://www.hampton.gov/Facilities/Facility/Details/Grandview-Nature-Preserve-and-Factory-Po-57>; accessed September 2014).

City of Poquoson Blueway

The City of Poquoson's Blueway is a water trail for kayaking and canoeing that includes a route of more than 8 miles on the waters surrounding the refuge (<http://www.poquoson-va.gov/sites/default/files/blueway11.pdf>; accessed March 2014). The Blueway brochure informs the public that the paddle around the refuge is challenging and that landing on the refuge is restricted.

2.10 Refuge Administration

Refuge Establishment, Land Acquisition, and Management Jurisdiction

The Service, acting under the authority of the MBCA, issued an administrative order (Wildlife Order 94) to establish Plum Tree Island

NWR on April 24, 1972, for the following purposes:

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (MBCA, 16 U.S.C. 715d);

“...for the development, advancement, management, conservation, and protection of fish and wildlife resources...” (Fish and Wildlife Act of 1956, 16 U.S.C. 742f(a)(4));

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

“...particular value in carrying out the national migratory bird management program.” (GSA Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes, 16 U.S.C. 667b).

The transfer of the 3,276-acre property originally acquired by the DOD for the PTI Range to DOI was approved on May 22, 1972. The property transfer included reservations of rights for continued use of specific areas by NASA and the USAF (refer to section 2.3 for details).

On October 13, 1993, the Service was authorized under the authority of the MBCA to expand the refuge's approved acquisition boundary to include 156 parcels of land in Poquoson, Virginia, representing 101 landowners and an additional 2,119 acres (USFWS 1993). The Service identified acquisition of these lands as fish and wildlife habitat worthy of protection because they support the goals set forth in the NAWMP, by protecting and enhancing migration and wintering habitat for black duck, and meet the intent of the Emergency Wetlands Resource Act by assuring the protection of critical wetland functions. An approved acquisition boundary designates those lands that the Service has authority to acquire or manage through various agreements. The approval of an acquisition boundary does not grant the Service jurisdiction or control over lands within the boundary, and it does not make lands within the refuge boundary part of the Refuge System. Lands within a refuge's approved acquisition boundary do not become part of the refuge until the Service buys them or they are placed under an agreement that provides for their management as part of the refuge.

Since approval of the refuge boundary expansion in 1993, the Service has acquired only two parcels of land (USFWS 1993). On April 17, 1996, the Abbitt Land Company donated one 15-acre parcel to the east of Lloyd Bay to the Service. On June 25, 1997, the Service purchased the 211-acre parcel (known as Cow Island) from Harvey A. Taylor, III

and J.W.W. Chisman, Jr. with monies from the Land and Water Conservation Fund (LWCF), which required that this tract be opened to the public and maintained in perpetuity for public outdoor recreation; this tract was opened to public waterfowl hunting for the 1999/2000 season (64 FR 43834; codified at 50 CFR 32.67; USFWS 2007b). Approximately 1,893 acres within the refuge's approved acquisition boundary remains private property (map 1.3).

We have managed Plum Tree Island NWR by closely collaborating with State and Federal agencies with management oversight on the areas surrounding the refuge. The Federal Government has joint jurisdiction with Virginia over the beds of navigable waterways within the refuge. This shared jurisdiction between the Federal and State governments explains why the USACE established a Temporary Danger Zone and the VMRC established a Restricted Area at the southern end of the refuge and adjacent waterways (map 2.2). The complex nature of the refuge area and the number of agencies involved in managing the areas surrounding the refuge has resulted in confusion for public users regarding jurisdiction. Developing strong partnerships with the multiple agencies with management oversight and jurisdiction in the area of the refuge enables the Service to meet its management goals.

Staffing

Plum Tree Island NWR is the newest refuge to be included in the Eastern Virginia Rivers NWR Complex. The term "Refuge Complex" is used to describe when two or more individual refuges, typically in the same region of the State or adjoining states, are combined under a single Refuge Manager's responsibility. Upon creation of a new position within the Eastern Virginia Rivers NWR Complex in 2003, the Regional Chief decided that administrative duties at Plum Tree Island NWR would shift from Back Bay NWR to the Eastern Virginia Rivers NWR Complex.

As of March 2016, the following positions are currently stationed at the Eastern Virginia Rivers NWR Complex headquarters, located on the Rappahannock River Valley NWR in Warsaw, Virginia: Refuge Manager, Deputy Refuge Manager, Administrative Assistant, Wildlife Biologist, and Maintenance Worker. The remaining staff person, a Wildlife Refuge Specialist, is stationed near James River NWR and Presquile NWR at the Harrison Lake National Fish Hatchery in Charles City, Virginia. The co-located office also supports and employs a Natural Resources Assistant (summer intern) to assist with those refuges.

All positions within the Refuge Complex share responsibility for all four refuge units. The Refuge Complex manager is responsible for determining the priorities for the Refuge Complex and how to distribute staff time and resources among the four refuges. Since

2003, one full-time employee has been administering activities and providing visitor services at Plum Tree Island, James River, and Presquile NWRs with assistance from other refuge staff as needed.

Budget

The funding for Plum Tree Island NWR comes out of the budget for the entire Eastern Virginia Rivers NWR Complex. Operational funding includes salaries, supplies, utilities, fuel, and all other operational activities that are not funded by special projects. Base maintenance funds are used to repair vehicles, equipment, and facilities and have been generally stable over the past 5 years. Replacement of vehicles, large pieces of equipment, or larger facilities are funded as projects. Annual funding fluctuates according to the number and size of projects funded in a given year (table 2.11).

Table 2.11 Funding and Staff Allocations for the Eastern Virginia Rivers NWR Complex, 2005 to 2015

Year	Operations	Maintenance	Projects	Cost Share	Total Funding	Staff
2005	\$ 650,748	\$23,520	\$368,229	\$ 8,133	\$1,050,630	8.34
2006	\$ 588,006	\$24,535	\$474,459	\$11,272	\$1,098,272	8.00
2007	\$ 782,083	\$59,117	\$116,917	\$10,606	\$ 968,723	8.30
2008	\$ 734,535	\$22,034	\$ 41,283	\$ 2,469	\$ 800,321	8.35
2009	\$ 788,886	\$24,000	\$469,021	\$ 7,999	\$1,289,906	7.40
2010	\$ 823,579	\$27,016	\$ 38,771	\$54,172	\$ 943,538	7.00
2011	\$ 963,324	\$27,410	\$290,260	\$ 0	\$1,280,994	7.40
2012	\$ 891,061	\$93,030	\$ 85,328	\$ 0	\$1,069,419	9.50
2013	\$ 918,134	\$27,410	\$ 21,579	\$10,680	\$ 977,803	8.0
2014	\$ 966,895	\$27,410	\$ 64,534	\$ 6,000	\$1,064,839	8.0
2015	\$1,010,338	\$27,410	\$ 59,443	\$42,400	\$1,139,591	8.0

Facilities and Maintenance

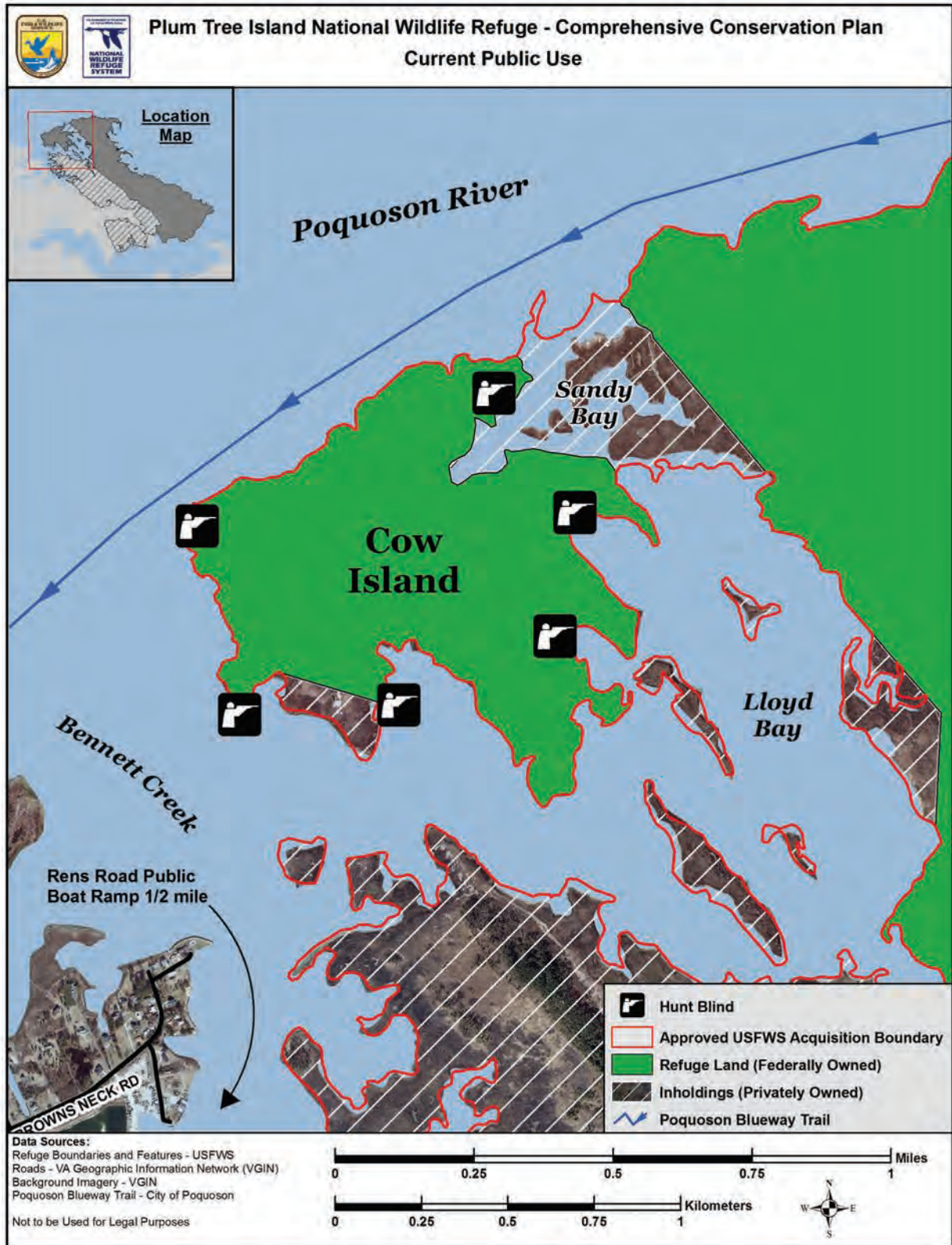
There are no roads or boat launching facilities within the refuge. Public roads and boat launching facilities adjacent to the refuge provide refuge staff with access to the refuge.

There are no buildings or other facilities (e.g., storage buildings) maintained on the refuge. Refuge staff do not maintain the concrete bunkers, pier, or other remnants of the site's former use as the PTI Range, and they have not been repurposed for use by refuge staff.

Refuge staff installs and maintain refuge boundary signs on the refuge when possible. Approximately 300 feet outside and adjacent to refuge property, the USACE installed Day Marker Danger Zone signs to warn the public of the presence of live bombs and declaring the area closed to the public.

Refuge staff maintains six waterfowl hunting blinds on Cow Island (map 2.4). Annual maintenance includes repairing the blind structure, cleaning and installing signs, purchasing and placing VDGIF stationary blind licenses, and wrapping blinds with camouflage fabric.

Map 2.4 Current Public Use Facilities on Plum Tree Island NWR



Refuge Access

Since refuge establishment in 1972, the vast majority of the refuge has remained closed to the public. The only location open to a specific public use is Cow Island; individuals with a valid, refuge-issued waterfowl hunting permit may access Cow Island, by boat (refer to section 2.13).

Limitations on public uses on the waters and disturbance of submerged lands immediately adjacent to the southern portion of refuge remain in effect until further notice from the USAF, USACE, and VMRC (refer to section 2.3).

2.11 Natural Resources

Soils

The low-lying terrain of the refuge is characterized by sandy loam soils (table 2.12). According to the Natural Resource Conservation Service (NRCS 2014), none of the soils at Plum Tree Island are prime farmlands. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Historically, lands within Plum Tree Island are known to have been used as grazing lands. Only 20 of the refuge's 3,502 acres are known to be infested with phragmites, indicating that refuge soils are functioning unimpeded (Silliman and Bertness 2004).

Table 2.12 Summary of the Most Prevalent Soils Types on Plum Tree Island NWR

Soil Type	Local Landform	Hydric Traits	Suitability	Classified as Prime and Other Important Farmland
Axis very fine sandy loam, 0 to 2 percent slopes	Salt marshes	Very poorly drained; hydric; very frequent flooding and frequent ponding	Agriculture: Poor Silviculture: Poor	Not prime farmland
Lawnes loam, 0 to 1 percent slopes	Tidal marshes	Very poorly drained; hydric; very frequent flooding and frequent ponding	Agriculture: Poor Silviculture: Poor	Not prime farmland
Nimmo–Urban land complex, 0 to 2 percent slopes	Stream terraces	Poorly drained; hydric; no flooding or ponding	Agriculture: Good Silviculture: Good	Not prime farmland

(NRCS 2014)

Habitat Types and Associated Special Status Plant Species

Vegetation communities within Plum Tree Island NWR were identified using the NatureServe ecological systems classification system and further defined by the Northeastern Terrestrial Wildlife Habitat Classification Project (Gawler 2008). An ecological system is a “group of plant community types (associations) that tend to co-occur within landscapes with similar ecological processes, substrates, or environmental gradients. A given ecological system will typically manifest itself in a landscape at intermediate geographic scales of tens to thousands of acres and will persist for 50 or more years” (Comer et al. 2003). These units form a cohesive, distinguishable unit on the ground (USFWS 2007c) that conservation and resource managers can readily map and identify in the field (Gawler 2008).

Salt marsh occupies approximately 66 percent of the refuge's total land area (table 2.13, map 2.5). We grouped similar ecological systems into broader habitat categories for this CCP to facilitate development of management objectives and strategies. Subsequent planning for the refuge's habitat management plan may make use of the more detailed mapping of habitat associations.

Table 2.13 Habitat Types at Plum Tree Island NWR

Habitat Type	Area ¹ (acres)
Salt Marsh	2,027
Maritime Shrubland and Dune	102
Sandy Beaches and Mudflats	80
Estuarine Habitats	740
Habitat Total	2,949
Refuge Total	3,502

¹Habitat areas estimated from GIS and rounded up to nearest whole number. The difference in habitat acres and total refuge acres occurs because boundaries that were used for habitat mapping project are not identical with the data held in our realty files.

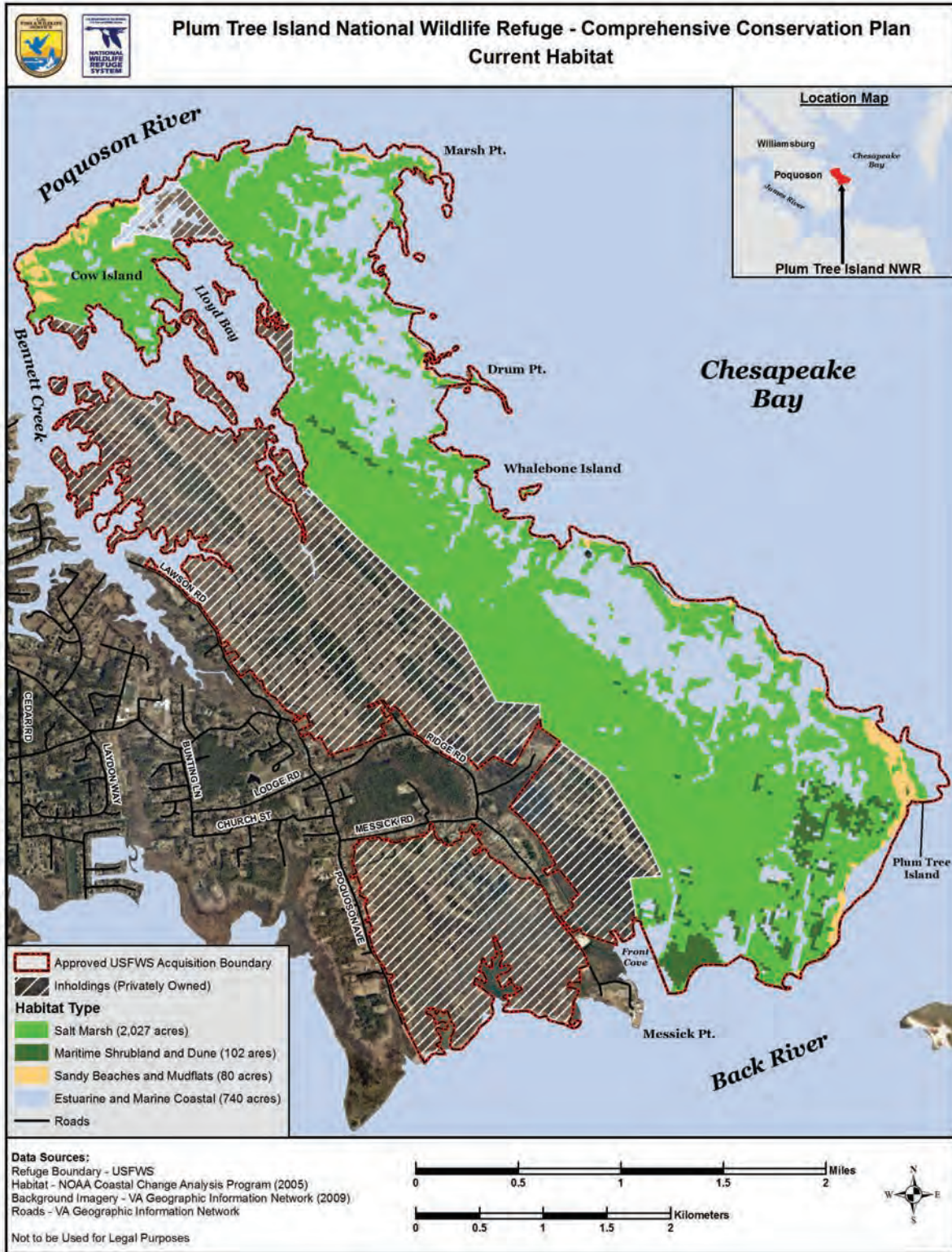
Habitat Types

Salt Marsh

Salt marsh is the largest single habitat type on the refuge. Tidal marsh ecosystems form the interface between the ocean and the land, playing a vital role in marine and terrestrial ecological processes (Bertness 1999). Salt marshes are unique and productive ecosystems with high intrinsic value as wildlife habitat, fishery nursery areas, and sources of food for near-shore finfish and shellfish populations. Salt marshes also filter sediments, nutrients, and other pollutants from upland drainages and buffer shorelines from flood and storm damage. Naturally extreme hydrology, salinity, soil conditions, and the narrow linear nature of salt marshes mean that few species are truly restricted to salt marsh habitats. In spite of these conditions, North American tidal salt marshes boast a high proportion of endemic taxa and are one of the most productive ecosystems in the world (Greenberg 2006).

Salt marshes vary in type and vegetation, based primarily on their elevation. Lower marshes are regularly flooded and higher marshes are irregularly flooded. Both are grass dominated, with species including smooth cordgrass, saltmeadow cordgrass, giant cordgrass, saltgrass, and glasswort. Depressions in these marshes (known as pannes) can retain seawater after floodwaters recede and, therefore, usually have high salinity levels and salt-tolerant plants. Our review of all available refuge-specific information indicates that the existing quality of habitats is good. The refuge offers an abundance of quality habitats that support nesting American black ducks, clapper rails, willets, northern harriers, and northern diamond-backed terrapins in high numbers.

Map 2.5 Current Habitat Types on Plum Tree Island NWR





Cyrus Brame/USFWS

Salt marsh and estuarine habitat

Due to the refuge's relatively low tidal elevation range and a high rate of historical sea level rise, the refuge's salt marsh habitat is considerably vulnerable to global sea level rise (Clough and Larson 2009). Salt marsh is predicted to be resilient to sea level rise of up to 0.39 meters by 2100, at which point the vast majority will be lost. In scenarios of greater than 0.39 meters sea level rise, between 74 and 99 percent of the salt marsh within the refuge's approved acquisition boundary will become regularly flooded.

Sandy Beaches and Mudflats

Sandy beaches and mudflats are physically dynamic ecosystem structures that include both marine and terrestrial components. Mudflats are located between the low and high tide elevations in quiet bays, where sand-sized particles are mixed with soil. Daily tidal fluctuations keep them inundated or moist and either unvegetated or sparsely covered with algae. The intertidal beach area provides habitat for a diversity of species (Defeo et al. 2009). This habitat type supports juvenile fishes, nesting turtles, and a high abundance of invertebrates, all of which are valuable food resources to shorebirds and waterbirds. Sandy beaches are located above high tide elevations and are affected by wave action, high spring tides, and storm surges. Sand beach ecosystems protect coastlines by reducing the force and effect of waves (Barbier et al. 2011). Soil consists of sand and shell fragments, and constant salt spray and precipitation keeps it moist. Vegetation is limited to salt-tolerant, succulent annuals, such as sea-rocket and Russian thistle. Sandy beaches and mudflats are vulnerable to stressors, such as recreational activities, invasive species, pollution, shoreline development and engineering, mining, and climate change (Defeo et al. 2009).

Maritime Shrubland and Dune

The maritime shrubland and dune habitats, also physically dynamic ecosystem structures, are in areas above the high tide where herbaceous vegetation dominates. Upland and wetland species more tolerant of dry conditions can be present. Limited hammock areas may have some shrub and or tree species. Though not influenced directly by lunar tides, these areas are subject to frequent salt spray, some flooding, and sand movement. Dunes stabilize sediments in vegetation root structure, prevent sediment erosion, and promote soil retention (Barbier et al. 2011). Further, dunes store and filter water through sand, providing water catchment and purification services to surrounding estuaries (Barbier et al. 2011). Human use, invasive species, and climate change threaten the maritime shrubland and dune habitats (Barbier et al. 2011).



Cyrus Braine/USFWS



Meghan Powell/USFWS

Sandy beaches and mudflats habitat (top); maritime shrubland and dune habitat (bottom)

Federally and State-listed Plants

In Virginia, the VDCR Natural Heritage Program maintains the database and rankings of plant and animal species. Determining which plants and animals are thriving and which are rare or declining is crucial for targeting conservation towards those species and habitats in greatest need. The ranks provide an estimate of extinction risk for plants and animals, while for ecological communities they provide an estimate of the risk of elimination. Conservation status ranks are based on a one to five scale, ranging from critically imperiled (G1) to demonstrably secure (G5). Status is assessed and documented at three distinct geographic scales: global (G), national (N), and state/province (S). These status assessments are based on the best available information, and consider a variety of factors such as abundance, distribution, population trends, and threats (<http://www.natureserve.org/explorer/ranking.htm#interpret>; accessed March 2013).

No federally or State-listed plant species are known to occur or have previously been reported as occurring on the refuge.

Invasive Plants

EO 13112, “Invasive Species,” signed on February 3, 1999, guides Federal management of nonnative, invasive plant species. EO 13112 requires that a Council of Departments dealing with invasive species be created and develop a National Invasive Species Management Plan every 2 years. The first plan was released in January 2001, providing the basis for Federal management of invasive species. EO 13112 defines an invasive species as “...*an alien (or nonnative) species whose introduction does, or is likely to cause economic or environmental harm or harm to human health.*”

The presence of invasive plants can have an adverse impact on the biological integrity, diversity, and environmental health of refuges and other natural areas. A comprehensive survey of invasive plants occurring on the refuge has not yet been conducted.

Currently, phragmites is the only invasive plant species known to occur on the refuge (Mowbray 2014 personal communication). Aerial surveys conducted in 2006 and 2007 documented phragmites on approximately 20 acres located in the salt marsh, maritime shrubland, and dune habitats (Virginia Polytechnic Institute and State University 2007). Refuge staff has not attempted to control phragmites infestations due to the safety concerns associated with the PTI Range, as well as limited staff time and resources to use a combination of mechanical removal and herbicide application.

Wildlife

Since Plum Tree Island NWR was established to conserve fish and wildlife, we highlight species of conservation concern under each of the following groups. A comprehensive list of potential wildlife species of conservation concern for the refuge is included in appendix A.

Birds

Plum Tree Island NWR is within BCR 30. There is a very limited amount of biological survey data for Plum Tree Island NWR, but during surveys conducted in 1989, the refuge was determined to be an area of particular importance to water-dependent birds such as marsh and water birds, wading birds, and waterfowl (USFWS 1993). These surveys also identified nesting black ducks, sedge wren, and northern harriers, and noted good numbers of sharp-tailed sparrows early in the season, all of which are considered species of conservation concern by VDGIF or the Service; collectively, these species and their habitats are referred to hereafter as priority refuge resources of concern (appendix A). More recently, the Western Shore Marshes IBA identifies specific habitats as important to various bird species of conservation concern

(<http://web4.audubon.org/bird/iba/virginia/Documents/Western%20Shore%20Marshes.pdf>; accessed March 2014):

- extensive areas of low marsh support populations of clapper rail, seaside sparrows, and marsh wrens;
- large high marsh areas provide habitat for breeding sedge wrens, northern harriers, prairie warblers, and eastern meadowlarks;
- tide pools support a high diversity of breeding bird species and migrant shorebirds;
- sandy berms and barriers are used by least terns and American oystercatchers;
- isolated marsh islands support American black ducks and American oystercatchers; and
- scattered pine hummocks and adjacent maritime forests support brown-headed nuthatches and Chuck-will's-widows.

Eighty-five bird species confirmed or highly likely to be present on the refuge are priority species common to BCR 30 or the Virginia WAP, including 26 landbirds, 17 waterbirds, 22 shorebirds, and 23 waterfowl (ACJV 2007, VDGIF 2005). Refer to appendix A for the refuge's comprehensive list of species of conservation concern.

Discussion about bird abundance on the refuge is based on data collected from the National Audubon Society's annual Christmas Bird Count (CBC) and the VDGIF Mid-winter Waterfowl Survey. The

annual CBC is an early winter bird census, where volunteers follow specified routes through a designated 15-mile (24-kilometer) diameter circle, counting every bird they see or hear all day. The Newport News (site code VANN) CBC covers Hampton Roads, Newport News, and Poquoson; while this count may not be truly representative of refuge habitats, it is considered representative of regional bird species.

Waterfowl

The refuge has historically provided important breeding, foraging, and resting habitat along the Atlantic Flyway for migratory waterfowl species. VDGIF conducts aerial mid-winter waterfowl surveys throughout the Chesapeake Bay and its tributaries. Table 2.14 summarizes the last 8 years of survey data from this survey (VDGIF 2016). Though this survey does not capture all wintering species, it does highlight some of the waterfowl species of importance in the State and the flyway that rely on refuge habitats including the American black duck, bufflehead, and the Atlantic brant. Ten species of waterfowl were harvested between 2009 and 2012 during the refuge's waterfowl hunt program: bufflehead, Canada goose, merganser, scoter, mallard, gadwell, scaup, ruddy duck, pintail, and coot.

Fourteen waterfowl species that are BCR 30 priority species and/or Virginia WAP tier category species have been observed near the refuge during mid-winter waterfowl surveys (table 2.14).

Table 2.14 BCR 30 and Virginia WAP Waterfowl Priority Species Observed in Poquoson Unit during the Mid-winter Waterfowl Surveys, 2008 to 2015

Species	BCR 30 Priority Status ¹	Virginia WAP Tier ²	2008	2009	2010	2011	2012	2013	2014	2015
Mallard	H	-	2	256	15	12	14	100	150	25
American Black Duck	HH	II	30	119	74	58	26	80	142	76
Gadwall	M	-	0	44	20	0	0	0	25	20
American Wigeon	M	-	0	0	50	0	0	0	10	0
Green-winged Teal	M	-	0	10	0	0	0	0	0	0
Bufflehead	H	-	196	123	725	325	200	1115	705	390
Scoter spp.	H	-	52	0	25	10	10	0	100	16
Canvasback	H	-	0	0	25	75	0	0	0	0
Scaup (Greater/Lesser)	H	IV	0	0	0	0	0	200	20	0
Hooded Merganser	M	-	10	97	0	2	9	0	23	7
Red-breasted Merganser	M	-	4	55	0	0	0	0	0	0
Merganser (unknown)	M	-	0	0	0	0	4	0	0	0
Ruddy Duck	M	-	0	32	125	207	70	25	410	0
Atlantic Brant	-	III	175	0	260	155	70	140	175	80

¹BCR 30 Priority Status (ACJV 2008): HH = Highest Priority; H = High Priority; M = Moderate Priority

²Virginia WAP Tier (VDGIF 2005): I = Critical Conservation Need; II = Very High Conservation Need; III = High Conservation Need; IV = Moderate Conservation Need



Donna Dewhurst/USFWS

Bufflehead and greater scaup

In the Waterfowl Implementation Plan of the ACJV, the York/Poquoson River Area is identified as a focus area for the Commonwealth of Virginia to protect, restore, and enhance 16,062 acres of habitat to reach goals in the NAWMP (ACJV 2005).

American Black Duck. The American black duck is in the highest tier for conservation in the NAWMP; that plan lists black ducks as an important waterfowl species for the Chesapeake Bay (ACJV 2005). The criteria for the Western Shore Marshes IBA also identified this area as important for breeding American black ducks. Since 1954, populations of American black ducks have declined by as much as 60 percent on the wintering grounds and continue to be a species of management concern (Steiner 1984, Whitman and Meredith 1987). Causes of decline for this species are still being researched, but they could include loss, degradation, and disturbance of important wintering areas (ACJV 2005). American black ducks use a variety of marsh habitats for breeding and during migration (Longcore et al. 2000). Black ducks are listed in the highest priority in the BCR 30 and as a very high conservation need in the Virginia WAP. The ACJV Plan (2005) also considers the American black duck as a species of major concern as populations have declined three percent annually since the 1950s (ACJV 2005).

Bufflehead. The bufflehead is listed on the BCR 30 as a high priority species and as a least concern species on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (BirdLife International 2012, ACJV 2008). Populations are increasing,

though hunting is a significant mortality factor. Buffleheads winter in Virginia, using sheltered areas more often than other sea ducks, and are commonly found in shallow waters of coves, harbors, estuaries, or along beaches. Their diet consists mainly of aquatic invertebrates, including insects (larvae of damselfly, dragonfly, mayflies and midge, and water boatmen), crustaceans (shrimps, crabs, and amphipods isopods), mollusks (snails and clams), and sometimes small fish or fish eggs (http://seaduckjv.org/infoseries/buff_sppfactsheet.pdf; accessed May 2014). During winter, they often feed during both day and night.

Shorebirds

The black skimmer, American oystercatcher, and tern species use the undisturbed sandy beach and dune coastlines of the refuge for nesting and foraging. Protection of this area for breeding was an important part of the refuge's designation as an IBA (Watts 2006). The refuge is also an important stopover location for migrating American avocets, ruddy turnstones, sanderlings, red knots, plovers, and sandpiper species; each of these species feeds in mudflats and tidal pools.

Black Skimmer. The black skimmer is listed on the BCR 30 as a moderate priority species, as a tier II very high conservation need species in the Virginia WAP, and as a least concern species on the IUCN Red List of Threatened Species (BirdLife International 2012, ACJV 2008, VDGIF 2005). Threats to the population include flooding, predation, and human disturbance. Black skimmers favor coastal waters protected from open surf, such as lagoons, inlets, sheltered bays, and estuaries. Their diet consists of primarily small fish that live near the water's surface (<http://birds.audubon.org/species/blaski>; accessed May 2014).

American Oystercatcher. The American oystercatcher is a year-round resident, present from nesting season through wintering season, when they are found in flocks throughout the Atlantic coast. In 2000, the entire North American population was estimated as 10,000, and research has identified Virginia, North Carolina, and South Carolina



Gary Kramer/USFWS

Black skimmer

as key breeding and wintering areas. The species' future success depends on protection from human disturbance of coastal dune and salt marsh habitat (Nol and Humphrey 2012). This species is listed as the highest priority species on the BCR 30 and very high conservation need in the Virginia WAP (ACJV 2007, VDGIF 2005).

Least Tern. The least tern breeds widely along coastal beaches of North America and prefers to nest on beaches that have little vegetation and are relatively open due to tidal action (Thompson et al. 1997). Least terns feed primarily on small fish, but their diet also includes crustaceans and insects (Atwood and Kelly 1984). Population declines due to recreational, industrial, and residential development in coastal breeding areas has exceeded that of any other wide-ranging North American tern species (Thompson et al. 1997). The least tern is listed as a high priority on the BCR 30 and as a tier II very high conservation need in the Virginia WAP (ACJV 2007, VDGIF 2005).

Twenty-two shorebirds that are BCR 30 priority species and Virginia WAP tier category species have been observed or are likely to occur during the breeding season or during migration at the refuge (table 2.15).

Table 2.15 BCR 30 and Virginia WAP Shorebird Priority Species

Species	Season of Occurrence ¹	BCR 30 Priority Status ²	Virginia WAP Tier ³
American avocet	M	M	-
American oystercatcher	B, W, M	HH	II
Black skimmer	B	M	II
Black-bellied plover	W, M	H	IV
Dunlin	W, M	H	IV
Greater yellowlegs	W, M	H	-
Gull-billed tern	B	HH	I
Killdeer	B, W, M	M	-
Least sandpiper	M	M	-
Least tern	B, M	H	II
Lesser yellowlegs	W, M	M	-
Piping plover	B, M	HH	I
Red knot	M	HH	IV
Royal tern	B	M	II
Ruddy turnstone	M	HH	-
Sanderling	W, M	HH	-
Sempalmated sandpiper	M	H	-
Short-billed dowitcher	M	H	IV
Spotted sandpiper	B, M	M	-
Whimbrel	M	HH	IV
Willet	B, W, M	H	-
Wilson's plover	B	H	I

¹ Season of Occurrence (ACJV 2007): B = Breeding; M = Migrant; W = Winter

² BCR 30 Priority Status (ACJV 2008): HH = Highest Priority; H = High Priority; M = Moderate Priority

³ Virginia WAP Tier (VDGIF 2005): I = Critical Conservation Need; II = Very High Conservation Need; III = High Conservation Need; IV = Moderate Conservation Need

Waterbirds

Thirteen species of waterbirds were observed during Breeding Bird Surveys and CBCs conducted around the refuge, including priority species such as clapper rail, black-crowned night heron, and the northern gannet.

Clapper Rail. Clapper rail are found almost exclusively in coastal saltwater marshes, with nests laid in ditches with tall and short grasses. They feed primarily on animals, including crayfish, small crabs, small fish, frogs, slugs, snails, aquatic insects, and grasshoppers. Approximately 20 percent of their diet is composed of seeds from weedy and woody plants

(http://www.ncwildlife.org/portals/0/learning/documents/profiles/clapper_rail091411.pdf; accessed May 2014). The clapper rail is listed on BCR 30 as a high priority species, as a tier IV moderate conservation concern species in the Virginia WAP, and as a least concern species on the IUCN Red List of Threatened Species (BirdLife International 2012, ACJV 2008, VDGIF 2005). Historic threats to clapper rail include egg collecting and market hunting; water pollution and habitat destruction are current threats to this species.

Black-crowned Night-heron. The black-crowned night-heron is the most widespread heron in the world, but its coloration, behavior, and nocturnal feeding habits make it one of the least noticed (Hothem et al. 2010). Nesting population size is related directly to the availability of foraging habitat, such as mudflats, salt marsh, pools, and canals (Kushlan 1978). Their diet consists mostly of fish and marine organisms but also includes lizards, eggs, and plant materials (Hothem et al. 2010). Black-crowned night-herons are great indicators of estuarine health and contamination because of their high level in the food chain, their wide distribution, and colony nesting (Custer et al. 1991). Population declines are mostly attributed to habitat loss or human disturbance. BCR 30 places the black-crowned night-heron as a moderate priority, and the Virginia WAP lists the species as a tier III high conservation need.



Howard Patterson

Clapper rail

Seventeen waterbirds that are BCR 30 priority species and Virginia WAP tier category species have been observed or are likely to occur during the breeding season at the refuge (table 2.16).

Table 2.16 BCR 30 and Virginia WAP Waterbird Priority Species

Species	Season of Occurrence ¹	BCR 30 Priority Status ²	Virginia WAP Tier ³
American bittern	B, W, M	M	II
Black rail	B	HH	I
Black-crowned night-heron	B, W	M	III
Clapper rail	B	H	IV
Common tern	B, M	M	III
Forster's tern	B, M	H	IV
Glossy ibis	B	H	III
Green heron	B	-	IV
Least bittern	B	M	III
Little blue heron	B, W	M	II
Northern gannet	W, M	H	-
Red-throated loon	W, M	HH	-
Snowy egret	B, W	M	-
Sora	B, M	M	-
Tricolored heron	B	M	III
Virginia rail	B, W, M	-	IV
Yellow-crowned night-heron	B, M	M	III

¹ Season of Occurrence (ACJV 2007): B = Breeding; M = Migrant; and W = Winter

² BCR 30 Priority Status (ACJV 2008): HH = Highest Priority; H = High Priority; M = Moderate Priority

³ Virginia WAP Tier (VDGIF 2005): I = Critical Conservation Need; II = Very High Conservation Need; III = High Conservation Need; IV = Moderate Conservation Need

Landbirds

From observations when the refuge was established and surveys for the establishment as an IBA, 29 species of landbirds were found within the boundaries of the refuge (Watts 2006).

Saltmarsh Sparrow. The saltmarsh sparrow is listed in the BCR 30 as highest priority, as a tier II very high conservation need species in the Virginia WAP, and as vulnerable on the IUCN Red List of Threatened Species (BirdLife International 2012, ACJV 2008, VDGIF 2005).

Threats to this species include historical loss and fragmentation, chemical spills, pollution, invasive species such as phragmites, and sea level rise (Greenlaw and Rising 1994, Sibley 1996). The implications of sea level rise are particularly noteworthy because nest sites in high salt marsh are directly threatened by flooding, while the high salt marsh habitat may disappear or be greatly reduced as sea level rises.

The Center for Conservation Biology (CCB) monitors saltmarsh sparrow populations on Cow Island.

Northern Harrier. The northern harrier, also called a marsh hawk, is a medium-sized, low-flying raptor of grasslands and marshes. Plum Tree Island NWR is at the southern edge of its breeding territory, and nests have been observed on the refuge (USFWS 1993). This harrier feeds on small to medium birds and mammals and hunts on visual and auditory cues (Smith et al. 2011). Globally, this species is declining (Del Hoyo et al. 1995). It is considered a species of high conservation need in Virginia primarily due to declining wetland and undisturbed grassland habitats (VDGIF 2005, USFWS 1987).

Twenty-six landbirds that are BCR 30 priority species have Virginia WAP tier categories and rely on habitats provided at the refuge (table 2.17).

Table 2.17 BCR 30 and Virginia WAP Landbird Priority Species

Species	Season of Occurrence ¹	BCR 30 Priority Status ²	Virginia WAP Tier ³
Bald eagle	B, W, M	M	II
Baltimore oriole	B	H	-
Barn owl	B, W, M	-	III
Brown creeper	W, M	-	IV
Brown thrasher	B	H	IV
Brown-headed nuthatch	B, W	M	IV
Chimney swift	B	H	IV
Eastern kingbird	B	H	IV
Eastern meadowlark	B, W, M	-	IV
Loggerhead shrike	B	M	I
Marsh wren	M	H	IV
Nelson's sparrow	M, W	-	III
Northern bobwhite	B, W	H	IV
Northern flicker	B, W, M	H	-
Northern harrier	B, W, M	-	III
Northern parula	B	-	IV
Northern rough-winged swallow	B	-	IV
Northern saw-whet owl	W, M	-	II
Peregrine falcon	B, M	-	I
Prairie warbler	B	HH	IV
Red-headed woodpecker	B, W, M	M	-
Saltmarsh sparrow	B, W, M	HH	II
Seaside sparrow	B, W, M	HH	IV
Sedge wren	B, W, M	M	III
Yellow-bellied sapsucker	W	-	I
Yellow-breasted chat	B	-	IV

¹ Season of Occurrence (ACJV 2007, Poole 2014, Marti et al. 2005, Poulin et al. 2013, Janster et al. 2012): B = Breeding; M = Migrant; W = Winter

² BCR 30 Priority Status (ACJV 2008): HH = Highest Priority; H = High Priority; M = Moderate Priority

³ Virginia WAP Tier (VDGIF 2005): I = Critical Conservation Need; II = Very High Conservation Need; III = High Conservation Need; IV = Moderate Conservation Need

Mammals

According to Linzey's *Mammals of Virginia* (1998), 44 mammal species have ranges that occur within a 3-mile radius of the refuge, including squirrels, shrews, foxes, bottle-nosed dolphin, and deer. Surveys performed in 1989 for the establishment of the refuge documented white-tailed deer, raccoon, muskrat, red fox, and other mammals on the refuge (USFWS 1993).

Muskrat

The muskrat inhabits wetlands and feeds primarily on plants but occasionally eats crustaceans, insects, or fish. Muskrats are active throughout the year, but they are mostly nocturnal. They resemble beavers, but are smaller with a rat-like tail. Muskrats are considered a nuisance in Virginia when they burrow into dams and dikes (<http://www.dgif.virginia.gov/wildlife/problems/muskkrats>; accessed May 2014).

Eastern Red Bat

The eastern red bat is the most common tree bat in Virginia and is most likely to inhabit maritime forest areas on or adjacent to the refuge (Mowbray 2014 personal communication). These bats roost in the foliage of trees and shrubs and feed along water courses or edges of open habitat. Although the eastern red bat is not considered at risk of extinction, population decline throughout its range is suspected to be occurring (<http://bit.ly/1njSLTb>; accessed January 2016).

Reptiles and Amphibians

Fourteen of the 15 reptile species likely to be found on the refuge have State status or are tiered species in the Virginia WAP, and includes such species as eastern hog-nosed snake, the loggerhead sea turtle, and the northern diamond-backed terrapin. Refuge habitats provide excellent breeding and foraging habitat for many species of reptiles. No baseline surveys have been conducted at Plum Tree Island NWR, but diamondback terrapins can easily be found foraging in the salt marsh or nesting in the dunes in May (Mowbray 2014 personal communication, Brame 2014 personal communication, Kleopfer 2015 personal communication).

Though a few amphibian species may inhabit the small amount of uplands along the western edge of the refuge, populations are likely not significant nor does the refuge provide habitat types that these species rely on (<http://www.virginiaherpetologicalsociety.com>; accessed May 2014).

Eastern Hog-nosed Snake

The eastern hog-nosed snake is listed in the Virginia WAP as a tier IV moderate conservation need species and as a least concern species on the IUCN Red List of Threatened Species. This status is likely due to its wide distribution, presumed large population, and unlikeliness to be

declining fast enough to qualify for listing in a more threatened category (Hammerson 2007, VDGIF 2005). Hog-nosed snakes inhabit forest edges, sand plains, barrier islands, and riparian zone habitats found on and around Plum Tree Island NWR and throughout Virginia (<http://www.dgif.virginia.gov/wildlife/information/?s=030024>; accessed March 2014). Although no major threats are known, conversion of natural habitats to intensively human-used areas may contribute to decline in some populations (Hammerson 2007).

Loggerhead Sea Turtle

The loggerhead sea turtle is listed in the Virginia WAP as a tier I critical conservation need species and as an endangered species on the Convention on International Trade in Endangered Species of Wild Flora and Fauna Appendix I of the IUCN Red List of Threatened Species (Marine Turtle Specialist Group 1996, VDGIF 2005). Worldwide habitat loss, incidental take by commercial fishing, and incidental take by commercial and recreational boat traffic are major threats to this species (Marine Turtle Specialist Group 1996, Terwilliger and Musick 1995, VDGIF 2005). Loggerhead sea turtles migrate among oceans, from nesting beaches to immature foraging areas on opposite sides of ocean basins. Nesting areas for loggerhead sea turtles are located throughout tropical to sub-tropical regions; non-nesting areas extend to temperate regions (<http://iucn-mtsg.org/about-turtles/species/loggerhead>; accessed March 2014). In Virginia, loggerhead sea turtles can be found in the Atlantic Ocean, throughout the Chesapeake Bay, and around barrier islands (Bellmund et al. 1987). Although there are no known active nesting populations in Virginia, individual females will nest on Virginia beaches every summer (Musick 1988). The Chesapeake Bay appears to be an important summer foraging area for subadults (5 to 15 years old) (Musick 1988). During all life stages, loggerhead sea turtles feed on mostly benthic invertebrates (such as crabs, other crustaceans, and mollusks) and occasionally jellyfish (<http://iucn-mtsg.org/about-turtles/species/loggerhead>; accessed March 2014). The diet of loggerhead turtles in the Chesapeake Bay is comprised primarily of horseshoe crabs (VDGIF 2005).

Northern Diamondback Terrapin

The northern diamondback terrapin is listed in the Virginia WAP as a tier II very high conservation need species and as a lower risk/near threatened species on the IUCN Red List of Threatened Species (Tortoise and Freshwater Turtle Specialist Group 1996, VDGIF 2005). Northern diamondback terrapins inhabit coastal marshes, tidal flats, coves, estuaries, and lagoons behind barrier beaches, as well as brackish and salt-water habitats (Ernst et al. 1994). Adults and hatchlings are invertivores, as they consume mostly clams, snails, worms, and crabs (Ernst et al. 1994). Historically, commercial exploitation of northern diamondback terrapins was the primary threat to the species. More recently, destruction of nesting habitat on



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Northern diamondback terrapin

barrier beach islands and commercial crabbing are among the major threats to the species

(<http://www.terrapinconservation.org/home.htm>; accessed March 2014).

Fish

The refuge offers habitats that boost production of ecologically important fishery species by serving as nursery and spawning habitat for estuarine fishes (Boesch and Turner 1984, Galvez and Swihart 1996). Salt marshes have a complex and tightly packed plant structure that is mostly inaccessible to large fishes, thereby protecting and sheltering young fishes, shrimp, and shellfish for increased growth and survival (Boesch and Turner 1984). The vegetated marsh surface is beneficial to fish diets and growth rates (MacKenzie and Dionne 2008). Maritime shrubland and dune and sandy beach and mudflat habitats also serve as nursery areas for juvenile fishes (Barbier et al. 2011). SAV in the tributaries and estuaries immediately surrounding the refuge serve as habitat for species such as scallops, shrimp, crabs, and juvenile fish (Barbier et al. 2011). SAV nourishes fishery species through leaves, detritus, and epiphytes while also protecting them from predators (Barbier et al. 2011).

Over 200 species of fish have been reported present in the Chesapeake Bay. Of the 54 fish species reported in literature known to occur in the Lower Chesapeake Bay, 30 species were detected present during a single, baseline survey conducted in waters adjacent to the refuge in August 1996 (Galvez and Swihart 1996). Of nearly 2,100 fish sampled during this survey, Atlantic silversides and spot were the most commonly encountered species (47 percent and 20 percent, respectively). Both migratory and non-migratory fish use refuge estuarine habitat at key life stages.

As noted above, many of the bird and mammal species depend on the abundance of fish prey species inhabiting the refuge.

Species of fish listed in the Virginia WAP and in the Virginia Fish and Wildlife Information Services Biota of Virginia Database for a 3-mile radius from the refuge are listed in table 2.18 (VDGIF 2010). Federal and State status is also included when applicable. Appendix A provides a list of potential fish species of conservation concern for the waters around the refuge.

Table 2.18 Virginia WAP Fish Priority Species

Common Name	State and Federal Status ¹	Virginia WAP Tier ²
American eel	-	IV
American shad	-	IV
Atlantic sturgeon	FE/SS	II

¹State and Federal Status: FE = Federally Endangered; ST = State Threatened; SS = State Species of Concern

²Virginia WAP Tier (VDGIF 2005): I = Critical Conservation Need; II = Very High Conservation Need; III = High Conservation Need; IV = Moderate Conservation Need

American Eel

American eel is North America's only freshwater eel, originating from the Sargasso Sea of the Atlantic Ocean. It is catadromous, born in the Sargasso Sea in the Atlantic Ocean, and then migrating thousands of miles to rivers and estuaries from Greenland to Venezuela. Larvae drift with the Gulf Stream and continue to develop while taking up to a year to reach the Chesapeake Bay. Adult eels may stay up to 20 years in freshwater tributaries before returning to the Sargasso Sea to spawn then die. American eels are nocturnal carnivores that feed on insects, fish, fish eggs, crabs, worms, clams, frogs, and carrion.

(<http://www.dgif.virginia.gov/outdoor-report/2009/08/26/>; accessed December 2015). Although widely distributed throughout their historical range, American eel populations have declined over the past century as their habitats are altered or lost

(http://www.fws.gov/northeast/americaneel/pdf/American_Eel_factsheet_2015.pdf; accessed December 2015).

The American eel is listed in the Virginia WAP as a tier IV moderate conservation need species and as an endangered species on the IUCN Red List of Threatened Species due to declines in recruitment and stocks. Declines have been attributed to hazardous barriers; poor body condition; climate change and shifts in ocean-atmosphere conditions; disease and parasites; exploitation and trade; hydrology, habitat loss, pollutants, and predation (<http://www.iucnredlist.org/details/191108/0>; accessed December 2015). In Virginia, contaminated bottom sediments in feeding areas and impediments to migration are the greatest threats to American eels

(<http://www.dgif.virginia.gov/outdoor-report/2009/08/26/>; accessed December 2015). As of 2007, the DGIF and its partners have reopened 2,288 stream miles in Virginia by removing dams and improving

natural passages for migratory and resident fish
(<http://www.dgif.virginia.gov/fishing/fish-passage/>; accessed December 2015).

American Shad

American shad are anadromous, meaning that the adults travel in large schools along ocean coastal areas until they are sexually mature, and then run up large rivers from saltwater to freshwater to spawn. After spawning, surviving adults return to the ocean. Newly hatched young remain in freshwater until fall, when they move downstream to brackish estuaries and may remain for a year or more before moving out to the ocean. Adult shad eat zooplankton in the ocean, as well as worms and small fish. Young shad in fresh and tidal portions of rivers feed on zooplankton and insect larvae

(<http://www.dgif.virginia.gov/wildlife/fish/details.asp?fish=010040>; accessed May 2014).

The American shad is listed in the Virginia WAP as a tier IV moderate conservation need species and as a least concern species on the IUCN Red List of Threatened Species in view of its large range extent, large population size, and recent restoration efforts that have led to increases in habitat extent and shad abundance over the past 12 years (NatureServe 2013, VDGIF 2005).

Atlantic Sturgeon

The Atlantic sturgeon is listed in the Virginia WAP as a tier II very high conservation need species and as a critically endangered species on the IUCN Red List of Threatened Species (Gesner et al. 2010, VDGIF 2005). In February 2012, NOAA's Fisheries Service announced the listing of Atlantic sturgeon as federally endangered. Atlantic sturgeon is an ancient, bony fish once found throughout the Chesapeake Bay and its rivers but now very rare. Until the late 1990s, Atlantic sturgeon was thought to be extirpated from the James and York Rivers. However, in the last decade, populations of unconfirmed size have been found in the Bay during the spring as they travel to the James and York Rivers to spawn. Recent data suggest sturgeon in the James River spawn again in the fall as a separate group then head to the Bay (Balazick and Musick 2015). Their diet focuses on clams, crustaceans, worms, and insects that they get out of the river bottom mud

(http://www.chesapeakebay.net/fieldguide/critter/atlantic_sturgeon; accessed May 2014). Atlantic sturgeon in Virginia contend with disturbances, poor water quality, and degraded and altered habitat (Moss 2015 personal communication).

Numbers of Atlantic sturgeon in the Chesapeake Bay distinct population segment are extremely low compared to historical levels and have remained so for the past 100 years

(http://www.nmfs.noaa.gov/pr/pdfs/species/atlanticsturgeon_chesapeake

kebay_dps.pdf; accessed May 2014). The spawning population of this distinct population segment is thought to be one to two orders of magnitude below historical levels. Spawning may also occur in the York River as well.

Invertebrates

This taxon is the least studied and understood group of animals on the refuge. During warmer seasons, the refuge supports a wide range of insects, including dragonflies, butterflies, and beetles, specifically the federally threatened northeastern beach tiger beetle.

Invertebrates play an important role in basic ecological functions. Starting in the shallow waters with zooplankton (copepods) and phytoplankton (green and blue-green algae), the complex web of life is built. Fish, birds, reptiles, and mammals feed on insects and rely on them as a required source of protein. Young animals in particular need invertebrates to supplement their diets as they grow. Large areas of diverse native vegetation in the refuge's salt marshes and submerged environments encourage healthy invertebrate populations.

Crustaceans

Blue Crab. According to NOAA, the Chesapeake Bay blue crab stock is not currently overfished, but they are the most sought-after shellfish in the mid-Atlantic region (<http://chesapeakebay.noaa.gov/fish-facts/blue-crab>; accessed May 2014). Habitat loss and increased nutrient loading present the greatest threats to the population. Blue crabs occupy a wide variety of habitats throughout their life history. Offshore, high-salinity waters are used during early larval stages. Larvae move into the estuary and use intertidal marshes, seagrass beds, and soft-sediment shorelines as they grow. Crabs are highly tolerant of temperature and salinity variations and can live in just about any region of the Bay. Crabs are voracious predators and are considered scavengers, eating just about anything they can, including fish, clams, oysters, mussels, snails, worms, and insects. They are extremely cannibalistic and are most vulnerable while in the soft-shell stage of molting.

Insects

Northeastern Beach Tiger Beetle. In 1990, the Service listed the northeastern beach tiger beetle as a threatened species because of its extirpation from all but one of the many historic northeastern sites where it was once abundant and widespread. In the Chesapeake Bay region, adults emerge in mid-June, reach peak abundance by early July, and begin to decline through August (USFWS 1994). The adults are active on warm, sunny days along the water's edge, where they are commonly seen feeding, mating, or basking. The number of adult beetles active on rainy or cool, cloudy days is very low, probably because the beetles need to maintain high body temperatures for maximal predatory activity. Adults tend to be concentrated in wider



Northeastern beach tiger beetle

sections of beach, and occur in smaller numbers or are even absent from nearby areas of narrow beach. The tiger beetle prefers wide beaches with a gradual slope and is susceptible to activity in the intertidal zone. Mating and egg laying occur from late June through August.

The recovery plan for this species indicates that the objective is to “restore this species to a secure status within its historical range, thereby enabling its removal from the Federal list of endangered and threatened wildlife and plants” (USFWS 1994). In 2008, the Service initiated a 5-year review of the northeastern beach tiger beetle’s status under the ESA. New information was considered, and the Service concluded that the northeastern beach tiger beetle populations should be reclassified as endangered because serious threats to this species continued existence grow and populations are declining through most of its range

(<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=I02C>; accessed February 2015). No critical habitat has been designated for this species

(<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=I02C#crithab>; accessed March 2014).

Although northeastern beach tiger beetles are known to occur at nearly 100 sites within the Chesapeake Bay of Maryland and Virginia, many of these sites are small, unprotected, and/or subject to natural perturbations and human-caused impacts. Numerous sites have been lost or populations reduced in the past 10 years. Since 2001, there has been a 20 percent loss in occupied sites (12 of 58 occupied sites) (USFWS 2009b). The majority of occupied sites show evidence of habitat loss as a result of Hurricanes Isabel and Ernesto. In addition, total numbers have declined 70 percent since 2001. Also, the eight largest sites that support approximately 50 percent of the total beetles in 2001 have declined by 78 percent.

Northeastern beach tiger beetles were first detected at the refuge in 2005. The refuge is within Virginia’s western shore of the Chesapeake Bay geographic recovery area, the southernmost occurrence of this

species. Beetles at the refuge and nearby Grandview Island site are considered a single population because of their close proximity to each other and their isolation from any other occupied site, the nearest of which is almost 14 miles away at New Point Comfort. Annual surveys for adult beetles on the refuge and Grandview Island suggest that the population is growing (table 2.19). In 2009, the Service prepared a biological opinion for northeastern beach tiger beetle distribution and abundance at Plum Tree Island NWR and Northend Beach in Hampton, Virginia (USFWS 2009b). We determined that viable breeding populations are present at both sites. The refuge's habitat seems to be more stable than the Northend Point site due to a higher elevation, more developed back beach, and possibly less habitat loss.

In 2009, the City of Hampton proposed to develop an ordinance to support seasonal closure to protect northeastern beach tiger beetles, several species of nesting migratory birds, and nesting northern diamondback terrapins at the nearby Factory Point. The closure would have applied to boaters and pedestrians, and would have been accompanied by signage, public education, and legal enforcement.

Table 2.19 Abundance of Adult Northeastern Beach Tiger Beetles at Plum Tree Island NWR and Grandview Island, 2005 through 2012

Survey Year	Plum Tree Island NWR (number of adult beetles)	Grandview Island (number of adult beetles)
2005	6	8
2006	9	7
2007	2	0
2008	17	7
2009	168	195
2010	66	0*
2011	67	Not checked
2012	329	39
2013	282	615
2014	521	342

* Beach renourishment occurred, leaving a soft sand pack, not initially suitable to support beetle use.

Marl Pennant. The Marl pennant dragonfly is a critically imperiled species in Virginia that inhabits mineralized waters and brackish permanent pools near beaches and salt marshes, salt marsh, open beach fringed with marsh grasses, reeds, and shrubs, and brackish pools. An established population uses the entire length of Grandview Beach (<http://virginianaturalhistorysociety.com/banisteria/pdf-files/ban28/B28-full-Marl-pennant.pdf>; accessed May 2014).

Pests. Several species of mosquitos breed in the lowland fresh, brackish, and salt marshes within and near the City of Poquoson. Mosquitos are capable of transmitting diseases, causing concern that a disease outbreak would result in severe human health consequences,

especially for children and senior citizens.

Mosquito spraying began in the York County area in the 1950s and was conducted over Plum Tree Island NWR until the late 1980s, although the Service never formally permitted it (USFWS 1993). When the Service became aware that the USAF conducted aerial spraying over the refuge, the Service informed USAF that aerial spraying could not continue unless the Service issued a permit to conduct the activities (USFWS 1993, USAF 1997). To date, the USAF has not applied for a permit to control mosquitos at Plum Tree Island NWR.

Invasive Wildlife

Invasive wildlife species of potential management concern include nutria. However, nutria have not yet been detected on the refuge.

2.12 Cultural Resources

Archaeological Sites and Artifacts

Although the current body of archaeological information from the refuge is limited, it does appear that the area first witnessed occupation by Native Americans as early as the Pleistocene–Holocene transition (ca. 10,000 years ago). Occupation and use of the land occurred during the Middle Archaic period (ca. 6,000 years ago) and the Middle Woodland period (1,500 to 2,000 years ago). This suggests that the coastal habitats of the Plum Tree Island vicinity were attractive to indigenous peoples during periods of contrasting climate and environmental conditions. A small amount of Euro-American settlement or use of the land occurred during the 18th or 19th centuries. No artifact collections are kept on the refuge or the Eastern Virginia Rivers NWR Complex.

Four archaeological sites have been recorded on refuge lands. All of the sites were locations where artifacts were found on the ground surface. None of these known sites have been systematically surveyed, tested, or evaluated due to the presence of UXO.

- Site 44YO1056 is a location where Native American artifacts were reportedly found ca. 1980. The artifacts consisted of projectile points of the Hardaway, Morrow Mountain, and Badin varieties. The artifacts constitute evidence of Native American settlement that occurred during the Paleo-Indian/Early Archaic period (9,000 to 10,000 years ago), the Middle Archaic period (ca. 6,500 years ago), and the Middle Woodland period (1,500 to 2,000 years ago). Fragments of historic brown stoneware were also reported from the site. Documentary evidence suggests that a small house (ca. 1850) belonging to Mr. Charles Firth once existed here.
- Site 44YO157 is where fragments of brown, blue, and gray stoneware were reportedly found in the 1980s. This suggests

Euro-American use in the late 18th century or 19th century.

- Site 44YO164 is where Native American projectile points and pottery fragments were reportedly found in the 1980s, but no additional information is available.

Site 44YO165 is where Native American projectile points of the Kirk and Morrow Mountain types were reportedly found in the 1980s. These artifacts are characteristic of Native American settlement during the Early Archaic period (9,000 to 9,500 years ago) and the Middle Archaic period (ca. 6,500 years ago).

National Register Properties

To date, none of the known archaeological sites or historic structures (e.g., concrete bunkers, wooden pier, gunnery target foundations, or fallen observation towers) have been determined eligible for listing in the National Register. Until sites and structures have been evaluated for National Register eligibility, they are treated as if eligible.

Indigenous Cultural Landscapes

Plum Tree Island NWR is a good example of a new concept of place known as an “indigenous cultural landscape” (Beacham personal communication 2011). Developed during planning for the Captain John Smith Chesapeake NHT, the concept is intended to represent large landscapes from the perspective of American Indian nations at the time of their first contact with Europeans. The indigenous cultural landscapes identified in the Chesapeake Bay area still have many of the cultural and natural resources that would have supported the historic lifestyles and settlement patterns of American Indian peoples in their totality. The concept also attempts to demonstrate that American Indian places were not confined to the sites of houses, towns, or settlements. It emphasizes that the American Indian view of one’s homeland is holistic rather than compartmentalized into the discrete site elements typically described by European-descended peoples as “hunting grounds,” “villages,” or “sacred sites.” More on this concept is described in appendix Q of the final Comprehensive Management Plan/EA for the Captain John Smith Chesapeake NHT (<http://parkplanning.nps.gov/CAJO>; accessed April 2012).

The conclusion that Plum Tree Island NWR exemplifies an indigenous cultural landscape is supported by the presence of several pre-contact archaeological sites, documentation by John Smith during the early 1600s about the territory, and persistence of landscape elements that supported American Indian communities. The good hunting and fishing grounds, sources of fresh water, transportation routes on the bay and nearby rivers, accessible landing places, marshes, and brushy and wooded areas were all central elements that supported American Indian communities for centuries prior to and following European settlement. Interpretation of the refuge as an indigenous cultural

landscape is wholly consistent with the Service mission “to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people,” which includes Native Indian peoples independent of Federal or State recognition.

2.13 Public Uses

A September 1972 press release announced the establishment of Plum Tree Island NWR and stated that it would be closed to the public due to hazardous conditions of unexploded munitions on the Island. Furthermore, it stated that the refuge would be used “as a refuge for migratory water fowl, nesting shorebirds, and wading birds.” No public use activities have been allowed to occur on lands within the former bombing range.

Currently, public waterfowl hunting is the only public use allowed to occur on the Cow Island tract of the refuge (USFWS 2007b) because this 211-tract was not part of the PTI Range. The refuge’s Wildlife Refuge Specialist spends up to 2 percent of his time annually administering the refuge’s public waterfowl hunt.

Hunting

Plum Tree Island NWR is only open to waterfowl hunting. The refuge opened to public waterfowl hunting in the 1999 to 2000 season (64 FR 43834; codified at 50 CFR 32.67; USFWS 2007b).

The Service established a Memorandum of Agreement (MOA #50130–11–K006) with VDGIF to administer a quota hunt at the refuge for the 2006 through 2011 waterfowl hunt seasons. This 5-year was renewed for the 2011 through 2016 seasons and is expected to be renewed in the future as appropriate. VDGIF works through a contractor to process hunter applications, make equitable and random selections of hunters to participate in the hunt, notify all applicants about selection outcome, and provide applicant contact information to the Service. The VDGIF contractor charges each applicant a processing fee to reimburse for services provided.

Refuge waterfowl hunts are advertised on the refuge and VDGIF Web sites (currently found at http://www.fws.gov/refuge/plum_tree_island and <http://www.dgif.virginia.gov/hunting/quotahunts>, respectively; accessed August 2013), as well as in the annual “Hunting & Trapping in Virginia” regulations digest, published by VDGIF. Participation instructions are included in these announcements. Scouting days prior to the application deadline are available to interested parties in the form of off-shore observations of Cow Island, the blinds, and the local environment. No island access is allowed, but the off-shore observations help hunters determine if they want to submit an



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Waterfowl hunt blind on Cow Island

application to hunt on the refuge.

The refuge is currently open to waterfowl hunting on up to 30 specific days during the last two segments of the State's season (USFWS 2007b). Participation in the refuge's waterfowl hunt requires a refuge-issued permit. Hunters wishing to participate in the refuge's hunt apply through the State's quota hunt lottery system. Hunters may apply by mail, telephone, or through the VDGIF's Web site (<http://vaquotahunts.com>). Two guest hunters and one retrieval dog may accompany each selected hunter (USFWS 2007b). One boat is permitted at each of the refuge's six designated waterfowl hunt blinds on Cow Island (USFWS 2007b).

Hunting parties have two options for hunting the refuge: dock boat near one of the refuge blinds and hunt from that blind, or if a member of the hunting party has a float blind license and the boat meets the State's criteria for being a float blind, hunters can hunt from their boat within 100 feet of the designated blind.

The refuge allows hunting of waterfowl including sea ducks, gallinule, coot, mergansers, snow geese, Atlantic brant, and resident Canada geese (USFWS 2007b). In accordance with Federal and State regulations (50 CFR 20, VDGIF 2014), non-toxic shot approved by the Service is required for hunting all waterfowl, mergansers, coots, moorhens, gallinules, snipe, and rails. Lead shot is not allowed for hunting these species and cannot be possessed in the field while hunting these species. Shot size can be no larger than "T."

We can offer up to 540 hunter use days annually (three hunters per location per day, six hunt locations per day, 30 days per refuge hunt season). However, we typically offer a reduced number of hunter use days annually for two reasons. First, two of our six hunt locations are

difficult to access at times due to wind direction, wind strength, and tide cycles. Our waterfowl hunt participants are offered their choice of any of the six hunt locations. Second, we currently limit our waterfowl hunt season to between 24 and 26 of the approved 30 days to provide waterfowl respite between hunt dates. If the State's hunting segments were to expand to longer seasons, we would adjust our refuge waterfowl hunt days to include Wednesdays, Saturdays, holidays, and opening hunt season days up to 30 days. During the 2006 to 2007 season, we offered a youth waterfowl hunt day (Brame 2013 personal communication).

Data collected from Plum Tree Island NWR waterfowl hunt participants during the 2009 to 2012 seasons indicate that only 24 percent of selected hunters actually participate in the Plum Tree Island NWR hunt (USFWS 2012b). Also, refuge hunt participants harvested approximately half as many ducks or geese per hunter use day as compared to the national harvest (1.25 versus 2.3 ducks or geese, respectively; USFWS 2012b). This information suggests that administrative changes to the refuge's existing waterfowl hunt may be necessary to increase hunter participation. We coordinate with the VDGIF to offer hunting opportunities for the public that are fair, equal, and of high quality.

Fishing

Although fishing is one of the priority public uses on refuges, Plum Tree Island NWR is not open to recreational fishing from the refuge shoreline to protect sensitive shoreline habitat, minimize disturbance to wildlife, and protect human health and safety.

Ample fishing opportunities exist on nearby waters allowed by State regulation and on adjacent lands where permitted by the landowner. All waters around Poquoson are open to the public for hook and line fishing (City of Poquoson 2008), but specific restrictions may apply to fishing activities conducted in designated danger zones or restricted areas (see section 2.3).



Fishing from kayak

Wildlife Observation, Photography, Environmental Education, and Interpretation

Although wildlife observation, photography, environmental education, and interpretation are four of the six priority public uses for refuges, Plum Tree Island NWR is not currently open to these uses.

Few commercial guide service providers offer wildlife observation, photography, environmental education, and interpretive opportunities on the Back River, Poquoson River, or Chesapeake Bay. Commercial guides offer tours in the refuge vicinity using a variety of watercraft, including non-motorized kayak, personal watercraft (e.g., Jet Ski), and airboat.

Since refuge establishment, refuge staff has participated in off-site environmental education and interpretive programs opportunistically. During the past decade, refuge staff has participated in up to three programs annually. For example, refuge staff has:

- given presentations to the Poquoson Exchange Club (local civic organization) and Poquoson Museum;
- given environmental education and interpretation programs at Mt. Vernon elementary school;
- partnered with Junior Master Gardeners and York County 4H for school yard habitat grant award;
- coordinated with City of Poquoson Parks and Recreation to draft the interpretive Blueway plan; and
- participated in the York County Bird Fan Fair and Poquoson Seafood Festival.

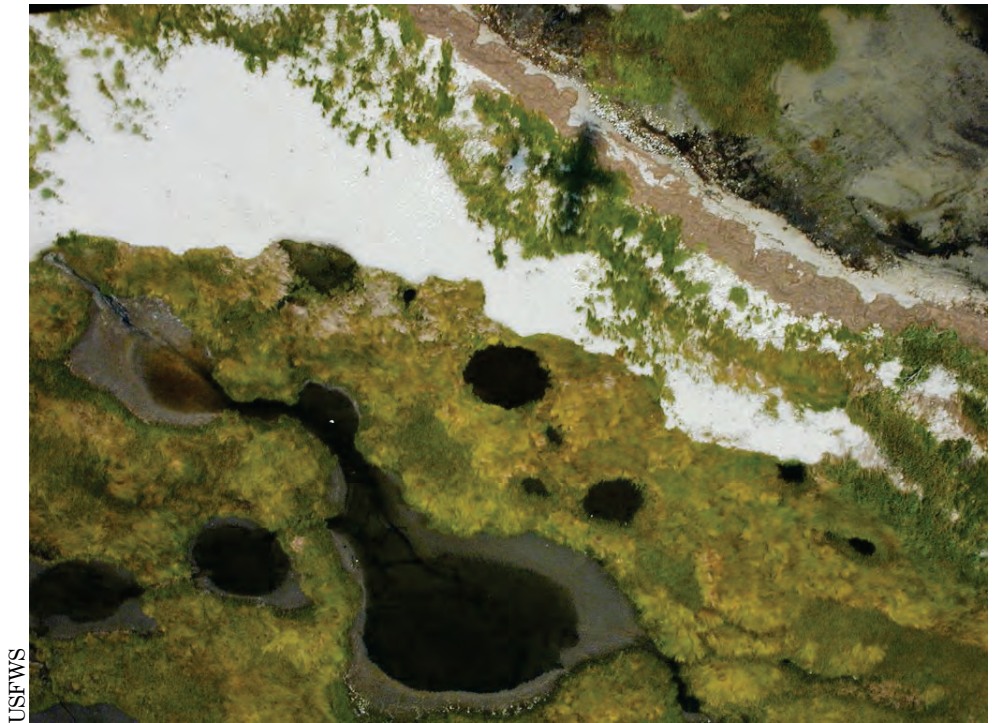
Findings of Appropriateness and Compatibility Determinations for Public Uses

Refuges are closed to public uses unless opened through an evaluation of appropriateness and compatibility. Six priority public uses are identified by the Refuge Administration Act: wildlife observation, photography, environmental education, interpretation, hunting, and fishing. In accordance with this Act and Service policy, these six uses are considered appropriate and receive enhanced consideration over general public uses in the Refuge System. The refuge has an existing compatibility determination for waterfowl hunting.

Appendix B includes our evaluations for appropriateness and compatibility that are included in this document for public review and comment. Final decisions on these uses will be made with the final CCP.

Certain activities were determined to be not appropriate uses of the refuge. We provide updated findings of appropriateness in accordance with Service policy (603 FW 1) in appendix B.

Chapter 3



USFWS

Aerial view of Plum Tree Island National Wildlife Refuge

Alternatives

3.1 Introduction

3.2 Formulating Alternatives

3.3 Actions Common to Both Alternatives

3.4 Alternative A. Current Management (No Action Alternative)

3.5 Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)

3.6 Comparison of Alternatives

3.1 Introduction

This chapter describes:

- our process for formulating two management alternatives;
- actions that are common to both alternatives;
- descriptions of the two alternatives we analyzed in detail; and
- actions or alternatives we considered but did not fully develop.

At the end of this chapter, table 3.3 compares how the two alternatives address key issues, support major programs, and achieve refuge goals.

3.2 Formulating Alternatives

As we describe in chapter 1, the purpose of a CCP is to develop strategic direction to meet the management goals of the refuge. Other broad purposes are to:

- best achieve the refuge’s establishment purposes and vision;
- contribute to the missions of the Service and the Refuge System;
- contribute to the Refuge System vision implementation document “Conserving the Future” (USFWS 2011);
- adhere to Service policies and mandates;
- address significant issues; and
- incorporate sound principles of fish and wildlife science.

Different approaches to meeting refuge management goals are explored through the CCP development process. Through this process, we explore a range of reasonable alternatives that may allow a refuge to achieve its purpose and goals, as well as the Refuge System mission.

The CEQ has provided guidance on the development and analysis of alternatives under NEPA. A full range of alternatives must be developed for analysis for any Federal action. The alternatives should meet the purpose and need as stated in chapter 1, at least to a large degree. Alternatives should also be developed to minimize impacts to environmental resources and be “reasonable,” which CEQ has defined as those that are economically and technically feasible, and show evidence of common sense. Alternatives or elements of alternatives that could not be implemented, if they were chosen, for economic or technical reasons or do not resolve the need for action and fulfill the stated purpose in taking action to a large degree, are therefore not considered reasonable.

Relating Goals, Objectives, and Strategies

Goals

Refuge goals are intentionally broad, descriptive statements of the desired future condition of refuge resources. They articulate the principal elements of the refuge purposes and our vision statement, and provide a foundation for developing specific management objectives and strategies. By design, they are less quantitative, and more prescriptive, in defining the target of our management. Both alternatives address these same goals, which are first presented in chapter 1.

Objectives

The objectives we developed are incremental steps toward achieving a goal. Objectives further define management targets in measurable terms. Typically, they vary among the alternatives and provide the basis for determining strategies that are more detailed, monitoring refuge accomplishments, and evaluating successes. We followed guidance in “Writing Refuge Management Goals and Objectives: A Handbook” (USFWS 2004c) for writing “SMART” objectives that possess five characteristics:

- Specific;
- Measurable;
- Achievable;
- Results-oriented; and
- Time-fixed.

A rationale accompanies each objective to explain its context and why we think it is important. The objectives outlined in the alternative selected for the final CCP would guide development of refuge step-down plans, described later in this chapter. We would measure our successes by how well we achieve the objectives. Unless otherwise noted, the objectives and strategies we describe would be implemented by refuge staff.

Strategies

Strategies are the specific actions, tools, or techniques we may use to achieve the objectives. The list of strategies under each objective represents the potential suite of actions we may implement. We would evaluate most of them further as to how, when, and where we should implement them when we write our refuge step-down plans. We would measure our successes by how well our strategies achieve our objectives and goals.

Inventory and Monitoring Activities

For most objectives, we also identify inventory and monitoring

activities that would help us measure our success toward meeting refuge goals and objectives. The activities listed would be further refined in the refuge's inventory and monitoring step-down plan to be developed after final CCP approval.

Developing Alternatives, Including the “No Action” Alternative

In this chapter, we fully analyze two alternatives that characterize different ways of managing the refuge over the next 15 years, the life of the plan. We believe they represent a reasonable range of alternative proposals for achieving the refuge purpose, vision, and goals, as well as addressing the issues described in chapter 1. Unless otherwise noted, all actions would be implemented by refuge staff. Both alternatives are summarized in a matrix at the end of this chapter (table 3.3).

Alternative A addresses 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.

Many of the objectives in alternative A do not strictly follow the current guidance in the Service goals and objectives handbook (Adamcik et al. 2004) because we are describing current management decisions and activities that were established prior to Service guidance. Our descriptions of those activities originate from a variety of formal and informal management decisions and planning documents. Thus, the objectives in alternative A are fewer and more subjective than are those in alternative B. Alternative B was developed in accordance with current and applicable laws, regulations, and Service policy manuals and guidance handbooks, as described in chapter 1. Alternative B also incorporates the principles of strategic habitat conservation and priority species management, as well as reflects the most recent advances in the fields of conservation science and delivery of conservation actions on the ground by the Service.

During the alternatives development phase of this CCP and EA, we considered all available information about the refuge, its resources, and public comments submitted since announcing in January 2012 that we would develop a CCP for Plum Tree Island NWR. Our review of all available refuge-specific information indicates that the existing quality of habitats is good. Surrogate species (such as nesting American black ducks, clapper rails, willets, northern harriers, and northern diamond-backed terrapins [USFWS 2012d]) are present in significant numbers, indicating that the habitat features that they require are readily available on the refuge. In addition, only a very small number of sites have been found to have invasive plant species. The NAWMP and the ACJV Plan have set goals to protect 12,000 acres of waterfowl habitat in the York/Poquoson River watershed. The 2,027 acres of salt marsh on Plum Tree Island NWR is a significant part of this goal and is very

important to the American black duck, saltmarsh sparrow, and other migratory wading birds that are high priority species (ACJV 2009). Maintaining the current conditions of refuge habitats is critical to supporting high priority bird and migratory fish species. Salt marsh, dune, and beach habitats are very sensitive to disturbance, and active management is presently not necessary to maintain these habitats in good condition as long as natural processes are still in place. Therefore, the top priorities for this habitat are protection from human disturbance, and inventory and monitoring.

Additionally, the USACE continues to lead the planning effort to remedy the human health and ecological risks associated with the UXO on the refuge and the vicinity. We have been and would continue to participate in the USACE planning efforts and interagency coordination effort to identify, select, and implement a remedy for the human health and ecological risks associated with the UXO on the refuge. Our ongoing coordination is essential to ensure that a feasible and most appropriate remedy is selected for implementation. Although eliminating all human health and ecological risks is not feasible at the PTI Range FUDS, residual human health and ecological risks can be effectively managed (USACE 2015).

Therefore, we have developed one action alternative to fulfill the Service's responsibilities for wildlife and habitat management, while also considering opportunities to provide for limited wildlife-dependent recreation opportunities on the refuge once the USACE has an approved remedial action plan and implementation of the remedial actions are completed.

Comparison of the Alternatives

Actions that are common to all alternatives are detailed in section 3.3.

We include a habitat map for each alternative to help visualize how refuge vegetation would look under each alternative (maps 3.1 and 3.2). Table 3.1 compares the acreages of the habitat types under each of the alternatives. Table 3.2 compares the visitor services offered annually under each of the alternatives.

Table 3.1 Comparison of Habitat Types, by Alternative, on Plum Tree Island NWR

Habitat Type	Alternative A	Alternative B
Salt Marsh	2,027	2,027
Maritime Shrubland and Dune	102	102
Sandy Beaches and Mudflats	80	80
Estuarine and Marine Coastal	740	740
Habitat Total	2,949	2,949
Refuge Total	3,502	3,502

¹Habitat areas estimated from GIS and rounded up to nearest whole number. The difference in habitat acres and total refuge acres occurs because boundaries that were used for habitat mapping project are not identical with the data held in our reality files.

Table 3.2 Comparison of Visitor Services Offered Annually, by Alternative, on Plum Tree Island NWR

Visitor Services Offered		Alternative A	Alternative B
Waterfowl Hunting	Hunter use days accommodated annually	540	558, which includes: <ul style="list-style-type: none"> • 540 adult hunter • 18 youth hunter
	Youth hunt days offered	None	1 fall day
	Designated locations	Six	Six existing, plus investigate five new potential blind locations
Wildlife Observation, Photography, Environmental Education, and Interpretation	Designated public use areas	None	One on Cow Island
	Visitor use days accommodated annually	None	6,075 total, which includes: <ul style="list-style-type: none"> • 3,510 commercially guided • 2,475 individual recreational • 30 refuge-sponsored • 60 partner-sponsored
	Commercially guided tours offered annually	None	Up to 234, offered between early February and late October
	Refuge-sponsored programs on refuge	None	Opportunistically, up to two annually for 15 visitors each
	Partner-sponsored on refuge	None	Opportunistically, up to four annually for up to 15 visitors each
	Refuge- or partner-sponsored programs off refuge	By request, up to two annually	By request, up to two annually

Service-preferred Alternative

In accordance with CEQ guidance to do so, we identified in this draft CCP and EA that one of our alternatives would best fulfill our agency's statutory mission and responsibilities, giving consideration to economic, environmental, technical, and other factors. We identified alternative B as the Service-preferred alternative because it combines the actions we believe would be most effective at

- meeting the refuge purposes, vision, and goals;
- addressing issues and concerns identified throughout the planning process;
- responding to public comments and inquiries; and
- being feasibly implemented in accordance with applicable laws, regulations, policies, and guidance.

Alternatives or Elements Considered but Eliminated from Detailed Study

As mentioned previously, alternatives to be analyzed should be reasonable. Unreasonable alternatives or elements of alternatives may be those that cannot be implemented for technical or logistical reasons; do not meet mandates; would be in violation of laws, regulations, or policies; are inconsistent with carefully considered, up-to-date refuge statements of purpose and significance or management objectives; have severe environmental impacts; or are unreasonably

expensive.

We considered the following suggestions from public comments, but dismissed them from further consideration and detailed study.

Close the Refuge to Public Waterfowl Hunting

Public comments suggested that refuges, such as Plum Tree Island NWR, be closed to public waterfowl hunting.

As detailed in chapter 2, public waterfowl hunting is a historic, appropriate, and compatible use on the refuge that has been accounted for in refuge planning documents and refuge-specific regulation revisions published in the *Federal Register* and in Title 50 of the CFR. Closing the refuge to hunting would also conflict with the Improvement Act, which

- includes hunting as an appropriate and priority use of the Refuge System,
- requires that hunting shall receive priority consideration in refuge planning and management,
- mandates that hunting opportunities should be facilitated when feasible, and
- directs the Service to administer the Refuge System so as to “provide increased opportunities for families to experience wildlife-dependent recreation, particularly opportunities for parents and their children to safely engage in traditional outdoor activities, such as fishing and hunting.”

Additionally, we are required to provide public outdoor recreation opportunities in perpetuity on the 211-acre tract of Cow Island because this tract was purchased using monies from the LWCF (Public Law 88–578, codified at 16 U.S.C. 4601). Since public waterfowl hunting is the only public use currently allowed at Cow Island, closing the refuge to this use was not carried forward for further analysis.

In accordance with Service policy, we updated the refuge’s compatibility determination for hunting opportunities analyzed in this draft CCP and EA. The compatibility determination for hunting focuses on public waterfowl hunting and provides specific information regarding where, when, why, and how this use would be conducted on the refuge, to ensure that this use would not materially interfere with or detract from the fulfillment of the Refuge System mission or the refuge’s purpose. We provide detailed analyses of impacts associated with allowing this use in chapter 4 and in the compatibility determination included in appendix B of this draft CCP and EA. Expanding the existing hunt program for adults and youth requires additional NEPA review, and planning for these changes is anticipated

to be initiated within 5 years of CCP approval.

Open the Refuge to Public Rail Hunting

Public comments suggested that the refuge be opened to public rail hunting.

The purpose of this CCP is to develop a strategic course of action that achieves the refuge's goals as presented in chapter 1. Hunting is one of the six priority wildlife-dependent public uses of refuges, each of which receives priority consideration in refuge planning and management. In accordance with the Improvement Act and the Service's Compatible Use Policy, these six priority uses shall be facilitated where found to be compatible.

In accordance with Service policy, we prepared a compatibility determination for public hunting opportunities analyzed in this draft CCP and EA, appendix B. The refuge would remain open to hunting waterfowl (ducks), sea duck, coot, mergansers, light (snow) geese, Atlantic brant, and Canada geese. For purposes of this draft plan, these species are all included in discussions of "waterfowl hunting."

Rails are not included in the hunting program. Public rail hunting differs in season and technique from our existing waterfowl hunt. The Virginia rail hunting season spans from September 1 through mid-November, which directly coincides with fall migration of shorebirds that use the refuge marshes and mudflats. Rail hunting also requires hunters to walk through the mudflats and shorelines, which conflicts with the refuge goal of minimizing human-caused disturbance to the shorelines and salt marsh habitats. For these reasons, opening the refuge to rail hunting was not carried forward for further analysis.

Open the Refuge to Public Deer Hunting

Public comments suggested that the refuge be opened to public white-tailed deer hunting.

The purpose of this CCP is to develop a strategic course of action that achieves the refuge's goals as presented in chapter 1. Hunting is one of the six priority wildlife-dependent public uses of refuges, each of which receives priority consideration in refuge planning and management. In accordance with the Improvement Act and the Service's Compatible Use Policy, these uses shall be facilitated where found to be compatible.

Although some of the marsh habitat on the refuge does support white-tailed deer, the majority of the upland habitat that provides preferred food and cover resources for deer is not within the refuge boundary. Deer are only transitory on the refuge, and the refuge would not be capable of providing a quality deer hunt. Thus, opening the refuge to public deer hunting was not carried forward for further analysis. If upland habitat that supports deer is acquired for the refuge in the

future, we would reevaluate the potential to open the refuge to deer hunting at that time.

Open the Refuge to Recreational Fishing

Public comments suggested that Plum Tree Island NWR be opened to public recreational fishing.

Similar to hunting, fishing is a priority public use of the Refuge System.

Since refuge establishment, we have worked to protect, maintain, and restore the ecological integrity of the refuge's habitats for the benefit of wildlife. Because of the potential to disturb nesting, foraging, and wintering wildlife, we limit activities along the refuge's shoreline to allow only those activities that support refuge operations and activities related to the PTI Range FUDS management. This closure to fishing, along with other refuge access restrictions, has been in place since refuge establishment. We believe the public understands that fishing from the refuge shoreline would conflict with our efforts to protect, maintain, and restore the refuge's wildlife habitat (603 FW 2). In addition, we believe they recognize and are satisfied with the fact that there are many opportunities for fishing in State and other public waters (where authorized) in the refuge vicinity. However, if we acquire areas in the future that do not have the impacts and concerns of existing refuge lands, we would reevaluate the potential to open these new areas to public recreational fishing.

Open the Refuge to Recreational Public Beach Uses

Public comments suggested that the refuge's sandy beaches be opened for public use for various activities including, but not limited to, swimming, sunbathing, camping, and picnicking. Public comments suggested that the refuge consider opening sandy beaches in a manner similar to that allowed at Grandview Beach in Hampton, Virginia.

The Improvement Act identifies six priority and appropriate uses of wildlife refuges: hunting, fishing, wildlife observation, photography, environmental education, and interpretation. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management. All other uses are defined by the Improvement Act as general uses and should be evaluated on each refuge for their appropriateness and compatibility in contributing to the purpose of that refuge.

Recreational beach activities do not contribute to the fulfillment of this refuge's purposes for protecting migratory birds and other native fish and wildlife resources. Managing these uses would involve staff resources and time that would detract from accomplishing priority

resource projects and administering priority public uses on the refuge. The refuge does not have the facilities or staff to manage these activities. These uses are not consistent with Service policy on secondary uses and are not consistent with any approved refuge management plan. Recreational beach activities have been determined to be inappropriate for this refuge (see appendix B).

Opening the PTI Range FUDS to Public Uses

Due to the ecological concerns and safety hazards associated with its former use as a bombing range, the PTI Range FUDS (3,276 acres; 93.5 percent of refuge) has not been opened to public use since its transfer to the Service and refuge establishment in 1972. The PTI Range FUDS remains closed to all public use. However, public comments suggested that we open various locations within the PTI Range FUDS to a variety of public uses.

The Improvement Act states, “. . . the Secretary shall not initiate or permit a new use of a Refuge or expand, renew, or extend an existing use of a [refuge], unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety.” If a public use can be safely accommodated, the Refuge Manager must find specific public uses compatible with the refuge’s purpose(s) and System mission to allow them (603 FW 2). Furthermore, the Refuge Manager has the authority and discretion to determine where appropriate and compatible public uses may occur on the refuge. The Refuge Manager has the authority and discretion to determine stipulations necessary to ensure that such public uses are appropriate and compatible with the refuge's purpose(s) and System mission.

At this time, we cannot consider opening the PTI Range FUDS to any public uses unless and until the proposed remedial action to reduce UXO hazards and to ensure public safety is successfully implemented. If the Service approves and USACE successfully implements remedial action(s) that reduce UXO hazards within the PTI Range FUDS, then the Refuge Manager would re-evaluate the potential to allow new compatible public uses within the PTI Range FUDS. Therefore, this alternative was not carried forward for further analysis.

3.3 Actions Common to Both Alternatives

Both of the alternatives share some common actions. These actions are current practices or policies that would continue under all alternatives. Some of these 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 require public review, but are those that we want to highlight in this public document.

We discuss these common actions in more detail below and have organized our discussion under the following headings:

- Refuge staffing and administration
- Species and habitat conservation
- Cultural resources management
- Visitor services management
- Findings of appropriateness and compatibility determinations
- Refuge revenue sharing payments
- Special designation areas
- Additional NEPA analysis

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 above current budget allocations and, as such, should be viewed as strategic in nature. Congress determines our budgets annually, which are then distributed through our Washington and regional offices before arriving at field stations. 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.

Refuge Staffing and Administration

All alternatives include the following actions related to refuge staffing and administration.

Refuge Staff

Continue to share staff across the Eastern Virginia Rivers NWR Complex, including the three new positions identified in appendix C of this draft CCP, appendix C of the final CCP for Rappahannock River Valley NWR, final CCP for Presquile NWR, and appendix C of the draft CCP and EA for James River NWR (USFWS 2009d, USFWS 2012c, and USFWS 2014, respectively).

Discussion and Rationale

In 2000, the Regional Chief decided to administratively group Rappahannock River Valley, James River, and Presquile NWRs to form the Eastern Virginia Rivers NWR Complex (Refuge Complex). In 2003, Plum Tree Island NWR joined the Refuge Complex. The intent of administratively grouping these refuges was to create management efficiencies, to the extent possible, due to declining budgets. Current staffing at the Refuge Complex includes seven positions. The Refuge Manager for the Refuge Complex is responsible

for setting staff priorities and resource distribution across the four refuges.

In 2007, our Refuge leadership team completed the “Strategic Workforce Plan for the Refuge System in Region 5” (Phase 2; January 16, 2007) to support a new base budget approach. Its goal is a maximum of 75 percent of a refuge station budget to cover salaries and fixed costs, while the remaining 25 percent or more would be operating and maintenance funds. An analysis of refuge staffing using the National Staffing Model resulted in a proposed increase of three staff, with shared responsibilities among the four refuges in the Refuge Complex (USFWS 2007c). Increasing Refuge Complex staff by three would help support management on Plum Tree Island NWR, including increased visitor services opportunities and management of the natural and built facilities on the refuge. The three new positions would be allocated across each of the four refuges as needed to ensure efficient operation and management throughout the Refuge Complex.

Our region’s strategy is to improve each refuge’s capability to do the highest priority work and not to have most of a refuge budget tied up in inflexible fixed costs. This strategy was successful for a few fiscal years; however, we now anticipate a level or declining budget environment, which would affect our flexibility in managing financial resources and may have implications for the level of permanent staffing. A new round of workforce planning began in 2013 in response to the Federal Government’s sequestration directive and anticipated future budget reductions.

Jurisdiction over Lands and Waters

Continue to coordinate with other Federal and State government agencies with legal authority to use or regulate use of lands or waters within the refuge’s approved acquisition boundary.

Discussion and Rationale

As detailed in chapter 2, other Federal and State government agencies retain ownership and/or have legal authority to use or regulate use of lands or waters within the refuge. The Service would continue to coordinate with these agencies to ensure the protection of refuge resources, employee safety, and public safety.

- The Commonwealth of Virginia retains title to the beds of navigable waterways when not specifically transferred in property deeds and on behalf of the public’s right to fish, hunt, and navigate. The Service would continue to work cooperatively with the State to resolve questions of ownership and overlapping jurisdiction for fishing, hunting, and navigation purposes.
- The USAF has established a danger zone as an emergency jettison area and for ordnance disposal operations for limited durations. In

accordance with the rights reserved by the USAF, refuge staff would comply with the restriction that no person or vessel shall enter or remain in this danger zone during periods of firing, bombing, or when the zone is otherwise in use. Refuge staff would refer to the USCG “Local Notice to Mariners,” local press, and radio to be aware of the USAF planned use of the danger zone.

- The USACE has established a temporary danger zone on the waters surrounding the southern portion of the refuge. In accordance with the use restrictions established by the USACE, refuge staff would closely coordinate with the USACE to ensure compliance and enforcement of restrictions on activities that would disturb sub-aqueous soil within the temporary danger zone, including dropping anchor or beaching of watercraft on the refuge.
- The VMRC has established a restricted area on the waters surrounding the southern portion of the refuge. Refuge staff would continue to coordinate with VMRC as needed to ensure compliance and enforcement of the restricted area closure.

Land Acquisition

In accordance with the refuge’s existing, approved Land Protection Plan (LPP; USFWS 1993), we would continue to consider land acquisition from willing sellers within the refuge’s approved acquisition boundary (map 1.3). If we acquire new lands for the refuge, they would be evaluated for compatible, priority public use opportunities, or otherwise managed in accordance with final CCP goals, objectives, and strategies.

Discussion and Rationale

On October 13, 1993, the Service was authorized under the authority of the MBCA to expand the refuge's approved acquisition boundary to include an additional 2,119 acres of land in Poquoson, Virginia (USFWS 1993). The Service identified acquisition of these lands as fish and wildlife habitat worthy of protection because they support the goals set forth in the NAWMP, by protecting and enhancing migration and wintering habitat for black duck, and meet the intent of the Emergency Wetlands Resource Act by assuring the protection of critical wetland functions.

An approved acquisition boundary designates those lands that the Service has authority to acquire or manage through various agreements. The approval of an acquisition boundary does not grant the Service jurisdiction or control over lands within the boundary, and it does not make lands within the refuge boundary part of the Refuge System. Lands within a refuge’s approved acquisition boundary do not become part of the refuge until the Service buys them or they are placed under an agreement that provides for their management as part of the refuge.

Since approval of the refuge boundary expansion in 1993, the Service has acquired only two parcels of land (USFWS 1993). Approximately 1,893 acres within the refuge's approved acquisition boundary remains private property. Should any of these 1,893 acres be identified by willing sellers, we would consult with our Regional Office staff to determine if funding could be available for acquisition.

Refuge Access

Continue to require a permit for access to areas of the existing refuge that are closed to public uses.

Discussion and Rationale

Since refuge establishment, the refuge has been closed to general public access. Only those visitors who participate in the refuge's waterfowl hunts or made advanced reservations to conduct a visit are allowed access to the refuge. People interested in visiting areas currently closed to general public use are required to request permission in advance of their visit. If the request is determined to be compatible and is granted, refuge staff issue a special use permit (SUP) that visitors are required to carry a copy of while on the refuge. It has worked well because it:

- Protects human health and safety on the former bombing range;
- Proactively prevents incompatible or unauthorized uses from occurring on the refuge;
- Minimizes disturbance of refuge wildlife by stipulating in the permit that access is in designated areas only;
- Minimizes disturbance of cultural resources by requiring visitors to stay in designated areas;
- Allows for stricter monitoring of who is on the refuge and why;
- Minimizes conflicts between user groups (e.g., bird watchers and waterfowl hunters) for safety purposes and supports high quality experiences;
- Protects the visitor experience of being immersed in nature in a secluded and remote area; and
- Provides a mechanism for law enforcement to prevent visitors from beaching their boats on the refuge and engaging in other unauthorized uses.

Non-Service personnel and public access to closed areas or for special uses would be allowed with a valid refuge-issued permit for appropriate and compatible public uses (e.g., waterfowl hunting) or SUP (e.g., research). We would continue to coordinate closely with the



Public announcement

USACE and VDEQ to implement the selected remedy as communicated in the Final Decision Document for the PTI Range FUDS, (*in development*) which may include, but is not limited, to:

- UXO recognition and site-specific safety awareness training, to be completed by refuge staff and volunteers
- Installation and maintenance of institutional controls (e.g., signage)
- Enforcement of restricted areas and prohibited activities
- Distribution of safety-related information to the public and partners

Refuge staff would continue to access Cow Island without consulting the USACE because Cow Island is not within the PTI Range FUDS boundary and no UXO hazards have been identified for Cow Island (Shaw Environmental, Inc. 2013b). However if UXO or other safety-related concerns are identified at Cow Island in the future, we may close the designated public use area temporarily. We would contact the USACE and other emergency responders for assistance with assessing the level of threat to public safety. If new evidence were found to be related to the Plum Tree Range FUDS, then USACE would consider all new information and revisit potential FUDS responsibility and eligibility for Cow Island.

Refuge Step-down Plans

Continue to complete key refuge step-down plans according to the identified schedule. The habitat management plan, inventory and monitoring plan, and visitor services plan are priorities for completion.

Discussion and Rationale

The Service uses CCPs to detail the “what, why, and how” of refuge management priorities that would be explored further in step-down plans, which detail the “how, where, and when” we would accomplish the refuge’s goals and objectives. Step-down plans would be prepared in accordance with Service guidance, handbooks, and the refuge’s final CCP. The following three step-down plans are a priority for completion on Plum Tree Island NWR. Under each description, we identify a timeline for their completion.

Habitat Management Plan (HMP): An HMP for the refuge is the requisite first step to achieving the biological objectives of Goals 1 and 3 for any of the alternatives (USFWS 2013). We would complete an HMP within 5 years of CCP approval. The HMP would provide more details on the habitat management strategies we would use to accomplish CCP goals and objectives over the life of the plan. In particular, the HMP would detail the specific areas and habitat types we would manage for, as well as the tools and techniques we would use and the timing of our management actions. Additional analysis of the impacts of specific methods may be necessary to fulfill our responsibilities under NEPA. The HMP would also incorporate the results of appendix A, which identifies how we derived priority refuge species and habitats for the refuge. We would not prepare a separate Forest Management Plan because the HMP would serve the same purpose for this refuge.

The goals, objectives, and strategies in this CCP identify how we intend to manage habitats on the refuge. Both the CCP and HMP are based on current resource information, published research, and our own field experiences. Our methods, timing, and techniques would be updated as new, credible information becomes available. To facilitate our management, we would regularly maintain our databases, including GIS data, documenting any major vegetation changes on at least a 5-year basis.

Inventory and Monitoring Plan (IMP): The IMP would outline and prioritize inventorying and monitoring activities for the refuge based on the priorities identified in the alternative selected for the final CCP and detailed in the HMP. The IMP would be completed within 5 years of completing the HMP. We would use our inventory and monitoring program to assess whether our original assumptions and proposed management actions are supporting the refuge’s habitat and species objectives, as well as Service priorities at the regional, flyway, and landscape scales. The results of inventories and monitoring would

provide us with more information on the status of our natural resources and allow us to make more informed management decisions. The IMP would incorporate recommendations from the “Strategic Plan for Inventories and Monitoring on National Wildlife Refuges: Adapting to Environmental Change” (USFWS 2010a) to ensure a coordinated approach to inventory and monitoring across refuges.

Visitor Services Plan (VSP): A VSP is required by Service policy (605 FW 1, Section 1.8.A) and, along with the HMP, is among the highest priority step-down plans for all refuges (USFWS 2013). Exhibit 1 of that policy includes an outline for the plan. The VSP would further detail strategies to help meet the visitor services goals and objectives contained in the refuge’s CCP over the life of the plan, including finding ways to increase the understanding and appreciation for fish and wildlife conservation by urban audiences (<http://americaswildlife.org/wp-content/uploads/2012/04/Recommendation-131.pdf>; accessed September 2013). We would complete a VSP within 5 years of CCP approval. If the VSP includes proposals for modifying existing visitor service facilities and/or additional visitor service improvements, additional NEPA and approvals may be necessary prior to implementing those actions.

Existing Facilities Maintenance and Planned New Construction

Continue to maintain the refuge’s existing six waterfowl hunt blinds.

Discussion and Rationale

Periodic maintenance and renovation of existing facilities would continue to ensure safety and accessibility for staff and visitors. The refuge’s existing facilities are described in chapter 2. Construction and maintenance projects currently listed in the RONS and SAMMS databases would be undertaken in accordance with the regional and refuge rankings for each project (see appendix D).

As we undertake these projects, we would consult other Federal, State, and local government agencies with jurisdiction and authority to ensure that activities are consistent, to the maximum extent practicable, with applicable laws, regulations, and enforceable policies.

CEQ guidelines for implementing NEPA also require examining energy requirements and conservation potential in environmental documents. For any of the alternatives, we would meet these guidelines by incorporating principles of sustainability in the design, construction, and operation of facilities on refuges.

Species and Habitat Conservation

Both alternatives include the following actions related to species and habitat conservation.

Ecological Risks Associated with FUDS

Ecological risks associated with the PTI Range FUDS are evaluated, identified, and minimized by working with the USACE and VDEQ to implement the selected remedy as communicated in the Final Decision Document (at press time the USACE decision document is in preparation).

Discussion and Rationale

The USACE conducted site investigations, analyses, and assessments of munitions constituents (metals) at the PTI Range FUDS (Shaw Environmental, Inc. 2013a). The ecological risk assessment process included characterizing the ecological communities near the PTI Range FUDS, identifying the munitions constituents of potential ecological concern, identifying pathways for receptor exposure, and evaluating potential risk to identified receptors.

For the PTI Range FUDS, the USACE evaluated ecological risk using a multi-step process that included:

- a Screening Level Ecological Risk Assessment, conducted as part of the Remedial Investigation;
- a Focused Baseline Ecological Risk Assessment, conducted as part of the Remedial Investigation; and
- a Feasibility Study Addendum.

The results of the Screening Level Ecological Risk Assessment indicated that the following munitions constituents may be a hazard to ecological receptors: cadmium, copper, lead, selenium, and zinc. The refined evaluation conducted in the Focused Baseline Ecological Risk Assessment eliminated cadmium, lead, selenium, and zinc as munitions constituents of ecological concern at the PTI Range FUDS; however, copper was still a concern. The USFWS, VDEQ, USACE, and the USACE contractor (Shaw Environmental, Inc.) reached a consensus in January 2013 that additional sampling of shrimp and crabs might resolve the concerns related to copper concentrations in prey species inhabiting refuge ponds outside of the PTI Range FUDS. In September 2013, USFWS and USACE personnel conducted additional shrimp and crab sampling in refuge ponds outside of the PTI Range FUDS. The prey species of fish, shrimp, and crabs in these ponds were found to have similar copper concentrations compared to prey species in the bomb crater ponds. It was concluded that munitions constituent-related copper does not cause unacceptable ecological risk to predators who feed upon prey at PTI ponds. Therefore, no further action was recommended for munitions constituents, including copper, at the PTI Range FUDS (USACE 2014).

Protecting Federally Listed Species

Continue to protect and enhance northeastern beach tiger beetle

foraging habitat for both adults and larvae throughout the refuge shoreline by protecting sandy beaches and mudflat habitat, especially along the southeastern shoreline, to maintain an average annual count number of more than 300 individuals.

Protect and enhance existing habitat throughout the refuge for federally listed species found to exist on the refuge.

Discussion and Rationale

The northeastern beach tiger beetle is currently a federally threatened species. The recent 5-year review conducted by the Service concluded that the northeastern beach tiger beetle populations should be reclassified as endangered because serious threats to this species' existence continue to grow and populations are declining through most of its range

(<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=I02C>; accessed February 2015). Numerous sites have been lost or populations reduced in the past 10 years. Since 2001, there has been a 20 percent loss in occupied sites (12 of 58 occupied sites) (USFWS 2009b).

The refuge is within Virginia's western shore of the Chesapeake Bay geographic recovery area, which is the southernmost occurrence of this species. Under both alternatives, we would continue to protect the northeastern beach tiger beetle by restricting activities from June 1 to September 15 on the refuge's sandy beaches and dunes because adult northeastern beach tiger beetles emerge and use these areas during this time for sheltering, foraging, and mating. The section of beach from the mean low water line to the base of the dune system is where the larval northeastern beach tiger beetles burrows can be found. The larva is present year-round, so limiting human-caused disturbance to this habitat area will avoid the possible loss of larval northeastern beach tiger beetles.

Estuarine Habitats Management

Continue to coordinate with partners on management actions to benefit estuarine habitats adjacent to Plum Tree Island NWR and the lower Chesapeake Bay.

Discussion and Rationale

In all alternatives, the Service would continue to work opportunistically with VMRC and NOAA to improve estuarine habitats in the lower Chesapeake Bay. The quality of these habitats directly affects the health and integrity of the habitats and wildlife species that utilize the refuge. Estuarine habitats supply food resources to migratory and breeding wildlife of top priority to the refuge, as well as to species that are important in the larger Chesapeake Bay community, such as the blue crab, oyster, horseshoe crab, and striped bass. Our coordination with these partners would

continue as we work to protect our common resources for human and wildlife population health.

Adaptive Management

Continue to employ an adaptive management approach for improving our resource decisions and management.

Discussion and Rationale

All alternatives would employ an adaptive management approach for improving resource management by better understanding ecological systems through iterative learning.

The DOI's technical guidebook to assist managers and practitioners in adaptive management ("Adaptive Management: The U.S. Department of Interior, Technical Guide") provides the following definition for adaptive management (<https://www.usgs.gov/sdc/doc/DOI-%20Adaptive%20ManagementTechGuide.pdf>; accessed January 2016):

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, increases 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 continuous learning. This approach recognized that we can never achieve perfect understanding of the natural world and that we must implement management in the face of uncertainty. At the refuge level, adaptive management is an integral part of management planning, research design, and monitoring. Uncertainties about ecological systems are addressed through targeted monitoring of resource response to management actions and predictive models that mimic the function of the natural world.

Adaptive management gives the Refuge Manager flexibility to adjust management action or strategies if they do not meet goals or objectives. As we adjust our management, we will evaluate whether

additional NEPA review is warranted. Implementing an adaptive management approach supports all refuge goals. Furthermore, adaptive management is even more compelling in light of climate change concerns.

Climate Change

Continue to address climate change through maintaining and restoring healthy, connected, and genetically diverse wildlife populations and ecological communities; monitoring conditions over the long-term; and promoting energy efficient practices and other carbon reduction activities.

Discussion and Rationale

There is consensus among the scientific community that global climate change, occurring in part as a result of emissions of carbon dioxide and other greenhouse gases from human activities, would lead to significant impacts across the U.S. and the world (Joint Science Academies 2005). The effect of climate change on wildlife and habitats is expected to be variable and species-specific, with a predicted general trend of species ranges and vegetation communities shifting northward and higher in elevation.

Uncertainty about the future effects of climate change requires Refuge Managers to use adaptive management to maintain healthy ecosystems in light of unpredictability (Inkley et al. 2004). This involves improving or adjusting policies and practices based on the outcomes of monitoring or management activities and may result in changes to regulations, shifts in active habitat management, or changes in management objectives. A few recommendations include:

- preparing for diverse and extreme weather conditions (e.g., drought and flood);
- maintaining or restoring healthy, connected, and genetically diverse wildlife populations to increase resiliency in wildlife and habitats; and
- protecting coastal habitats to accommodate marsh migration in response to sea level rise (see Inkley et al. 2004 for more recommendations).

Plum Tree Island NWR may play an important role in monitoring and predicting the effects of global climate change. At the refuge level, it would be increasingly important to understand how the refuge and its habitats and communities respond to potential changes, such as habitat shifts, sea level rise, changes in temperature, changes in waterway salinity, and storm intensification.

Invasive Plant Species Monitoring

Continue to monitor invasive species on refuge lands as funding,

staffing, and equipment logistics allow, with particular attention to *phragmites*.

Discussion and Rationale

EO 13112 defines an invasive species as “...an alien (or non-native) species whose introduction does, or is likely to cause economic or environmental harm or harm to human health.” The unchecked spread of invasive plants threatens the biological diversity, integrity, and environmental health of all refuge habitats. In many cases, invasive species out-compete native species and become the dominant cover. This situation reduces the availability of native plants as food and cover for native wildlife.

Over the past several decades, government agencies, conservation organizations, and the public have become more aware of the negative effects of invasive species. One report estimated the economic cost of invasive species in the U.S. at \$137 billion every year (Pimentel et al. 2000). Up to 46 percent of the plants and animals federally listed as threatened and endangered have been negatively impacted by invasive species (Wilcove et al. 1998, National Invasive Species Council 2001).

The Service’s Northeast Region initiated an effort to systematically identify, locate, and map invasive plant species occurring on refuge lands, leading to an effective integrated management plan. Plum Tree Island NWR staff has begun identifying and mapping locations of invasive species on the refuge as time and resources allow. *Phragmites* is the only invasive plant species currently known to occur on the refuge.

Under all alternatives, we would continue to implement the following strategies related to invasive species monitoring:

- Follow the national guidance on invasive species provided in the Service Manual (620 FW 1.7G).
- Complete the inventory and mapping of invasive plant species.
- When using heavy equipment on refuge property, we would ensure all equipment brought onto the refuge for this work is clean and free from reproductive plant parts to minimize opportunities for invasive species introduction.

Pest Management

Continue to participate with State and Federal partners to monitor nuisance issues from wildlife, such as nutria.

Discussion and Rationale

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. An example of a potential problem and remedy of pest management follows.

- *Potential problem:* Nutria eating roots and stems of wetland plants can convert marshes into unvegetated mudflats (Ehrlich 1962, Holm et al. 2011).

Potential solutions: If documented on the refuge in the future, use control methods to eliminate population on refuge property. Methods may be conducted by Service staff, partners, or other entities operating under refuge-issued SUPs.

When nuisance animals are affecting refuge management capabilities, they may be trapped and removed; nutria is considered a nuisance mammal in Virginia (<http://www.dgif.virginia.gov/hunting/regulations/definitions.asp>, accessed September 2015). We do not intend to initiate a public trapping program at this time. Trapping is considered an economic activity and must meet a higher standard of compatibility than priority wildlife-dependent public recreational uses or other non-commercial uses. We would reconsider our position if future situations arise in which predation, habitat loss, or disease is severe, and if we determine public trapping to be an effective, essential element in managing them. Until that activity is necessary, we would use trapping on a case-by-case basis to help alleviate a particular problem. Trapping may 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.

Cultural Resources Management

All alternatives include the following actions related to cultural resource management.

Protection and Maintenance Recommendations

Continue to comply with Section 106 of the NHPA through consultation with the Regional Historic Preservation Officer (RHPO) and SHPO (SHPO) when new ground-altering activities are proposed and evaluate standing structures more than 50 years old for National Register eligibility before altering.

Discussion and Rationale

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. 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.

We would conduct an evaluation of the potential for our projects to impact archeological and historical resources, and would consult with our RHPO and SHPO as appropriate. This would 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 would ensure we comply with Sections 106 and 110 of the NHPA, regardless of the alternative implemented. That compliance may require a State Historic Preservation Records survey, literature review, and/or field survey. In addition to any surveys and reviews, we would seek to minimize adverse impacts to eligible archaeological sites by limiting public access and through increased monitoring by law enforcement officials.

We also plan to work with the NPS, Tribal representatives, the SHPO, and local historical societies to interpret cultural resources on the refuge and to explain the importance of protection and preservation of those resources.

Outreach and Communications

Continue to consult with federally recognized tribes and communicate actively with state recognized Tribal organizations, and Native American descendant communities to discuss proposed refuge activities and share periodic progress reports on refuge activities.

Discussion and Rationale

Plum Tree Island NWR provides an ideal place to demonstrate to the public how an appreciation of indigenous values regarding stewardship of land and wildlife can enhance public and personal attachment to the Chesapeake Bay. We invited participation in CCP development from 11 federally recognized Indian Tribes (i.e., Absentee Shawnee Tribe of Oklahoma, Catawba Nation, Cherokee Nation of Oklahoma, Delaware Nation of Oklahoma, Delaware Tribe of Indians, Eastern Band of the Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Pamunkey Tribe, Shawnee Tribe, Tuscarora Nation, and United Keetoowah Band of Cherokee Indians in Oklahoma) and 10 unrecognized Indian Tribes represented in Virginia (i.e., Cheroenhaka [Nottoway], Chickahominy, Eastern Chickahominy, Mattaponi, Monocan Nation, Nansemond, Nottoway of Virginia, Pattawomeck, Rappahannock, and Upper Mattaponi (<http://www.ncsl.org/issues-research/tribal/list-of-federal-and-state-recognized-tribes.aspx#s-va>; accessed December 2015). In July 2015,

the Pamunkey Indian Tribe became the first Virginia tribe to win Federal recognition

(<http://www.bia.gov/cs/groups/public/documents/text/idc1-030829.pdf>, accessed December 2015).

Visitor Services Management

Outreach and Communications

Continue to work with partners to promote the protection and preservation of the refuge for the benefit of wildlife through environmental education and interpretation about the natural environment and wildlife of the Chesapeake Bay.

Discussion and Rationale

Developing and maintaining partnerships is key to fulfilling the Service's mission. Refuge staff has established working relationships with a variety of partners to promote wildlife and habitat conservation through environmental education and interpretation. Under all alternatives, we would continue to participate in these partnerships and develop a better understanding of the refuge's and the Service's role in surrounding communities.

EO 13508, "Protection and Restoration of the Chesapeake Bay" (signed May 2009), outlines actions for the Federal government to make progress toward restoring the health of the Chesapeake Bay. A Federal Leadership Committee was created for the Chesapeake Bay and issued a strategic plan in September 2010 that identified specific efforts to undertake. Actions at Plum Tree Island NWR are related to the overall health of the Chesapeake Bay. Of the nine goals in the strategic plan, the refuge is most directly connected to the goals of conserving land, increasing public access, and expanding citizen stewardship.

To the maximum extent practicable, we would continue working with the NPS to promote the Captain John Smith Chesapeake NHT and Chesapeake Bay Gateways and Watertrails Network at Plum Tree Island NWR by enhancing place-based interpretation and fostering conservation and restoration of natural and cultural resources related to the Chesapeake Bay through programming, outreach, and citizen involvement. We would work with the NPS to ensure that Captain John Smith Chesapeake NHT-related activities proposed to occur at the refuge would be conducted in a manner compatible with the purpose and intent of the refuge.

Although Plum Tree Island NWR is not an officially designated urban refuge (per 110 FW 1), we would aspire to meet the Service's "Standards of Excellence" for our visitor opportunities (<http://www.fws.gov/urban/refugePDFs/Urban%20Standards%20of%20Excellence.October2014.pdf>, accessed January 2016). The approach to excellence for urban national wildlife refuges must be as flexible and

unique as the very communities the refuges serve. The Service must strive to understand both the human and natural environments to best address the expectations of the urban community. The Service must provide programs and leadership on conservation initiatives that are relevant to their urban audiences while highlighting the many ecosystem services and aesthetic benefits nature provides. Service staff, volunteers, and partners must proactively engage urban communities to develop meaningful connections to nature that will last a lifetime. This starts by building awareness, fostering deeper understanding, and growing participation through programs that will bring more people from the urban world into the broad conservation community. Among the potential means by which we could more effectively reach urban audiences, we could work with partners with financial resources to offset the cost of commercial tour services to the refuge.

Findings of Appropriateness and Compatibility Determinations

Chapter 1 describes the requirements for findings of appropriateness and compatibility determinations. Uses are evaluated based on whether or not they contribute to meeting refuge purposes, goals, and objectives. Appendix B includes the appropriateness and compatibility determinations consistent with implementing alternative B, the Service-preferred alternative. Some of these uses are already approved, while others are presented here in draft for public review. Our final CCP would include all approved findings of appropriateness and compatibility determinations for the alternative selected. These activities would be evaluated based on whether or not they contribute to meeting refuge purposes, goals, and objectives.

All alternatives include the following actions related to findings of appropriateness and compatibility determinations. See appendix B for additional details.

Activities Allowed

In accordance with approved compatibility determinations, we would continue to:

- Support our existing partnership with the VDGIF to administer a quality public waterfowl hunt.
- Support existing partnerships with other Federal and State agencies to conduct compatible research and investigations on the refuge that help further our knowledge of refuge resources, or that address regional or national conservation concerns of the Service.

Activities Not Allowed

Continue to prohibit certain activities on the refuge that the Refuge Manager determined to be not appropriate.

Discussion and Rationale

We occasionally receive requests for activities that are prohibited on refuges (50 CFR 25–26). Other activities are not allowed because the Refuge Manager has determined that the activities are not appropriate on the refuge. Appendix B documents the Refuge Manager’s justification for why they are deemed not appropriate.

All other uses not explicitly allowed or not allowed that require a SUP would be evaluated on a case-by-case basis by the Refuge Manager for appropriateness and compatibility (50 CFR 26, 603 FW 2).

Refuge Revenue Sharing Payments

Continue to issue annual refuge revenue sharing payments to the City of Poquoson in accordance with law and annual Congressional appropriations.

Discussion and Rationale

National wildlife refuges contribute to local economies through shared revenue payments. Federally owned lands are not taxable; however, under the provisions of the Refuge Revenue Sharing Act (16 U.S.C. 715s), the municipality or other local unit of government receives an annual refuge revenue sharing payment to offset the loss of property taxes that would have been collected if the land had remained in private ownership. In addition, federally owned land requires few services from municipalities, yet it provides valuable recreational opportunities for local residents. As we describe in chapter 2, we pay annual refuge revenue sharing payments based on the acreage and the appraised value of refuge lands. The annual payments are calculated by formula determined by, and with funds appropriated by, Congress. Under all alternatives, 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.

Special Designation Areas

All alternatives include the following actions related to special designation areas.

Federally Designated Special Status Areas (e.g., Wilderness Areas, Wild and Scenic Rivers)

Continue to conduct reviews every 15 years as required by Service policies (602 FW 1 and 3, and 610 FW 4).

Discussion and Rationale

A wilderness review is the process we follow to identify and recommend for congressional designation Refuge System lands and waters that merit inclusion in the NWPS. Wilderness reviews are a required element of CCPs, and we follow the planning process outlined in 602 FW 1 and 3.

The wilderness review process has three phases:

- **Inventory**—We identify lands and waters that meet the minimum criteria for wilderness. These areas are called wilderness study areas.
- **Study**—We evaluate wilderness study areas to determine if they are suitable for wilderness designation.
- **Recommendation**—We use the findings of the study to determine if we would recommend the area for designation as wilderness in the final CCP. We report our wilderness recommendations from the Director through the Secretary of the Interior and the President, to Congress, in a wilderness study report.

We conducted phase 1, the inventory, for Plum Tree Island NWR and determined that it does not meet all the minimum criteria for wilderness. Size, naturalness, solitude or primitive and unconfined recreation, and supplemental values are the minimum criteria established in the Wilderness Act. We found that the refuge did not meet two of these four criteria. Our wilderness review results are included as appendix E.

In addition, no designated Wild and Scenic Rivers are currently within our jurisdiction. Going forward under either alternative, we would take care to avoid or mitigate adverse effects on the river resources and values associated with its eligibility for Wild and Scenic River designation, and coordinate with other agencies in the event that they initiate Wild and Scenic River designation within the life of the plan.

Other Special Area Designations

Continue to protect and maintain the characteristics on refuge lands that contributed to the area's special designation as a Marine Protected Area and the Western Shore Marshes IBA, as well as its contribution to other State natural resource area designations.

Discussion and Rationale

In chapter 2, we describe the various special area designations that include the refuge. Most relate to significant natural resources in the region, and the unique opportunities the area affords to protect and interpret these resources. Our existing and proposed activities on the refuge would be consistent with, or not detract from, those special area designations.

Additional NEPA Analysis

This draft CCP and EA was developed with sufficient detail to account for the greatest potential impacts that could result from future step-down planning efforts. However, if we determine that our analysis of potential impacts on the human and natural environments are found to be inadequate during subsequent planning (e.g., refuge step-down

plans), additional NEPA review and NHPA compliance may be required prior to implementing those plans, actions, or activities (40 CFR 1508.28).

Although we analyze the impacts of the management alternatives we have developed in this draft CCP and EA, additional NEPA analysis would be necessary for certain types of actions, even once we adopt a final CCP. Where decisions have not been made in this CCP, but must be made later, we analyze the impacts of the possible range of alternatives in this document, but may need to supplement this analysis later.

Examples of proposed actions that may require further analysis include:

- Improving or removing any existing facilities and construction of new facilities, including new waterfowl hunt blinds and visitor support facilities.
- Expanding the existing hunt program and adding new hunting opportunities for adults and youth.
- Removing nuisance wildlife through public hunting or trapping permits, if deemed necessary.



Clarke Dirks/USFWS

Youth hunter with retrieval dog

3.4 Alternative A. Current Management (No Action Alternative)

Alternative A satisfies the NEPA requirement of a “no action” alternative, which we define as continuing current management. It presents current and approved management plan activities; describes projects funded or underway; and serves as a baseline for comparing and contrasting alternative B.

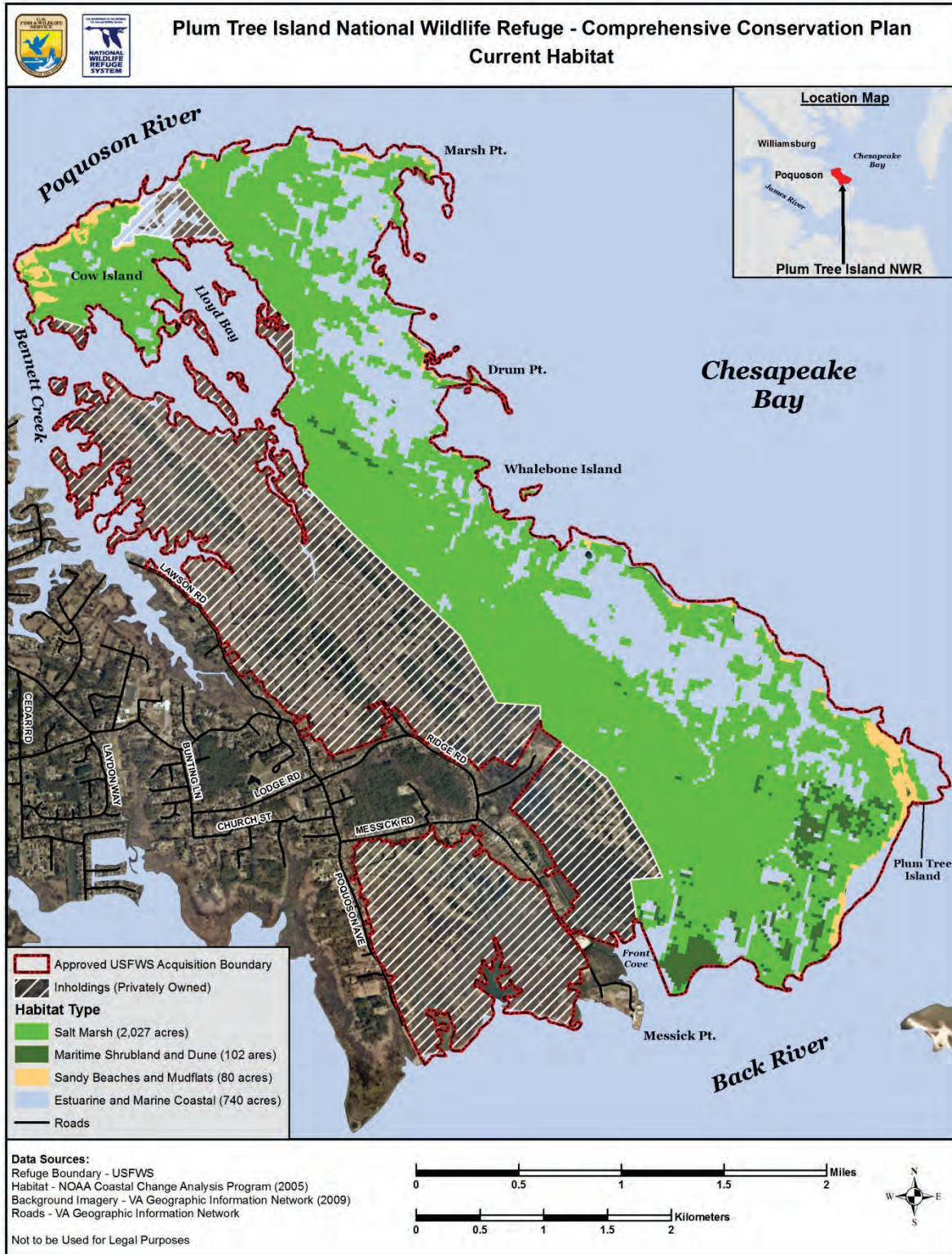
Since refuge establishment in 1972, we have administered Plum Tree Island NWR in line with the following four broad goals of the Refuge System (USFWS 1982):

- To preserve, restore, and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered.
- To perpetuate the migratory bird resource.
- To preserve a natural diversity and abundance of fauna and flora on refuge lands.
- To provide an understanding and appreciation of fish and wildlife ecology and man's role in his environment, and to provide refuge visitors with high quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife to the extent these are compatible with the purposes for which the refuge was established.

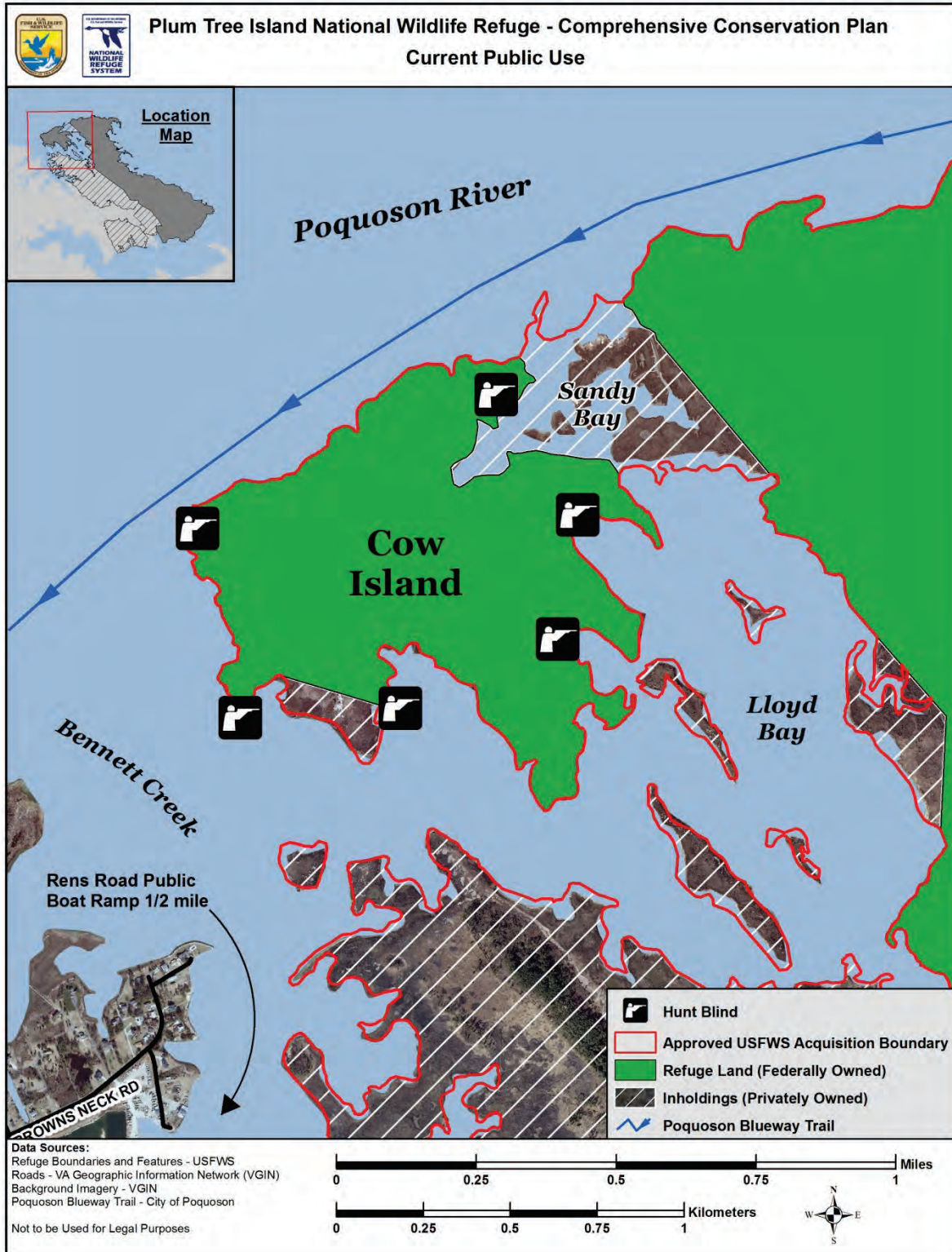
In addition to the actions detailed in section 3.3 as common to all alternatives, we would continue to conduct the following activities under alternative A.

We would continue to protect the refuge’s wildlife habitats by allowing natural processes to occur unimpeded (map 3.1). Our refuge management efforts would continue to focus on minimizing human-caused disturbance of refuge habitats and wildlife, conducting annual northeastern beach tiger beetle surveys, performing visual surveys of shoreline changes, and administering the waterfowl hunt while on the refuge (map 3.2). While off the refuge, our staff would continue to focus on interagency coordination to assess and evaluate hazards posed by the former bombing range. Refuge staff has also participated in community programs and events to promote understanding and appreciation for the purpose of the refuge and the mission of the Service. The refuge’s limited waterfowl hunt on Cow Island would continue to be the only public use permitted on the refuge.

Map 3.1 Alternative A: Current Habitat Management at Plum Tree Island NWR



Map 3.2 Alternative A: Current Public Use Facilities at Plum Tree Island NWR



GOAL 1

WILDLIFE AND HABITATS

Conserve the coastal estuarine ecosystem to sustain high ecological integrity for the benefit of native flora and fauna, with emphasis on priority refuge resources of concern, within the lower Chesapeake Bay.

Objective 1.1

Salt Marsh

Over the life of the plan, allow natural processes to act unimpeded on 2,027 acres of salt marsh habitat.

Discussion and Rationale

Tidal marsh ecosystems form the interface between the ocean and the land, playing a vital role in marine and terrestrial ecological processes (Bertness 1999). Salt marshes are unique and productive ecosystems with high intrinsic value as habitat for breeding and migrating wildlife, fishery nursery areas, and sources of food for near-shore finfish and shellfish populations. Salt marshes provide ecosystem services by filtering sediments, nutrients, and other pollutants from upland drainages and buffering shorelines from flood and storm damage. Harsh conditions including naturally extreme hydrology, salinity, soil conditions, and the narrow linear nature of salt marshes mean that few species are truly restricted to salt marsh habitats. In spite of these conditions, North American tidal salt marshes boast a high proportion of endemic taxa and are one of the most productive ecosystems in the world (Greenberg and Maldonado 2006).

Organisms in the lower levels of the marsh food chain are sensitive to changes in sediment and pollution loads. Adverse impacts on these lower level organisms cascade up through all levels of the marsh food chain. Hundreds of species depend on a healthy marsh or estuarine system at some point in their life cycle, many of which are important in commercial and recreational enterprises. These include fish (such as striped bass, Atlantic menhaden, and anchovy), waterfowl (such as black duck, mallard, and Canada goose), and shellfish (such as oyster, clams, and blue crab).

Public law directs the Secretary of the Interior to ensure the biological integrity, diversity, and environmental health of the Refuge System for the benefit of present and future generations of Americans (Public Law 105-57). Salt marshes and adjacent uplands are valuable as breeding, resting, and feeding habitats for migratory birds, and as producers of detritus, which forms the basis of a major marine food web. Refuges like Plum Tree Island NWR have been established in coastal areas to protect large tracts of salt marsh and wetland-dependent species. Unfortunately, minimal pristine salt marsh habitat remains and local, regional, and global changes to the environment have led to a disproportionately high number of salt marsh endemic species becoming conservation priorities (Pashley et al. 2000, Greenberg and Maldonado 2006).

Watts (1992) states, “Marsh area is a good indicator of bird species richness for salt marshes of the Chesapeake Bay.” That is, larger marshes usually contain a greater diversity of bird species. In addition, he found that the presence of tide pools causes an increase in bird use of marshes. Marshes within the refuge’s approved acquisition boundary exhibit many of the characteristics important to breeding and foraging birds and is the largest contiguous marsh in the lower Chesapeake Bay.

The presence of invasive species like phragmites degrades this valuable habitat by creating a monoculture of dense stems and roots. Phragmites not only pushes out native plant species, but can also alter the hydrology and increase fire potential (Swearingen et al. 2010). This plant reduces feeding sites for invertebrates, fish, and waterbirds by eliminating small intertidal channels and pool habitats on which these species rely (USFWS 2007d). In New York and in Delaware, phragmites has formed dense vegetative mats above and below the surface, which reduces the availability of suitable nesting areas for terrapin females (Simoes and Chambers 1999, Delaware Wild Lands 2014). Currently, we have fewer than 20 acres of phragmites located on the refuge. However, refuge staff has not attempted to control phragmites infestations due to the safety concerns associated with the PTI Range, as well as limited staff time and resources to use a combination of mechanical removal and herbicide application.

Strategies

Continue to:

- Limit human-caused disturbance.

Inventory and Monitoring Activities

None.

Objective 1.2

Maritime Shrubland and Dune

Over the life of the plan, allow natural processes to act unimpeded on 102 acres of maritime shrubland and dune habitat.

Discussion and Rationale

Plum Tree Island NWR has 102 acres of maritime shrubland and dune habitat within its boundaries. This strip of dune and shrub habitat protects the salt marsh from erosion and inundation. Parts of this habitat also exist on the western border of the refuge as upland islands containing shrubs and pine trees. These areas were once more extensive but have been reduced through frequent salt spray and subsidence.

Coastal habitats are dynamic and interconnected. Activities that would affect the stability of the upland island habitats should be avoided because they would affect the integrity of the entire system (Mason 2009). Protecting vegetation on these dunes is also vital to protecting

the stability of the dune structure.

Strategies

Continue to:

- Limit human-caused disturbance.

Inventory and Monitoring Activities

None.

Objective 1.3

Sandy Beaches and Mudflats

Over the life of the plan, allow natural processes to act unimpeded on 80 acres of sandy beaches and mudflats habitat.

Discussion and Rationale

Plum Tree Island NWR has 80 acres of sandy beach and mudflat habitat. This habitat serves as the intermediate strip between the refuge dunes and the surrounding waters. The beaches of Plum Tree Island NWR are categorized as either impermeable beaches or marsh barriers beaches. These beach types have a layer of sand over Holocene sediments having a high clay content or salt marsh peat. These two types of sediments are most susceptible to erosion and subsidence respectively (Hardaway et al. 2001).

Wind and wave action creates and removes acres of beach and mudflat habitat over time; flora and fauna in these coastal habitats have adapted to the natural processes of overwash, salt spray, and adjusting coastlines. Refuge staff conducts visual surveys of the shoreline by boat to assess coastline changes, document wildlife and habitat conditions, and report any occurrences of UXO to the USACE.

The sandy beach and mudflat habitat is breeding and foraging habitat for the threatened northeastern beach tiger beetle at Plum Tree Island NWR (USFWS 1994). Adults emerge on the beaches in mid-June and forage along the intertidal zone. In July and August, this population breeds, with peak population numbers found in mid-July. Though once found on beaches throughout the Chesapeake Bay, there are few remaining natural beaches where this beetle thrives. The northeastern beach tiger beetle prefers wide beaches with a gradual slope and is very susceptible to activity in the intertidal zone. Beetles occurring at the nearby Grandview Beach in Hampton, Virginia, are part of the same population as the beetles at the refuge; however, beetle habitat at Grandview Beach has experienced drastic changes with human use and beach re-nourishment projects (Waterway Surveys & Engineering, Ltd. et al. 2011).

In addition to the northeastern beach tiger beetle, these changing coastlines provide an invaluable source of invertebrates to breeding and migrating shorebirds. Breeding black skimmers and oystercatchers have been documented foraging in these habitats, as

well as common and least tern, semipalmated sandpipers, and short-billed dowitchers. The intertidal zone where these birds feed is also the area of highest human activity on beaches (Meager et al. 2012). Because the refuge's sandy beach and mudflat habitats are closed to public use, these 80 acres provide a place where shorebirds can feed without human-caused disturbance.

Strategies

Continue to:

- Limit human-caused disturbance.

Inventory and Monitoring Activities

Continue to:

- Conduct informal visual survey for nesting birds.
- Conduct annual survey for northeastern beach tiger beetle on- and off-refuge.
- Conduct qualitative and quantitative shoreline erosion visual survey by boat and report presence of exposed UXO to USACE as needed.

GOAL 2

WILDLIFE-DEPENDENT RECREATION

Provide safe and compatible wildlife-dependent recreational opportunities for visitors to connect with nature and foster enhanced stewardship of the lower Chesapeake Bay and the Refuge System.

Objective 2.1

Waterfowl Hunting

Over the life of the plan, accommodate public waterfowl hunting opportunities on the refuge for up to 540 hunter use days annually during the last two segments of the waterfowl hunting season.

Discussion and Rationale

Hunting is one of the six priority public uses as outlined in the Improvement Act. The Service strives to provide hunting opportunities that are not available on other public or private lands and to provide participants with reasonable harvest opportunities, uncrowded conditions, few conflicts among hunters, relatively undisturbed wildlife, and limited interference from, or dependence on, mechanized aspects of the sport (USFWS 1986). When managed responsibly, hunting can instill a unique appreciation of wildlife, their behavior, and their habitat needs. Service policy also states that, where practicable, we should make our hunt regulations consistent with State regulations. Because the original portion of the refuge was used as a bombing range and posed safety risks to refuge staff and refuge visitors, the refuge did not open to any public uses when first established.

In 1993, the Service proposed to expand the refuge's boundary to preserve important habitat for migratory bird species and "to provide

for public enjoyment of the area's resources, through providing wildlife-oriented recreational opportunities, that do not materially detract from the purposes of the refuge” (USFWS 1993). An additional 2,119 acres adjacent to the existing refuge and beyond the limits of the former bombing range were identified as suitable lands for potential acquisition in the event willing sellers made them available and the Service has funding available to purchase them. Public comments on the proposed boundary expansion centered on one major theme-maintenance of hunting and fishing access to the area included within the proposed expansion boundary. In October 1993, the refuge’s boundary expansion plan was approved. One 5-acre parcel was acquired in 1996, and the 211-acre parcel known as Cow Island was acquired in 1997. No other lands have been acquired since 1997.

In July 1998, the refuge proposed to open specific areas for waterfowl hunting opportunities for two primary reasons: to provide for the wise use of a renewable natural resource, and to provide a high quality hunting experience. At that time, only Cow Island was proposed to be opened for hunting, and other tracts would be evaluated for inclusion in the hunting program as they are obtained. Cow Island is currently the only area on the refuge open to waterfowl hunting, with a refuge-issued permit. The refuge’s waterfowl hunting plan was approved on July 26, 1999, and designated areas within the refuge were announced as open to waterfowl hunting on August 11, 1999, for the 1999 to 2000 season (64 FR 43834; codified at 50 CFR 32.67). Since then, refuge-specific regulations for waterfowl hunting at Plum Tree Island NWR have been updated annually. Refuge-specific regulations take precedence where they are more restrictive than the State regulations.

Based on our experience administering the waterfowl hunt on Cow Island from 2003 through 2006, we determined that some minor changes were necessary to ensure that we would meet the original goals of offering safe, high-quality hunting opportunities while also providing resting and feeding opportunities for wintering waterfowl. The minor changes were aimed at reducing the potential for over-shooting or seasonally chasing waterfowl and other wildlife from the relatively small hunt site and to increase the potential for harvest success and species diversity (USFWS 2007b). We determine if our waterfowl hunt is meeting its goal of providing the public with a quality hunt program by distributing the Service’s Migratory Bird Hunt Report (FWS Form 3–2361) to participants and analyzing their voluntary responses.

Strategies

Continue to:

- Administer waterfowl hunt on the refuge in accordance with the approved waterfowl hunt plan (2007b) by:

- ❖ Allowing up to three persons and one retrieval dog per hunting party at each of the six designated locations on Cow Island.
- ❖ Offering waterfowl hunting on up to 30 calendar days per year.

Inventory and Monitoring Activities

- Occasionally distribute the Service's Migratory Bird Hunt Report (FWS Form 3-2361) to hunt participants and analyze responses.

Objective 2.2

Wildlife Observation, Photography, Environmental Education, and Interpretation—On Refuge

Over the life of the plan, the refuge remains closed to wildlife observation, photography, environmental education, and interpretation.

Discussion and Rationale

The refuge would remain closed to wildlife observation, photography, environmental education, and interpretation because the refuge has not previously been opened to these uses. All national wildlife refuges remain closed to specific public uses until those uses are determined to be appropriate and compatible with the refuge purpose (50 CFR 26.31).

Strategies

None.

Inventory and Monitoring Activities

None.



Daniel Lay/USFWS Intern

No trespassing sign on the refuge

Objective 2.3

Wildlife Observation, Photography, Environmental Education, and Interpretation—Off Refuge

Over the life of the plan, provide wildlife observation, photography, environmental education, and interpretation opportunities to visitors on a by-request, case-by-case basis, off refuge only.

Discussion and Rationale

Refuge staff has explored opportunities to participate in local programs and events held off-refuge that emphasize wildlife observation, photography, environmental education, and interpretation. Our involvement in up to two community programs and events annually allows us to foster a connection between visitors and natural resources, as well as discuss the refuge’s purposes, physical attributes, ecosystem dynamics, conservation strategies, and the Refuge System mission. We would tailor messages and delivery methods to specific audiences and present them in appropriate locations. Through heightened awareness, we aim to inspire support for refuge goals and the Refuge System mission.

Effective outreach depends on open and continuing communication and collaboration between the refuge and its many publics. Effective outreach involves determining and understanding the issues, identifying audiences, listening to stakeholders, crafting messages, selecting the most effective delivery techniques, and evaluating effectiveness.

Strategies

Continue to:

- Opportunistically offer up to two environmental education or interpretation programs off refuge annually.

Inventory and Monitoring Activities

None.

GOAL 3

PARTNERSHIPS

Cultivate partnerships to further conservation, education, and interpretation of the refuge’s natural and cultural resources, as well as the mission of the Refuge System.

Objective 3.1

Partnerships for Refuge Wildlife and Habitat Research

Over the life of the plan, continue to maintain our collaborative relationships with Federal, State, and local governmental agencies to fulfill mutual goals.

Discussion and Rationale

By sharing expertise and other resources with many agencies, we have developed strong partnerships for wildlife and habitat research at the refuge. We collaborate with the CCB and VDGIF to conduct a variety of wildlife surveys and research, acquiring new information

about wildlife use of the refuge that is comparable to data for other nearby survey areas. Most recently, we have coordinated with the USACE and their agents (e.g., Shaw Environmental, Inc.) to inform selection of appropriate remedial actions to reduce hazards to human and ecological health resulting from the site's former use as a bombing range. In addition, we look forward to collaborating with the Service's Virginia Fisheries Coordinator Office and other programs. We would continue these partnerships to support the refuge purposes, fulfill refuge goals, and meet management objectives for wildlife and habitat.

Strategies

Continue to:

- Coordinate with other Federal, State, and local government agencies, and private research organizations regarding research conducted on or around the refuge.

Objective 3.2

Partnerships for Public Uses

Over the life of the plan, continue to maintain our collaborative relationships with Federal, State, and local governmental agencies to fulfill mutual goals.

Discussion and Rationale

We work closely with many agencies on special projects related to public use by sharing expertise and other resources. Our partnership with the VDGIF facilitates administration of a quality waterfowl hunt on Cow Island. We also work closely with the USACE, USCG, VDEQ, VMRC, and Virginia Marine Police regarding public awareness about the PTI Range FUDS hazards and enforcement trespassing regulations for the protection of public safety and refuge resources. We would continue to support the City of Poquoson's promotion of safe and enjoyable public use activities around the refuge. We would continue to coordinate with the City on its recently established Blueway for kayakers and canoers. We would continue these partnerships to support the refuge purposes, fulfill refuge goals, and meet management objectives for appropriate and compatible use of the refuge.

Strategies

Continue to:

- Protect public safety by enforcing refuge regulations.
- Coordinate with other Federal, State, and local law enforcement agencies regarding public uses on and around the refuge.

3.5 Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)

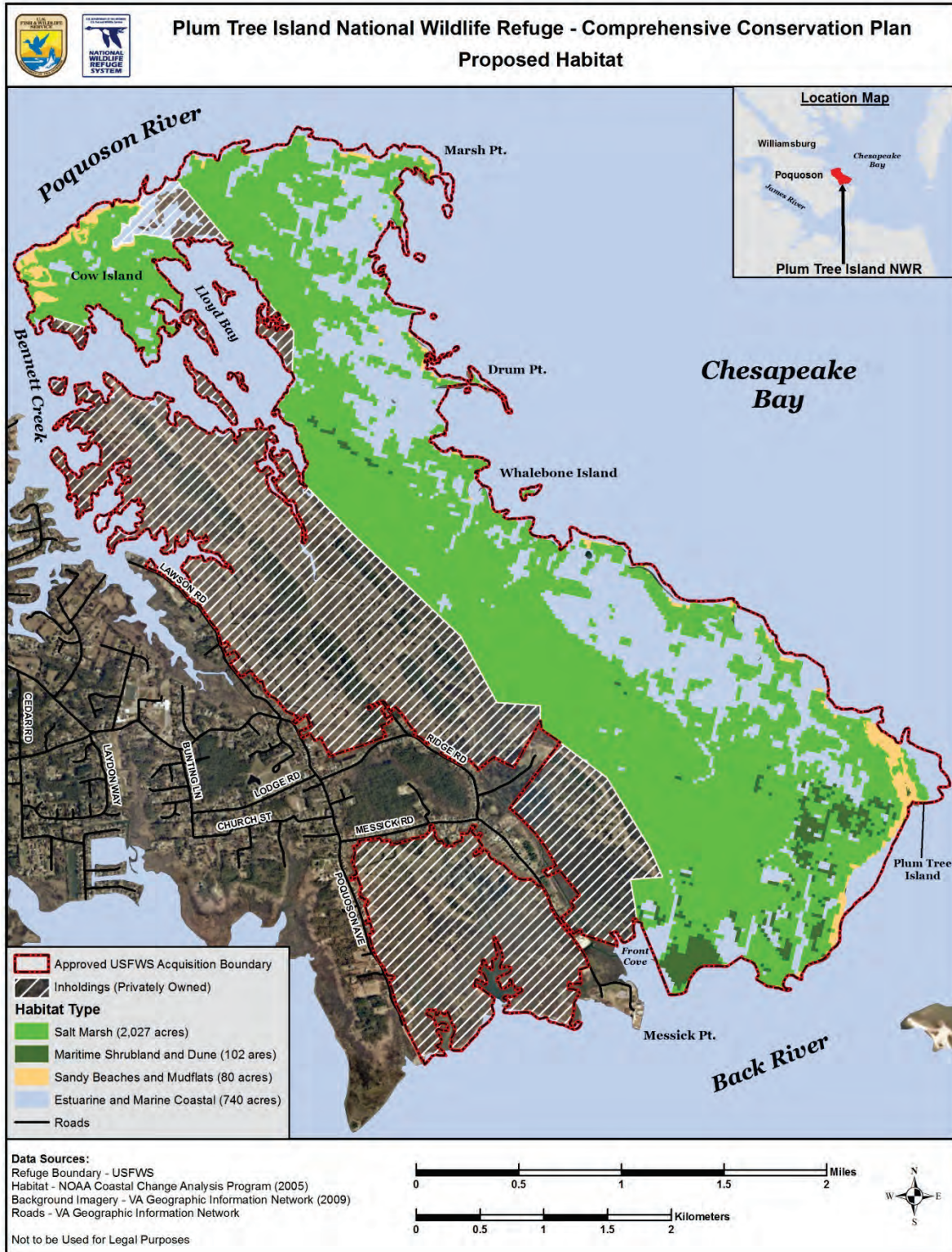
In addition to the actions detailed in section 3.3 as common to all alternatives, the following describes what other activities would occur under alternative B. Map 3.2 depicts the habitat configuration that would result under alternative B management.

Over the life of the plan, we would continue to protect the refuge's wildlife habitats by allowing natural processes to occur unimpeded (map 3.3). Our refuge management efforts would continue to focus on minimizing human-caused disturbance of refuge habitats and wildlife, while working with a greater diversity of partners to conduct biological research, inventory, and monitoring efforts. We are primarily interested in learning more about the presence, absence, and populations of priority wildlife species, as well as the monitoring of habitat conditions over the life of the plan. Collecting this information would serve as the basis for future refuge management actions in the next CCP.

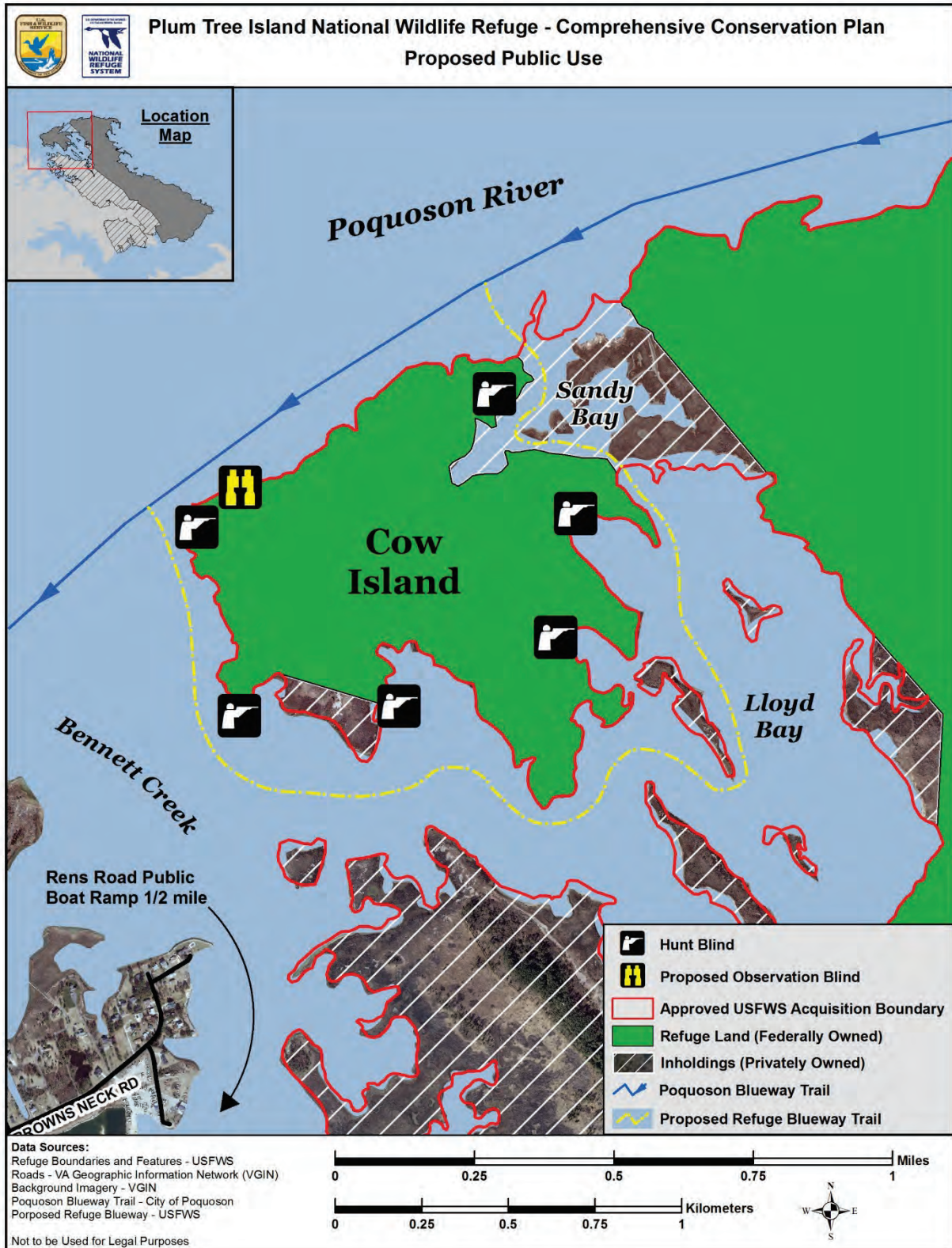
We would continue to offer waterfowl hunting opportunities on Cow Island (map 3.4). We would investigate up to five new locations for waterfowl hunt blinds on the northern end of the refuge if resource and conditions allow.

Within 5 years of CCP approval, we would open the refuge to recreational and commercial wildlife observation, photography, environmental education, and interpretation at one designated location on Cow Island from early February through late October. Specifically, we would designate a landing area on Cow Island for kayaks and canoes and provide access to a viewing platform at the waterfowl hunt blind #2 location. Visitors could land both motorized and non-motorized boats to view, photograph, and learn about wildlife at this newly designated public area. We would work closely with commercial guide services and the City of Poquoson regarding public use of this designated location for wildlife observation, photography, environmental education, and interpretation on Cow Island.

Map 3.3 Alternative B: Proposed Habitat Management at Plum Tree Island NWR



Map 3.4 Alternative B: Proposed Public Use Facilities at Plum Tree Island NWR



GOAL 1

WILDLIFE AND HABITATS

Conserve the coastal estuarine ecosystem to sustain high ecological integrity for the benefit of native flora and fauna, with emphasis on priority refuge resources of concern, within the lower Chesapeake Bay.

Objective 1.1

Salt Marsh

Over the life of the plan, manage and prevent the degradation of the refuge's 2,027 acres of salt marsh to include a mix of high and low salt marsh vegetation, pool, mudflat, and panne habitat that:

- is eradicated of invasive plants,
- is of high ecological integrity as measured by the Salt Marsh Integrity Index, and
- sustains populations of breeding clapper rail and saltmarsh sparrow, as well as migrating and wintering American black ducks and shorebirds.

Discussion and Rationale

Tidal marsh ecosystems form the interface between the ocean and the land, playing a vital role in marine and terrestrial ecological processes (Bertness 1999). Salt marshes are unique and productive ecosystems with high intrinsic value as habitat for breeding and migrating wildlife, fishery nursery areas, and sources of food for near-shore finfish and shellfish populations. Salt marshes provide ecosystem services by filtering sediments, nutrients, and other pollutants from upland drainages and buffering shorelines from flood and storm damage. Harsh conditions including naturally extreme hydrology, salinity, soil conditions, and the narrow linear nature of salt marshes mean that few species are truly restricted to salt marsh habitats. In spite of these conditions, North American tidal salt marshes boast a high proportion of endemic taxa and are one of the most productive ecosystems in the world (Greenberg and Maldonado 2006).

Organisms in the lower levels of the marsh food chain are sensitive to changes in sediment and pollution loads. Adverse impacts on these lower level organisms cascade up through all levels of the marsh food chain. Hundreds of species depend on a healthy marsh or estuarine system at some point in their life cycle, many of which are important in commercial and recreational enterprises. These include fish (such as striped bass, Atlantic menhaden, and anchovy), waterfowl (such as black duck, mallard, and Canada goose), and shellfish (such as oyster, clams, and blue crab).

Public law directs the Secretary of the Interior to ensure the biological integrity, diversity, and environmental health of the Refuge System for the benefit of present and future generations of Americans (Public Law 105-57). Salt marshes and adjacent uplands are most valuable as

breeding, resting, and feeding habitats for migratory birds, and as producers of detritus, which forms the basis of a major marine food web. Refuges like Plum Tree Island NWR have been established in coastal areas to protect large tracts of salt marsh and wetland-dependent species. Unfortunately, minimal pristine salt marsh habitat remains, and local, regional, and global changes to the environment have led to a disproportionately high number of salt marsh endemic species becoming conservation priorities (Pashley et al. 2000, Greenberg and Maldonado 2006).

Watts (1992) states, “Marsh area is a good indicator of bird species richness for salt marshes of the Chesapeake Bay.” That is, larger marshes usually contain a greater diversity of bird species. In addition, he found that the presence of tide pools caused an increase in bird use of marshes. Marshes within the refuge’s approved acquisition boundary exhibit many of the characteristics important to breeding and foraging birds and is the largest contiguous marsh in the lower Chesapeake Bay.

The presence of invasive species like phragmites degrades this valuable habitat by creating a monoculture of dense stems and roots. Phragmites not only pushes out native plant species, but can also alter the hydrology and increase fire potential (Swearingen et al. 2010). This plant reduces feeding sites for invertebrates, fish, and waterbirds by eliminating small intertidal channels and pool habitats on which these species rely (USFWS 2007d). In New York and in Delaware, phragmites has formed dense vegetative mats above and below the surface that reduces the availability of suitable nesting areas for terrapin females (Simoes and Chambers 1999, Delaware Wild Lands 2014). Currently, we have fewer than 20 acres of phragmites located on the refuge. Under this alternative, we would conduct early detection and treatment of invasive species to prevent degradation of high quality habitats.

Coastal ecosystems are also threatened by accelerated rates of sea level rise caused by global climate change (Titus and Richman 2001). Coastal ecosystems are also subject to impacts from storm events, salinity changes, and nutrient runoffs that can change the composition, structure, and productivity of these habitats. Therefore, a variety of management practices are routinely applied to salt marshes on national wildlife refuges in an effort to restore and enhance ecological integrity and ensure marsh sustainability. Common management approaches include invasive species eradication, erosion abatement, and contaminant remediation.

To understand the impact of the threats listed above and those that any potential responsive management practices could have on salt marsh integrity, the refuge must implement an effective monitoring system. The purpose of the Service’s Salt Marsh Integrity Index is to

identify measurable salt marsh attributes that are useful for characterizing system status (Neckles et al. 2013). At coastal refuges along the North Atlantic Ocean, Service employees are assessing salt marsh integrity by measuring vegetation, water level and elevation, salinity, net sampling of invertebrates, and breeding birds including saltmarsh sparrows. This information will be used to inform management decisions (Neckles et al. 2013).

In addition to monitoring the habitat, it is also important to monitor priority species that rely on these habitats, such as American black duck, rail, and saltmarsh sparrow.

- American black duck populations have declined by as much as 60 percent on wintering grounds and continue to be a species of management concern (Whitman and Meredith 1987, Link et al. 2006, Plattner et al. 2010). Loss of wintering habitat acreage and quality is one of several possible explanations for this decline (Morton et al. 1989). The black duck uses inland freshwater, tidal freshwater, and tidal brackish marshes throughout the Chesapeake Bay region. The Chesapeake Bay is one of the nation's regions most susceptible to sea level rise, and shoreline development poses significant threats to black duck habitat availability (Glick et al. 2009, Serie 2002). For these reasons, the black duck is listed as an indicator species for the overall health of the Chesapeake Bay in the 2011 Action Plan for the EO on the Chesapeake Bay Protection and Restoration (Federal Leadership Committee 2010).
- The vast saltmarsh habitats within BCR 30 support the regional stronghold of rails and saltmarsh sparrows (Dettmers and Rosenberg 2000). Both of these species are high priority within BCR 30 (ACJV 2008). One of the highest research priorities for BCR 30 is to determine the abundance of breeding birds during breeding and non-breeding periods to inform the development of models that predict abundance and productivity as a function of tidal marsh or tidal flat manipulations (ACJV 2008).



Peter McGowan/USFWS

American black ducks

Strategies

Continue to:

- Limit human-caused disturbance.

Throughout the life of the plan:

- Use a combination of mechanical removal and herbicide application to treat infestations of phragmites.

Inventory and Monitoring Activities

Throughout the life of the plan:

- Monitor known invasive plant infestations and conduct surveys for new invasive plant and animal species.
- Assess invasive species control success rates.
- Initiate the Salt Marsh Integrity Index, which includes habitat monitoring along with breeding bird species counts including saltmarsh sparrow and net sampling of invertebrates and fish species.

Within 5 years of CCP approval:

- Conduct quantitative shoreline surveys.
- Determine and implement best possible monitoring techniques for migrating and wintering black duck populations and their habitat needs.
- Monitor breeding and migratory waterbird populations.
- Monitor breeding and migratory shorebird populations.

Objective 1.2

Maritime Shrubland and Dune

Over the life of the plan, protect 102 acres of maritime shrubland and dune habitat to ensure the integrity of the adjacent salt marsh and to maintain or increase northern diamondback terrapin nests by providing open sandy areas above the high tide line for nesting.

Discussion and Rationale

Plum Tree Island NWR has 102 acres of maritime shrubland and dune habitat within its boundary. This strip of dune and shrub habitat protects the 2,027 acres of salt marsh from erosion and inundation. Parts of this habitat also exist on the western border of the refuge as upland islands containing shrubs and pine trees. These areas were once more extensive but have been reduced through frequent salt spray and subsidence.

Coastal habitats are dynamic and interconnected. Activities that would affect the stability of the upland island habitats should be avoided because they would affect the integrity of the entire system (Mason 2009). Protecting native vegetation on these dunes is also vital to

protecting the stability of the dune structure. This dune structure protects the salt marsh behind it from erosion and storm events that would otherwise destroy this important habitat type (Mitsch and Gosselink 2000).

Protection of the limited dune habitat on Plum Tree Island NWR is vital to breeding northern diamondback terrapins. The northern diamondback terrapin, listed as a species of very high conservation need in the Virginia WAP (<http://bewildvirginia.org/wildlifeplan>; accessed December 2013), is an important species in coastal habitats throughout the northeastern U.S. (USFWS 2009a). Though much of its life cycle is spent in the salt marsh habitat, females lay eggs in sandy areas above the high tide level in May. Their nests have been documented primarily in flat sections of high dune areas (Palmer and Cordes 1988). By monitoring diamondback terrapin nests, we would better understand species population trends, as well as the quality of the dune habitat on the refuge. Developing that background knowledge would allow us to identify threats to nesting success and take action to prevent future impacts on the overall nesting population.

The presence of invasive species like phragmites degrades this valuable habitat by creating a monoculture of dense stems and roots. In New York and in Delaware, phragmites has formed dense vegetative mats above and below the surface that reduces the availability of suitable nesting areas for terrapin females (Simoes and Chambers 1999, Delaware Wild Lands 2014). Currently, we have fewer than 20 acres of phragmites located on the refuge. Early detection and treatment of invasive species, like phragmites, would prevent this species from degrading the dune habitat.

Strategies

Continue to:

- Limit human-caused disturbance, especially during terrapin nesting season (May).

Within 5 years of CCP approval:

- Use a combination of mechanical removal and herbicide application to treat infestations of phragmites.

Inventory and Monitoring Activities

Within 5 years of CCP approval:

- Monitor diamondback nesting population and any threats on nesting success.
- Monitor known invasive plant infestations and conduct surveys for new invasive plant and animal species.
- Assess invasive species control success rates.

Objective 1.3

Sandy Beaches and Mudflats

Over the life of the plan, protect 80 acres of sandy beaches and mudflats from human-caused disturbance and degradation to maintain an essential population of northeastern beach tiger beetles (average annual peak count of at least 300 adults), to maintain or increase the number of nesting black skimmers, and to provide foraging habitat for migrating shorebirds.

Discussion and Rationale

Plum Tree Island NWR has 80 acres of sandy beach and mudflat habitat. This habitat serves as the intermediate strip between the refuge dunes and the Chesapeake Bay. The beaches of Plum Tree Island NWR are categorized as either impermeable beaches or marsh barriers beaches. These beach types have a layer of sand over Holocene sediments having a high clay content or salt marsh peat. These two types of sediments are most susceptible to erosion and subsidence respectively (Hardaway et al. 2001).

Wind and wave action creates and removes acres of beach and mudflat habitat over time; flora and fauna in these coastal habitats have adapted to the natural processes of overwash, salt spray, and adjusting coastlines. Shoreline stabilization methods often reduce wildlife habitat quality.

The sandy beach and mudflat habitat is breeding and foraging habitat for the threatened northeastern beach tiger beetle at Plum Tree Island NWR (USFWS 1994). Though once found on beaches throughout the Chesapeake Bay, there are few remaining natural beaches where this beetle thrives. As one of the remaining populations, it is important to monitor population numbers to trigger evaluation if significant population decline is discovered. Monitoring northeastern beach tiger beetle use of the habitats at Plum Tree Island NWR will also help to inform management in other populations.

These coastlines provide an invaluable source of invertebrates to our breeding and migrating shorebirds. Breeding black skimmers and oystercatchers have been documented foraging in these habitats, as well as common and least tern, semipalmated sandpipers, and short-billed dowitchers. Significant population declines have occurred in



Jarek Tuszyński

Nesting black skimmers

black skimmer and common tern populations, as well as eight other seabird species, due to habitat change and loss due to sea level rise, increased mammalian predation, competition for colony sites, development, and changes in fish populations (Brinker et al. 2007). The intertidal zone where these birds feed is also the area of highest human activity on public beaches (Meager et al. 2012). Because the majority of the refuge's sandy beach and mudflat habitats are closed to public use, these 80 acres provide a place where shorebirds can feed without human-caused disturbance. Recording and monitoring baseline nesting populations of black skimmers would allow refuge biologists to evaluate populations and further investigate significant population declines.

Strategies

Continue to:

- Limit human-caused disturbance.

Inventory and Monitoring Activities

Continue to:

- Conduct annual population surveys to estimate the northeastern beach tiger beetle population.
- Work with the northeastern beach tiger beetle recovery team to develop population research studies and make recommendations about habitat management.

Within 5 years of CCP approval:

- Regularly conduct quantitative shoreline surveys to assess accretion and erosion (measuring acreage and shoreline changes).
- Implement monitoring of migrating and nesting shorebirds.
- Monitor black skimmer nesting population.

GOAL 2

WILDLIFE-DEPENDENT RECREATION

Provide safe and compatible wildlife-dependent recreational opportunities for visitors to connect with nature and foster enhanced stewardship of the lower Chesapeake Bay and the Refuge System.

Objective 2.1

Waterfowl Hunting

Over the life of the plan, improve existing public waterfowl hunting opportunities on the refuge for up to 540 adult hunter use days during the last two segments of the waterfowl hunting season, provide 18 youth hunter days on 1 day in the fall (in accordance with the State), and investigate opportunities to establish five new hunt locations.

Discussion and Rationale

Hunting is one of the six priority public uses as outlined in the Improvement Act. The Service strives to provide hunting opportunities that are not available on other public or private lands,

and to provide participants with reasonable harvest opportunities, uncrowded conditions, fewer conflicts among hunters, relatively undisturbed wildlife, and limited interference from, or dependence on, mechanized aspects of the sport (USFWS 1986). When managed responsibly, hunting can instill a unique appreciation of wildlife, their behavior, and their habitat needs. Service policy also states that, where practicable, we should make our hunt regulations consistent with State regulations. Because the original portion of the refuge was used as a bombing range and posed safety risks to refuge staff and refuge visitors, the refuge did not open to any public uses.

In 1993, the Service proposed to expand the refuge's boundary to preserve important habitat for migratory bird species and "to provide for public enjoyment of the area's resources, through providing wildlife-oriented recreational opportunities, that do not materially detract from the purposes of the refuge" (USFWS 1993). An additional 2,119 acres adjacent to the existing refuge and beyond the limits of the former bombing range were identified as suitable lands for potential acquisition in the event willing sellers made them available and the Service has funding available to purchase them. Public comments on the proposed boundary expansion centered on allowing hunting and fishing access to the expansion area. In October 1993, the refuge's boundary expansion plan was approved. One 5-acre parcel was acquired in 1996, and the 211-acre parcel known as Cow Island was acquired in 1997.

In July 1998, the refuge proposed to open specific areas for waterfowl hunting opportunities for two primary reasons: to provide for the wise use of a renewable natural resource, and to provide a high quality hunting experience. At that time, only Cow Island was proposed to be opened for hunting, and other tracts would be evaluated for inclusion in the hunting program as they are obtained. Cow Island is currently the only area on the refuge open to waterfowl hunting with a refuge-issued permit. The refuge's waterfowl hunting plan was approved on July 26, 1999, and designated areas within the refuge were announced as open to waterfowl hunting on August 11, 1999, for the 1999 to 2000 season (64 FR 43834; codified at 50 CFR 32.67; USFWS 2007b). Since then, refuge-specific regulations for waterfowl hunting at Plum Tree Island NWR have been updated annually. Refuge-specific regulations take precedence where they are more restrictive than State regulations.

Based on our experience administering the hunt from 2003 through 2006, we determined that some minor changes were necessary to ensure that we would meet original goals of offering safe, high-quality hunting opportunities while also providing resting and feeding opportunities for wintering waterfowl. As detailed in chapter 2, the minor changes were aimed at reducing the potential for over-shooting or seasonally chasing waterfowl and other wildlife from the relatively



Cyrus Braune/USFWS

Refuge waterfowl hunt blind on Cow Island

small hunt site and increasing the potential for harvest success and species diversity (USFWS 2007b). We determine if our waterfowl hunt is meeting its goal of providing the public with a quality hunt program by distributing the Service's Migratory Bird Hunt Report to participants and analyzing their voluntary responses. We would request feedback up to five times during the life of this plan to assess waterfowl hunter satisfaction.

Since the approval of our revised hunt plan in 2007, we have identified that additional improvements to our waterfowl hunting program are needed. Data collected from Plum Tree Island NWR waterfowl hunt participants during the 2009 to 2012 seasons indicates that only 24 percent of selected hunters actually participate in the Plum Tree Island NWR hunt (USFWS 2012b). Also, refuge hunt participants harvested approximately half as many ducks or geese per hunter use day as compared to the national harvest (1.25 versus 2.3 ducks or geese, respectively; USFWS 2012b). We identified potential factors contributing to low participation rates to include unfamiliarity with the hunt unit due to distance from residences (more than 60 percent of selectees reside more than 60 miles away), dates selected are not convenient with selectees availability, lack of incentive to participate in a hunt, non-conducive weather, and health or boat issues. Possible reasons for low harvest ratio include natural unpredictability of migratory waterfowl usage aligning with hunt dates; weather factors; and inexperience of the hunter. Therefore, we propose to improve hunter participation in the currently available 540 hunter use day opportunities by offering additional opportunities to hunters should all available slots not be filled and by promoting Apprentice Hunter opportunities through the current hunt program.

Secondly, we propose to provide youth hunt opportunities on one day during the State's fall waterfowl hunt season. During the scoping period for this refuge management plan, the VDGIF and public requested that we consider promoting youth hunt involvement. State fish and wildlife agencies across the Nation have reported significant

declines in the number of youth hunters (Engelmeyer 2013 personal communication). Virginia has observed a 30-year decline in hunting license sales and in response has implemented a youth hunting program (<http://www.dgif.virginia.gov/about/board/issues/hunter-recruitment-retention/hunter-recruitment-retention-presentation.pdf>; accessed August 2013). By providing a separate youth hunt day on the refuge, we would contribute to the State and Service's goals of developing a new generation of hunters and fostering a sense of stewardship for the environment. No new specialized infrastructure would be required to support youth hunting opportunities. Adding one youth waterfowl hunting day would result in an additional 18 hunter use days on the refuge, bringing the total to 558 hunter use days annually.

During the public scoping comment period for this CCP, we received comments requesting an increase in number of hunting locations on the refuge. New waterfowl hunting locations on the refuge would be located within the PTI Range FUDS, meaning that the USACE, VDEQ, and VDGIF would be consulted to determine if new waterfowl hunting locations could be provided on the refuge. We propose to investigate the potential for establishing five new blind locations on the northern end of the refuge because potential conflicts with resource management goals and objectives, as well as known hazards associated with the PTI Range FUDS, are lowest there as compared to other portions of the refuge.

Strategies

Continue to:

- Administer waterfowl hunt on the refuge in accordance with the approved waterfowl hunt plan (2007b) by:
 - ❖ Allowing up to three persons and one retrieval dog per hunting party at each of the six designated locations on Cow Island. The party limit is due to the size and distribution of blinds.
 - ❖ Offering waterfowl hunting on up to 30 calendar days per year.

Throughout the life of the plan:

- Investigate up to five new blind locations on the northern end of the refuge that could be established if resources and conditions allow.

Within 3 years of CCP approval:

- Improve hunt administration processes and promotion by:
 - ❖ Offering additional opportunities to hunters should all available slots not be filled.
 - ❖ Promoting Apprentice Hunter opportunities through the regularly administrated hunt.

- Host special youth waterfowl hunt day in the fall.

Inventory and Monitoring Activities

Throughout the life of the plan:

- On up to five occasions, distribute the Service's Migratory Bird Hunt Report (FWS Form 2-2361) to hunt participants and analyze responses.

Objective 2.2

Wildlife Observation, Photography, Environmental Education, and Interpretation—On Refuge

Over the life of the plan, provide wildlife observation, photography, environmental education, and interpretation opportunities on the refuge for up to 6,075 visitor use days annually at one designated location on Cow Island.

Discussion and Rationale

Wildlife observation, photography, environmental education, and interpretation are four of the six priority public uses as outlined in the Improvement Act. When managed responsibly, these uses can instill refuge visitors with a deeper appreciation for wildlife, their behavior, and their habitat needs.

The 2011 Virginia Outdoors Demand Survey (VDCR 2013) identified that access to natural areas, public access to State waters for non-motorized boating, and trails for wildlife watching and nature study were among the top 10 recreational activities for the Hampton Roads Recreational Planning Region. During the scoping period for this CCP, we received comments expressing great interest in making the refuge accessible for safe, appropriate, and compatible public uses.

Under alternative B, we would complete a VSP within 5 years of CCP approval and open the refuge to wildlife observation, photography, environmental education, and interpretation opportunities at a designated kayak and canoe landing and viewing platform on Cow Island where we currently have waterfowl hunt blind #2. The site is a sandy beach spit, located at the northwest corner of Cow Island, bounded by the Poquoson River and Bennett Creek to the north and west. Maritime shrubland and dune habitat is to the south and east of the sandy beach. The shallow waters and flat beach at this site make getting in and out of kayaks and canoes easy. The waterways and vegetated habitats surrounding the beach serve as natural boundaries to the designated public use area.

To prepare the site for increased and expanded public use, we would transform the existing waterfowl hunt blind (#2). The existing structure would be modified so that it would support up to 15 visitors at any one time. The purpose of the structure would be to serve as a wildlife observation platform from early February through late October (approximately 275 days per year) and as a waterfowl hunting

blind from late October through the end of January (approximately 90 days per year). We would avoid affecting the refuge's waterfowl hunt by conducting construction activities outside of the waterfowl hunt season. We would clearly mark the boundaries of the designated public use area using signage. We would develop and install interpretive signage to enhance the visitor experience on the wildlife observation platform and waterfowl hunt blind. We would open the designated public use area after construction activities and signage installation has been completed.

In addition, within 3 years of opening the blind #2 area to public use, we would evaluate the north beach at Cow Island to determine if additional acreage could support these priority public uses without materially interfering with or detracting from the mission of the Refuge System or the purposes for which the refuge was established.

We would establish a 3-mile water trail loop around Cow Island for wildlife observation, photography, environmental education, and interpretation by kayak or canoe. We would offer up to two refuge-sponsored environmental education or interpretation programs on the refuge opportunistically and coordinate with the City of Poquoson to establish a connection between the existing Blueway and the location on Cow Island for these new refuge uses. We anticipate that an average of nine visitors would use the site per day that is open for wildlife observation, photography, environmental education, and interpretation, resulting in a total estimate of 2,475 visitor use days annually.

Because the refuge is only accessible by boat, and commercial guides are interested in offering trips to the refuge, we would allow commercially guided wildlife observation, photography, environmental education, and interpretation tours to use the designated public use area on Cow Island. We have determined that these commercially guided services are appropriate and compatible with the refuge purpose if they are conducted in accordance with refuge-specific regulations, stipulations for compatibility, and conditions detailed in an approved SUP issued to the service provider (appendix B). Upon approval of the final CCP, we would use a phased approach to pursue conversations with commercial service providers. In years 1 and 2 of this new commercial services program, the Refuge Manager would permit up to two commercial service providers to conduct tours on one day per week each, during a 39-week season. Up to 15 refuge visitors per commercially guided trip would be allowed, and each commercial guide service provider would be allowed to schedule up to three trips on their scheduled tour day per week. Each commercial guide service provider would be allowed to conduct tours one day per week between early February and late October, a 39-week season. In subsequent years, up to four commercial service providers may be permitted to conduct up to 234 tours annually. Up to 3,510 visitor use days annually

would be offered for visitors participating in commercial service provider tours for wildlife observation, photography, environmental education, and interpretation at Cow Island's designated public use area.

Strategies

Throughout the life of the plan:

- Opportunistically offer up to two refuge-sponsored environmental education or interpretation programs on the refuge annually. An estimated 30 visitor use days annually are planned.
- Opportunistically offer up to four partner-sponsored environmental education or interpretation programs on the refuge annually. An estimated 60 visitor use days annually are planned.

Within 5 years of CCP approval:

- Designate a kayak and canoe landing area on Cow Island for wildlife observation, photography, environmental education, and interpretation, and transform the existing waterfowl hunt blind (#2) so that it also serves as a wildlife viewing observation platform. An estimated 2,475 visitor use days annually are planned.
- Work with up to two commercial guide service providers in years 1 and 2 to provide wildlife observation, photography, environmental education, and interpretation opportunities. Up to 3,510 visitor use days annually are planned. In subsequent years, consider working with up to four commercial guide service providers to accommodate the same number of planned use days annually.
- Develop and install interpretive media, where possible (e.g., panels, brochures).
- Establish a water trail for canoes and kayaks around Cow Island for wildlife observation, photography, environmental education, and interpretation.

Inventory and Monitoring Activities

Throughout the life of the plan:

- Evaluate the quality of these opportunities through formal and informal surveys and unsolicited comments from the public.

Within 5 years of CCP approval:

- Evaluate the north beach at Cow Island to explore the possibility of opening additional acreage for these priority public uses.

Objective 2.3

Wildlife Observation, Photography, Environmental Education, and Interpretation—Off Refuge

Over the life of the plan, provide up to four off-refuge opportunities for wildlife observation, photography, environmental education, and

interpretation opportunities to visitors on a by-request, case-by-case basis.

Discussion and Rationale

Refuge staff has explored methods for engaging the public in opportunities held off-refuge that emphasize wildlife observation, photography, environmental education, and interpretation. Our involvement in up to four community programs and events annually allows us to foster a connection between visitors and natural resources, as well as discuss the refuge's purposes, physical attributes, ecosystem dynamics, conservation strategies, and the Refuge System mission. In addition to offering staffed outreach opportunities at offsite programs and events, we would develop wayside signs, brochures, and electronic media that would allow us to reach a broader audience more consistently and effectively. We would tailor messages and delivery methods to specific audiences and present them in appropriate locations. Through heightened awareness, we aim to inspire support for refuge goals and the Refuge System mission.

Effective outreach depends on open and continuing communication and collaboration between the refuge and its many publics. Effective outreach involves determining and understanding the issues, identifying audiences, listening to stakeholders, crafting messages, selecting the most effective delivery techniques, and evaluating effectiveness.

Strategies

Throughout the life of the plan:

- Promote the refuge through interpretive media (e.g., brochures, waysides, and website sponsoring virtual tour).
- Offer wildlife observation, photography, environmental education, and interpretive opportunities in partnership with others to focus on:
 - ❖ promoting community involvement and knowledge of the refuge's natural resources and role of the refuge in the Refuge System (e.g., endangered species management).
 - ❖ risks and remedies regarding UXO.
 - ❖ natural and cultural history of the area.

Inventory and Monitoring Activities

Throughout the life of the plan:

- Evaluate the quality of these opportunities through formal and informal surveys and unsolicited comments from program participants.

GOAL 3

PARTNERSHIPS

Cultivate partnerships to further conservation, education, and interpretation of the refuge’s natural and cultural resources, as well as the mission of the Refuge System.

Objective 3.1

Partnerships for Refuge Wildlife and Habitat Research

Over the life of the plan, maintain existing partnerships and develop new partnerships with other government agencies, non-governmental organizations, groups, and individuals to conduct research that increases baseline knowledge, monitors regional and national priority species, and evaluates ecosystem quality.

Discussion and Rationale

By sharing expertise and other resources with many agencies, we have developed strong partnerships for wildlife and habitat research at the refuge. We collaborate with the CCB and VDGIF to conduct a variety of wildlife surveys and research, acquiring new information about wildlife use of the refuge that is comparable to data for other nearby survey areas. Most recently, we have coordinated with the USACE and their agents (e.g., Shaw Environmental, Inc.) to inform selection of appropriate remedial actions to reduce hazards to human and ecological health resulting from the site’s former use as a bombing range. We would continue these partnerships to support the refuge purposes, fulfill refuge goals, and meet management objectives for wildlife and habitat.

Within the Chesapeake Bay, SAV is an important component to the estuarine habitat that provides food resources and breeding habitat for fish and invertebrates found here, as well as food resources for species of conservation concern like the migratory and wintering bufflehead. The VDGIF conducts annual mid-winter surveys that will provide population trend data for bufflehead and other diving ducks using this area. The Virginia Institute of Marine Science tracks SAV health data for the state by area. The refuge biologist will continue to work with both of these groups to monitor the health of these habitats and evaluate the role refuge upland habitats are playing in their status.

We would develop new partnerships to collect information about refuge resources of concern, with specific emphasis on migratory bird monitoring, northeastern beach tiger beetle population monitoring and research, diamondback terrapin monitoring and research, detection of nutria, monitoring phragmites infestations and treatment success, and potential safe access to conduct refuge management or research actions.

Strategies

Throughout the life of the plan:

- Coordinate closely with partners regarding:

- ❖ migratory bird monitoring.
- ❖ nutria detection and impacts.
- ❖ long-term monitoring of the PTI Range FUDS.
- ❖ northeastern beach tiger beetle population monitoring and research.
- ❖ diamondback terrapin nesting and population monitoring.
- ❖ investigation of potential safe access of the refuge to conduct biological research.
- ❖ water quality and SAV bed monitoring and research.
- ❖ climate change impact monitoring and research.

Objective 3.2

Partnerships for Public Uses

Over the life of the plan, maintain existing partnerships and develop new partnerships with other government agencies, non-governmental organizations, groups, and individuals to promote priority public uses that foster an understanding and appreciation of the refuge and the mission of the Service.

Discussion and Rationale

We work closely with many agencies on special projects related to public use by sharing expertise and other resources. Our partnership with the VDGIF facilitates administration of a quality waterfowl hunt on Cow Island. We also work closely with the USACE, USCG, VDEQ, VMRC, and Virginia Marine Police regarding public awareness about the PTI Range FUDS hazards and enforcement trespassing regulations for the protection of public safety and refuge resources.

We would continue to support the City of Poquoson's promotion of safe and enjoyable public use activities around the refuge. We would continue to coordinate with the City on its recently established Blueway for kayakers and canoers. We would continue these partnerships to support the refuge purposes, fulfill refuge goals, and meet management objectives for appropriate and compatible use of the refuge. We would also coordinate with the City of Poquoson to establish a connection between the existing Blueway and the proposed refuge water trail around Cow Island for wildlife observation, photography, environmental education, and interpretation. The City of Poquoson recently established a Blueway, otherwise known as a water trail, for public canoeing and kayaking. Such trails offer a diversity of recreational opportunities on the land and water. We support the City of Poquoson in its promotion of safe and enjoyable public use activities around the refuge, and we would continue to coordinate with the City of Poquoson on its recently established Blueway to promote

awareness and appreciation of the refuge, its wildlife, and restricted use.

During the public scoping period for this CCP, the City of Poquoson expressed interest in partnering with the Service to explore opportunities to establish mainland access for visitors to participate in appropriate and compatible uses on the refuge. Since mainland access to the refuge would be through the PTI Range FUDS, coordination with the USACE and VDEQ would be required to ensure that such access and necessary infrastructure could be constructed and used safely.

We would continue these partnerships to enhance our ability to achieve goals and objectives, while also developing new partnerships. By expanding the number and types of partners with whom we coordinate, we would become more connected to and more effectively serve as an asset to our nearby communities. We would enhance our ability to connect people to nature, as well as to increase awareness about the cultural and historical significance of Plum Tree Island in the context of the Chesapeake Bay.

Strategies

Throughout the life of the plan:

- Support partners and coordinate efforts, as time and resources allow, to provide recreation opportunities near the refuge and in the Lower Chesapeake Bay that increase the appreciation for the refuge and its mission.
- Coordinate and collaborate with partners and adjacent landowners to investigate potential viewing platforms for mainland public access to participate in appropriate and compatible public uses.
- Offer wildlife observation, photography, environmental education, and interpretive opportunities in partnership with others to focus on:
 - ❖ promoting community involvement and knowledge of the refuge's natural resources and role of the refuge in the Refuge System (e.g., endangered species management).
 - ❖ risks and remedies regarding UXO.
 - ❖ natural and cultural history of the area.

3.6 Comparison of Alternatives

The following table displays the comparison of alternatives A and B as discussed throughout this chapter. See table 3.1 at the beginning of this chapter for a summary of the acreage comparisons.

Table 3.3 Comparison of Alternatives

Refuge Resource or Program	Alternative A Current Management (No Action Alternative)	Alternative B Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
<p>Goal 1. Wildlife and Habitats Conserve the coastal estuarine ecosystem to sustain high ecological integrity for the benefit of native flora and fauna, with emphasis on priority refuge resources of concern, within the lower Chesapeake Bay.</p>		
<p>Objective 1.1: Salt Marsh</p>	<p>Objective 1.1 A Over the life of the plan, allow natural processes to act unimpeded on 2,027 acres of salt marsh habitat.</p> <p>Strategies <i>Continue to:</i></p> <ul style="list-style-type: none"> • Limit human-caused disturbance. <p>Inventory and Monitoring Activities None.</p>	<p>Objective 1.1 B Over the life of the plan, manage and prevent the degradation of the refuge's 2,027 acres of salt marsh to include a mix of high and low salt marsh vegetation, pool, mudflat, and panne habitat that:</p> <ul style="list-style-type: none"> • is eradicated of invasive plants, • is of high ecological integrity as measured by the Salt Marsh Integrity Index, and • sustains populations of breeding clapper rail and saltmarsh sparrow, as well as migrating and wintering American black ducks and shorebirds. <p>Strategies <i>Continue to:</i></p> <ul style="list-style-type: none"> • Limit human-caused disturbance. <p><i>Throughout the life of the plan:</i></p> <ul style="list-style-type: none"> • Use a combination of mechanical removal and herbicide application to treat infestations of phragmites. <p>Inventory and Monitoring Activities <i>Throughout the life of the plan:</i></p> <ul style="list-style-type: none"> • Monitor known invasive plant infestations and conduct surveys for new invasive plant and animal species. • Assess invasive species control success rates. • Initiate the Salt Marsh Integrity Index, which includes habitat monitoring along with breeding bird species counts including saltmarsh sparrow and net sampling of invertebrates and fish species. <p><i>Within 5 years of CCP approval:</i></p> <ul style="list-style-type: none"> • Conduct quantitative shoreline surveys. • Determine and implement best possible monitoring techniques for migrating and wintering black duck populations and their habitat needs. • Monitor breeding and migratory waterbird populations. • Monitor breeding and migratory shorebird populations.

Refuge Resource or Program	Alternative A Current Management (No Action Alternative)	Alternative B Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
Objective 1.2: Maritime Shrubland and Dune	Objective 1.2 A Over the life of the plan, allow natural processes to act unimpeded on 102 acres of maritime shrubland and dune habitat.	Objective 1.2 B Over the life of the plan, protect 102 acres of maritime shrubland and dune habitat to ensure the integrity of the adjacent salt marsh and to maintain or increase northern diamondback terrapin nests by providing open sandy areas above the high tide line for nesting.
	Strategies <i>Continue to:</i> <ul style="list-style-type: none"> Limit human-caused disturbance. Inventory and Monitoring Activities None.	Strategies <i>Continue to:</i> <ul style="list-style-type: none"> Limit human-caused disturbance, especially during terrapin nesting season (May). <i>Within 5 years of CCP approval:</i> <ul style="list-style-type: none"> Use a combination of mechanical removal and herbicide application to treat infestations of phragmites. Inventory and Monitoring Activities <i>Within 5 years of CCP approval:</i> <ul style="list-style-type: none"> Monitor diamondback nesting population and any threats on nesting success. Monitor known invasive plant infestations and conduct surveys for new invasive plant and animal species. Assess invasive species control success rates.
Objective 1.3: Sandy Beaches and Mudflats	Objective 1.3 A Over the life of the plan, allow natural processes to act unimpeded on 80 acres of sandy beaches and mudflats habitat.	Objective 1.3 B Over the life of the plan, protect 80 acres of sandy beaches and mudflats from human-caused disturbance and degradation to maintain an essential population of northeastern beach tiger beetles (average annual peak count of at least 300 adults), to maintain or increase the number of nesting black skimmers, and to provide foraging habitat for migrating shorebirds.
	Strategies <i>Continue to:</i> <ul style="list-style-type: none"> Limit human-caused disturbance. Inventory and Monitoring Activities <i>Continue to:</i> <ul style="list-style-type: none"> Conduct informal visual survey for nesting birds. Conduct annual survey for northeastern beach tiger beetle on- and off-refuge. Conduct qualitative and quantitative shoreline erosion visual survey by boat and report presence of exposed UXO to USACE as needed. 	Strategies <i>Continue to:</i> <ul style="list-style-type: none"> Limit human-caused disturbance. Inventory and Monitoring Activities <i>Continue to:</i> <ul style="list-style-type: none"> Conduct annual population surveys to estimate northeastern beach tiger beetle population. Work with the northeastern beach tiger beetle recovery team to develop population research studies and make recommendations about habitat management. <i>Within 5 years of CCP approval:</i> <ul style="list-style-type: none"> Regularly conduct quantitative shoreline surveys to assess accretion and erosion (measuring acreage and shoreline changes). Implement monitoring of migrating and nesting shorebirds. Monitor black skimmer nesting population.

Refuge Resource or Program	Alternative A Current Management (No Action Alternative)	Alternative B Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
<p>Goal 2: Wildlife-dependent Recreation Provide safe and compatible wildlife-dependent recreational opportunities for visitors to connect with nature and foster enhanced stewardship of the lower Chesapeake Bay and the Refuge System.</p>		
<p>Objective 2.1: Waterfowl Hunting</p>	<p>Objective 2.1 A Over the life of the plan, accommodate public waterfowl hunting opportunities on the refuge for up to 540 hunter use days annually during the last two segments of the waterfowl hunting season.</p>	<p>Objective 2.1 B Over the life of the plan, improve existing public waterfowl hunting opportunities on the refuge for up to 540 adult hunter use days during the last two segments of the waterfowl hunting season, provide 18 youth hunter days on 1 day in the fall (in accordance with the State), and investigate opportunities to establish five new hunt locations.</p>
	<p>Strategies <i>Continue to:</i></p> <ul style="list-style-type: none"> • Administer waterfowl hunt on the refuge in accordance with the approved waterfowl hunt plan (2007b) by: <ul style="list-style-type: none"> ❖ Allowing up to three persons and one retrieval dog per hunting party at each of the six designated locations on Cow Island. ❖ Offering waterfowl hunting on up to 30 calendar days per year. <p>Inventory and Monitoring Activities <i>Continue to:</i></p> <ul style="list-style-type: none"> • Occasionally distribute the Service’s Migratory Bird Hunt Report (FWS Form 3-2361) to hunt participants and analyze responses. 	<p>Strategies <i>Continue to:</i></p> <ul style="list-style-type: none"> • Administer waterfowl hunt on the refuge in accordance with the approved waterfowl hunt plan (2007b) by: <ul style="list-style-type: none"> ❖ Allowing up to three persons and one retrieval dog per hunting party at each of the six designated locations on Cow Island. ❖ Offering waterfowl hunting on up to 30 calendar days per year. <p><i>Throughout the life of the plan:</i></p> <ul style="list-style-type: none"> • Investigate up to five new blind locations on the northern end of the refuge that could be established if resources and conditions allow. <p><i>Within 3 years of CCP approval:</i></p> <ul style="list-style-type: none"> • Improve hunt administration processes and promotion by: <ul style="list-style-type: none"> ❖ Offering additional opportunities to hunters should all available slots not be filled. ❖ Promoting Apprentice Hunter opportunities through the regularly administrated hunt. • Host special youth waterfowl hunt day in the fall. <p>Inventory and Monitoring Activities <i>Throughout the life of the plan:</i></p> <ul style="list-style-type: none"> • On up to five occasions, distribute the Service’s Migratory Bird Hunt Report (FWS Form 2–2361) to hunt participants and analyze responses.

Refuge Resource or Program	Alternative A Current Management (No Action Alternative)	Alternative B Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
<p>Objective 2.2: Wildlife Observation, Photography, Environmental Education, and Interpretation—On Refuge</p>	<p>Objective 2.2 A Over the life of the plan, the refuge remains closed to wildlife observation, photography, environmental education, and interpretation.</p> <p>Strategies None.</p> <p>Inventory and Monitoring Activities None.</p>	<p>Objective 2.2 B Over the life of the plan, provide wildlife observation, photography, environmental education, and interpretation opportunities on the refuge for up to 6,075 visitor use days annually at one designated location on Cow Island.</p> <p>Strategies <i>Throughout the life of the plan:</i></p> <ul style="list-style-type: none"> • Opportunistically offer up to two refuge-sponsored environmental education or interpretation programs on the refuge annually. An estimated 30 visitor use days annually are planned. • Opportunistically offer up to four partner-sponsored environmental education or interpretation programs on the refuge annually. An estimated 60 visitor use days annually are planned. <p><i>Within 5 years of CCP approval:</i></p> <ul style="list-style-type: none"> • Designate a kayak and canoe landing area on Cow Island for wildlife observation, photography, environmental education, and interpretation, and transform the existing waterfowl hunt blind (#2) so that it also serves as a wildlife observation platform. An estimated 2,475 visitor use days annually are planned. • Work with up to two commercial guide service providers in years 1 and 2 to provide wildlife observation, photography, environmental education, and interpretation opportunities for up to an estimated 3,510 visitor use days annually are planned. In subsequent years, consider working with up to four commercial guide service providers to accommodate the same number of planned use days annually. • Develop and install interpretive media, where possible (e.g., panels, brochures). • Establish a water trail for canoes and kayaks around Cow Island for wildlife observation, photography, environmental education, and interpretation. <p>Inventory and Monitoring Activities <i>Throughout the life of the plan:</i></p> <ul style="list-style-type: none"> • Evaluate the quality of these opportunities through formal and informal surveys and unsolicited comments from the public. <p><i>Within 5 years of CCP approval:</i></p> <ul style="list-style-type: none"> • Evaluate the north beach at Cow Island to explore the possibility of opening additional acreage for these priority public uses.

3.6 Comparison of Alternatives

Refuge Resource or Program	Alternative A Current Management (No Action Alternative)	Alternative B Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
Objective 2.3: Wildlife Observation, Photography, Environmental Education, and Interpretation—Off Refuge	Objective 2.3 A Over the life of the plan, provide wildlife observation, photography, environmental education, and interpretation opportunities to visitors on a by-request, case-by-case basis, off refuge only.	Objective 2.3 B Over the life of the plan, provide up to four off-refuge opportunities for wildlife observation, photography, environmental education, and interpretation opportunities to visitors on a by-request, case-by-case basis.
	Strategies <i>Continue to:</i> <ul style="list-style-type: none"> Opportunistically offer up to two environmental education or interpretation programs off the refuge annually. Inventory and Monitoring Activities None.	Strategies <i>Throughout the life of the plan:</i> <ul style="list-style-type: none"> Promote the refuge through interpretive media (e.g., brochures, waysides, and website sponsoring virtual tour). Offer wildlife observation, photography, environmental education, and interpretive opportunities in partnership with others to focus on: <ul style="list-style-type: none"> ❖ promoting community involvement and knowledge of the refuge’s natural resources and role of the refuge in the Refuge System (e.g., endangered species management). ❖ risks and remedies regarding UXO. ❖ natural and cultural history of the area. Inventory and Monitoring Activities <i>Throughout the life of the plan:</i> <ul style="list-style-type: none"> Evaluate the quality of these opportunities through formal and informal surveys and unsolicited comments from the program participants.
Goal 3. Partnerships Cultivate partnerships to further conservation, education, and interpretation of the refuge’s natural and cultural resources, as well as the mission of the Refuge System.		
Objective 3.1: Partnerships for Refuge Wildlife and Habitat Research	Objective 3.1 A Over the life of the plan, continue to maintain our collaborative relationships with Federal, State, and local governmental agencies to fulfill mutual goals.	Objective 3.1 B Over the life of the plan, maintain existing partnerships and develop new partnerships with other government agencies, non-governmental organizations, groups, and individuals to conduct research that increases baseline knowledge, monitor regional and national priority species, and evaluate ecosystem quality.
	Strategies <i>Continue to:</i> <ul style="list-style-type: none"> Coordinate with other Federal, State, and local government agencies, and private research organizations regarding research conducted on or around the refuge. 	Strategies <i>Throughout the life of the plan:</i> <ul style="list-style-type: none"> Coordinate closely with partners regarding: <ul style="list-style-type: none"> ❖ migratory bird monitoring. ❖ nutria detection and impacts. ❖ long-term monitoring of the PTI Range FUDS. ❖ northeastern beach tiger beetle population monitoring and research. ❖ diamondback terrapin nesting and population monitoring. ❖ investigation of potential safe access to conduct biological research on the refuge. ❖ water quality and SAV bed monitoring and research. ❖ Climate change impact monitoring and research.

Refuge Resource or Program	Alternative A Current Management (No Action Alternative)	Alternative B Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
Objective 3.2: Partnerships for Public Uses	Objective 3.2 A Over the life of the plan, continue to maintain our collaborative relationships with Federal, State, and local governmental agencies to fulfill mutual goals.	Objective 3.2 B Over the life of the plan, maintain existing partnerships and develop new partnerships with other governmental agencies, non-governmental organizations, groups, and individuals to promote priority public uses that foster an understanding and appreciation of the refuge and the mission of the Service.
	Strategies <i>Continue to:</i> <ul style="list-style-type: none"> • Protect public safety by enforcing refuge regulations. • Coordinate with other Federal, State, and local law enforcement agencies regarding public uses on and around the refuge. 	Strategies <i>Throughout the life of the plan:</i> <ul style="list-style-type: none"> • Support partners and coordinate efforts, as time and resources allow, to provide recreation opportunities near the refuge and in the Lower Chesapeake Bay that increases the appreciation for the refuge and its mission. • Coordinate and collaborate with partners and adjacent landowners to investigate potential viewing platforms for mainland public access to participate in appropriate and compatible public uses. • Offer wildlife observation, photography, environmental education, and interpretive opportunities in partnership with others to focus on: <ul style="list-style-type: none"> ❖ promoting community involvement and knowledge of the refuge’s natural resources and role of the refuge in the Refuge System (e.g., endangered species management). ❖ risks and remedies regarding UXO. ❖ natural and cultural history of the area.

Chapter 4



Cyrus Brame/USFWS

Observing wildlife at a hunt blind on Cow Island

Environmental Consequences

- 4.1 Introduction
- 4.2 Chapter Organization
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- 4.15 Cumulative Impacts
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- 4.18 Potential Irreversible and Irretrievable Commitments of Resources
- 4.19 Energy Efficiency
- 4.20 Environmental Justice
- 4.21 Summary of Environmental Consequences

4.1 Introduction

This chapter describes the foreseeable environmental consequences we predict from implementing the refuge management alternatives presented in chapter 3. Specifically, we predict the beneficial and adverse effects of implementing the management actions and strategies for each of the alternatives:

- Alternative A—Current Management (No Action Alternative), which serves as a baseline for comparing against the other alternatives.
- Alternative B—Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative).

In this chapter, we describe the effects likely to occur over the 15-year life span of this CCP. Beyond the 15-year planning horizon, we give an approximate description of environmental consequences. Where detailed information is available, we present a scientific and analytic comparison of the alternatives and their anticipated impacts and effects on the environment. When detailed information is not available, we base those comparisons on our professional judgment and experience. At the end of this chapter, table 4.1 summarizes the effects predicted for each alternative and provides a side-by-side comparison. Our discussion also relates the predicted impacts of the alternatives to the refuge goals and the key issues identified in chapter 1.

Regulations adopted by the CEQ and by the Service on implementing NEPA require that we assess the significance of the effects of all alternatives, based on their context, duration, and intensity. CEQ regulations also require agencies to “integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays in the process, and to head off potential conflicts.” Throughout development of this draft CCP and EA, we have made a concerted effort to integrate NHPA Section 106 compliance procedures into our NEPA review. We use NHPA Section 106 terminology to characterize effects on cultural resources in section 4.14.

We use the following terminology throughout the natural and human environment impact discussions. The context of our impact analysis covers site specific, regional, and landscape-scale impacts, depending on how widely the effect of an action can be observed. Certain actions (such as improvement of an existing waterfowl hunt blind) may have effects only in a local context, while others (such as protection of habitat for the northeastern beach tiger beetle) may have effects in a much broader context. It is important to note that local actions may have cumulative effects in a larger context when combined with other actions. For example, Plum Tree Island NWR is one of the many refuges along the Atlantic Coast where salt marsh integrity will be

assessed to generate a landscape-level understanding of how salt marshes are changing as sea level rises. We developed the two management alternatives to contribute to local, regional, and national conservation goals. Our proposed conservation objectives and strategies for species and habitats are consistent with plans identified in chapter 1.

This CCP characterizes the impacts of the proposed management actions by their overall type, and by their intensity and duration. The type of impact from a particular management action may be either beneficial or adverse. A “beneficial” impact is one that results in positive change in the condition or appearance of the resource, or a change that moves the resource toward a desired condition. An “adverse” impact results in a negative change in the condition or appearance of the resource, or a change that moves the resource toward an undesirable condition. When possible, we identify specific ways we would decrease the intensity of the adverse impact.

Impacts may also be either direct or indirect. A direct impact is one that results from an action and occurs at the same time and place. An indirect impact results from an action but occurs later in time or is farther removed in distance. Both beneficial and adverse impacts may be either direct or indirect.

Regarding intensity and duration, impacts can be described as negligible, minor, moderate, or major. The definition of these terms, for the purposes of this CCP:

- Negligible—Management actions would result in impacts that would not be detectable or, if detected, would have effects that would be considered slight, localized, and short-term.
- Minor—Management actions would result in a detectable change, but the change would be slight and have only a local effect on the community, the resource, or ecological processes. The change would be discountable, insignificant, and of little consequence and short-term in nature.
- Moderate—Management actions would result in a clearly detectable change. This could include changes to a local biotic population or habitat sufficient to cause a change in abundance, distribution, or composition, but not changes that would affect the viability of regional populations or habitats. Changes to local ecological processes would be of a limited extent.
- Major—Management actions would result in a clearly detectable change. The impacts would be substantial and highly noticeable and could result in widespread change. This could include changes in the abundance, distribution, or composition of local or regional populations or habitats to the extent that it would not likely

recover or continue in its previous condition or size. Significant ecological processes would be altered, and changes throughout the ecosystem would be expected.

The duration of identified effects and their consequences also varies, from those occurring only once for a brief period in the 15-year period of this plan, like the construction effects from expanding existing facilities, to those occurring more frequently during the year, like invasive species control. The environmental consequences analysis provided in this chapter also furnishes the level of detail necessary to assess the compatibility of all proposed uses. The duration of identified effects and their consequences varies, ranging from the short-term, which includes those activities that last for a matter of days or weeks, such as noise from construction, to long-term, which are permanent activities such as structure removal.

We based our evaluation of the intensity of the effects from implementing the alternatives on these factors:

- The expected degree or percent of change in the resource from current conditions;
- The frequency and duration of the effect;
- The sensitivity of the resource to such an effect, or its natural resiliency to recover from such an effect; and
- The potential for implementing effective preventive or mitigating measures to lessen the effect.

For this analysis, we assume that the baseline is the condition of the refuge as of mid-2013. Alternative A, which describes the current management of the refuge, assumes little change in current habitat condition, and no change to public access or infrastructure. Alternative B assumes the Service would undertake management activities to protect and prevent the degradation of refuge habitats, and would increase the amount and type of public uses on the refuge.

We do not fully evaluate the environmental impacts of certain proposed projects in this chapter. These include aspects of management that are common to all alternatives and do not individually or cumulatively have a significant effect on the quality of the human environment. The following would qualify for exclusion under the Service's list of categorical exclusions (as listed in 516 Departmental Manual 8.5A), if individually proposed:

- Environmental education and interpretive programs (unless major construction is involved or significant increase in visitation is expected).

- Research, resource inventories, monitoring, and other resource information collection.
- Operations and maintenance of existing infrastructure and facilities (unless major renovation is involved).
- Certain minor, routine, recurring management activities and improvements.
- Small construction projects (e.g., fences, kiosks, and interpretive signs).
- Native vegetation planting and invasive plant control.
- Minor changes in amounts and types of public use.
- Issuance of new or revised management plans when only minor changes are planned.
- Law enforcement activities.

We recognize that we cannot fully address all the potential consequences involved with several management alternatives through this planning process. We describe in chapter 3, under section 3.3 “Additional NEPA Analysis,” those future management decisions that may require more detailed analysis before a choice is made. We attempt to analyze the impacts of some of the available choices in this document to the extent possible, but a more detailed analysis will be required to inform the final choice. For specific projects evaluated in the future, NEPA documents would be prepared that address and fully analyze the potential consequences. Our goal is to develop and implement all future plans to minimize the impact to each resource while maximizing the long-term benefit to each resource. Each additional NEPA analysis will include compliance with Federal laws and mandates including the ESA, the NHPA, and the CZMA.

Although not a comprehensive list, we recognize that further analysis would be required for these projects and outcomes:

- Expanding the existing hunt program and adding new hunting opportunities for adults and youth.
- Removing nuisance wildlife through public hunting or trapping permits, if deemed necessary.

4.2 Chapter Organization

The chapter is organized as follows:

- Air Quality

- Water Resources
- Soils
- Vegetation
- Birds
- Fisheries
- Mammals
- Reptiles
- Invertebrates
- Public Use and Access
- Socioeconomic Environment
- Cultural and Historical Resources

Under each heading, we discuss impacts on each of the resource or program areas considered. Our discussion begins with impacts that are common to all alternatives. This discussion is followed by the benefits and adverse impacts of each of the alternatives. We examine the impacts of current and proposed administrative or general operations, habitat management, and visitor services/public uses on each of the physical, biological, and cultural resources noted above.

We end the chapter with discussions on:

- Cumulative Impacts.
- The Relationship Between Short-term Uses of the Human Environment and Enhancement of Long-term Productivity.
- Unavoidable Adverse Effects.
- Potential Irreversible and Irretrievable Commitments of Resources.
- Energy Efficiency.
- Environmental Justice.

4.3 Air Quality

We evaluated the management actions and the public uses that each alternative proposes for their impacts on air quality over both the short and long term. We evaluated and compared the alternatives based on their potential to provide air quality benefits, specifically

keeping the same amount of refuge acreage in vegetative cover.

We also evaluated and compared the impacts of refuge management actions with the potential to cause adverse effects to air quality, including:

- Habitat management, research, and invasive species management techniques.
- Refuge construction projects.
- Changes in recreational use.

As described in chapter 2, the air quality in the region that includes Plum Tree Island NWR was characterized as “good,” the highest rating, between 77 to 84 percent of the time during 2015. None of our proposed management activities would result in long-term local or regional air quality impacts that would alter this status, nor would they alter the status of the Virginia Beach–Norfolk–Newport News CBSA as an attainment area for ground-level ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, or fine and coarse particulate matter.

Each of the alternatives would involve the following activities that could have localized, short-term impacts on air quality:

- Emissions from mechanical equipment used for habitat management and research activities.
- Applying herbicides to control invasive plants.

While the degree to which the management activities described in the CCP would potentially result in slightly different degrees of impacts under both the alternatives, the Service would adhere to State and Federal standard safety regulations for applying herbicides under certain weather conditions, as required.

Regular updates to the refuge’s prescribed fire plan would incorporate changes that may occur to applicable Federal or State regulations, or to recommended mitigation strategies and techniques. According to the 2004 draft fire management plan for Plum Tree Island NWR, the refuge is currently in compliance with regard to managing the impacted area, employing the appropriate mitigation strategies, and using techniques to reduce impacts (USFWS 2004b). We would continue to follow these guidelines under any of the alternatives. We would also ensure that any management actions would be compliant with the State’s smoke management plan.

As needed, we would consult with the following offices to be protective of air quality in the refuge vicinity:

- VDEQ's Division of Air Program Coordination for guidance regarding refuge activities that have the potential to adversely affect air quality in the vicinity.
- VDEQ's Piedmont Regional Office to acquire permits for boilers or fuel-burning equipment.

Regardless of the alternative selected, we would implement refuge management activities in compliance with the Clean Air Act, and neither of the alternatives would violate EPA standards for criteria air pollutants. As necessary, we would consult with VDEQ for guidance and permit requirements.

Impacts of Alternative A

Beneficial Impacts

Habitat Protection and Management

Limiting disturbance in the salt marsh habitat within the refuge's boundary would result in minor, indirect, long-term benefits on local air quality. Globally, coastal wetlands sequester more carbon per unit area than any other terrestrial habitat (Chmura et al. 2003). Estuarine wetlands sequester carbon at a rate about tenfold higher on an area basis than any other wetland ecosystem due to high sedimentation rates, high soil carbon content, and constant burial due to sea level rise (Bridgham et al. 2006). Estuarine wetlands also contribute less methane to the atmosphere than other types of wetlands (Bridgham et al. 2006), which further increases the effectiveness of estuarine wetlands in sequestering carbon. For these reasons, they could be more valuable carbon sinks per unit area than other ecosystems in a warmer world (Choi and Wang 2004). The IPCC recommends wetland restoration as a carbon sequestration strategy. Both direct (e.g., development) and indirect (e.g., eutrophication, recreational fishing) human impacts on wetlands can significantly reduce or reverse carbon sequestration processes (Coverdale et al. 2014). At Plum Tree Island NWR, limiting disturbance in the salt marsh maximizes its ecological service to the Chesapeake Bay region as a carbon sink. We promote the function of natural systems by limiting human disturbance and by not creating any new permanent sources of emissions. These actions are examples of how the Service is meeting the climate change challenge (USFWS 2009c).

Public Use and Access

None identified.

Adverse Impacts

Habitat Protection and Management

Emissions from motorized boats used by refuge staff conducting visual surveys of shoreline erosion and biological surveys would result in direct, negligible, short-term impacts on local air quality. Any adverse air quality effects from refuge activities would be more than offset by

the benefits of maintaining the refuge in natural vegetation.

Public Use and Access

Emissions from motorized boats used by refuge staff to prepare and maintain waterfowl hunt blinds, as well as boat use by waterfowl hunt participants, would result in direct, negligible, short-term impacts on local air quality. Any adverse air quality effects from the refuge's waterfowl hunt activities would be more than offset by the benefits of maintaining the refuge's native vegetation.

Impacts of Alternative B

Beneficial Impacts

Habitat Protection and Management

Same as the impacts detailed under alternative A.

Public Use and Access

Interpretation of the refuge's habitats would provide a negligible, indirect, long-term impact on refuge air quality. At the designated public use area, interpretation programs explaining the important role that salt marsh vegetation plays in air and water purification, storm abatement, flood control, and nutrient cycling have the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Adverse Impacts

Habitat Protection and Management

In addition to the impacts detailed under alternative A, the increased frequency of motorized boat use by refuge staff to conduct habitat management, research, public use programs, and law enforcement activities would result in negligible, direct, short-term adverse impacts on local air quality. Fuel-burning equipment and herbicide applications would adversely affect air quality in the immediate vicinity of those actions, but impacts would dissipate quickly. By limiting the time that motorized boats idle and following best management practices for herbicide application, we would minimize our potential to adversely affect air quality in the refuge vicinity.

Public Use and Access

In addition to the impacts detailed under alternative A, increased fuel-burning equipment use by refuge visitors, refuge staff, and law enforcement officers would result in negligible to minor, direct, short- and long-term adverse impacts on local air quality.

Transformation of the existing waterfowl hunt blind (#2) on Cow Island would require the use of motorized boats to transport equipment and materials for the new structure, resulting in negligible, direct, short-term impacts to local air quality. In the long-term, the increased participation in the refuge's waterfowl hunt and designation of one public use area on Cow Island would result in an increase in

vehicular traffic to parking lots located adjacent to the refuge and motorized boat traffic on the waters surrounding the refuge. We would promote use of non-motorized boats and visiting the refuge with commercial tour service providers because they could accommodate up to 15 refuge visitors per trip. Increased visitation and public access infrastructure would require an increased staff presence for maintenance and law enforcement activities; one or two additional vehicles would travel to Poquoson from refuge offices in either Warsaw or Charles City, Virginia, to park in lots adjacent to the refuge a minimum of once a month.

4.4 Water Resources

We evaluated and compared the alternatives based on their potential to help maintain and improve the water resources on the refuge, including the wetlands, ponds, and tributaries of the Chesapeake Bay Estuary. We evaluated the benefits of actions that would protect, restore, maintain, or improve water resources including:

- Habitat management, research, and invasive species management techniques.
- Refuge construction projects.
- Changes in recreational use.

We evaluated and compared the impacts of refuge management actions with the potential to cause adverse effects to water resources including

- Use of herbicides to manage invasive species.
- Refuge construction projects.
- Changes in recreational use.

Regardless of the alternative selected, we would take a number of steps to ensure that we have sufficient scientific data to support management decisions regarding refuge water resources.

As needed, we would consult with the following offices to help protect land and water quality in the refuge vicinity:

- VDCR Regional Office to ensure compliance with State law and regulations:
 - ❖ Virginia Erosion and Sediment Control Law [VESCL] and regulations.
 - ❖ Virginia stormwater management law and regulations (including coverage under the general permit for stormwater

discharge from construction activities).

- ❖ Other applicable Federal nonpoint source pollution mandates (e.g., Section 313 of the Clean Water Act, Federal Consistency under the CZMA).
- VDCR's Division of Stormwater Management, Local Implementation Office regarding:
 - ❖ Administration of the coastal lands management enforceable policy of the Virginia Coastal Management Program for construction activities involving land-disturbing activities in areas greater than or equal to 2,500 square feet.
 - ❖ Requirement to register for coverage under the general permit for discharges of stormwater from construction activities.
 - ❖ Development of a project-specific stormwater pollution prevention plan. The plan must be prepared prior to submission of the registration statement for coverage under the general permit, and it must address water quality and quantity in accordance with the Virginia Stormwater Management Program permit regulations.
 - ❖ Erosion and sediment control and stormwater management requirements for RPAs.
 - ❖ Best management practices for minimizing land disturbance and impervious cover, as well as the protection of native vegetation to the maximum extent practicable.
- VDEQ Division of Water Quality Programs, Office of Wetlands and Water Protection/Compliance regarding:
 - ❖ Water regulations
 - ❖ A variety of permits, including:
 - Virginia Pollutant Discharge Elimination System permit.
 - Virginia pollution abatement permit.
 - Surface and groundwater withdrawal permit.
 - Virginia water protection permit, which governs wetlands, surface water, and surface water withdrawals/impoundments, and serves as Section 401 certification of the Federal Clean Water Act Section 404 permits for dredge and fill activities in U.S. waters.
- VDEQ's Division of Land Protection and Revitalization regarding:

- ❖ Solid or hazardous waste management strategies, including items such as facility siting, long-term (20-year) use and alternative programs (e.g., materials recycling and composting).
- VMRC regarding:
 - ❖ Projects that involve encroachments channel-ward of ordinary high water along non-tidal rivers and streams, and below mean low water in tidal regions.
 - ❖ Permit requirements for impacts to tidal wetlands.

As needed, we would consider the following recommendations from the VDEQ regarding land-disturbing activities:

- Maximize pervious surfaces and green spaces in the construction design to reduce runoff and the environmental impacts thereof.
- Protect indigenous vegetation to the maximum extent practicable by minimizing land disturbance and impervious cover.
- Meet all erosion and sediment control and stormwater management requirements for construction activities as defined by the VDEQ and Chapter 34 Article III, Erosion and Sediment Control Code of Ordinance of the City of Poquoson (City of Poquoson 2013).
- The Service or its agents must prepare an erosion and sediment control plan for review by the VDCR Regional Office serving the project area.
- Any soil suspected of contamination, or wastes that are generated during construction, must be tested and disposed of in accordance with applicable laws and regulations, including the Virginia Hazardous Waste Management Regulations (9 VAC 20–60) and the Virginia Solid Waste Management Regulations (9 VAC 20–80).
- The Service or its agents are responsible for determining whether a solid waste meets the criteria for management as a hazardous waste and, therefore, be managed as such.
- Acquire permit(s) from VMRC for projects that will affect tidal wetlands.
- The Service is ultimately responsible for achieving project compliance through oversight of onsite contractors, regular field inspection, prompt action against non-compliant sites, and other mechanisms consistent with agency policy (VESCL 10.1–567).
- Clearing and grading activities, installation of staging areas,

parking lots, roads, buildings, utilities, borrow areas, soil stockpiles, and related land-disturbing activities that result in the disturbance of 2,500 square feet or more of land are regulated by VESCL and regulations.

- Erosion and sediment controls and best management practices should be inspected and repaired before and after rain events.

Impacts of Alternative A

Beneficial Impacts

Habitat Protection and Management

Limiting disturbance in the 2,027 acres of salt marsh on the refuge would have moderate, direct and indirect, long-term benefits on water resources by preventing coastal erosion, stabilizing sediments suspended in water, and removing pollutants from water runoff. Shoreline erosion has been shown to be one of the most important sources of sediment to water resources, both in Virginia and in the U.S. (USGS 2003). Salt marshes influence regional hydrology patterns by providing extra water uptake and holding capacity, thereby storing floodwater and reducing flood flow rates. A 1-acre wetland can typically store about 1 million gallons of water (EPA 2006). In a study comparing basin areas with varying numbers of wetlands, the Chesapeake Bay had a flood flow that was 50 percent less than a basin with no wetlands (Mitsch and Gosselink 2000). By storing excess water and reducing flow rates, salt marshes restore natural hydrology patterns during and after storm events, effectively protecting coastlines and preventing coastal erosion (Davy et al. 2009). Additionally, salt marshes reduce wave height and energy (Moeller et al. 1996, Morgan et al. 2009, Gedan et al. 2011). Salt marshes have been shown to reduce wave height by more than 60 percent through the baffling and friction effect of upright grasses (Morgan et al. 2009) and to decrease wave energy between 47.4 percent and 100 percent across a salt marsh (Moeller et al. 1996). The ability of salt marshes to dampen wave height and energy further protects coastlines from eroding into the surrounding estuaries.

Acting as natural filters, salt marshes also purify water entering the estuary (Mitsch and Gosselink 2007). As water passing through the marsh is slowed by vegetation (Morgan et al. 2009), suspended sediments in the water are deposited on the marsh surface (Leonard and Luther 1995). Stabilized by the vegetation, nutrients and heavy metals in the sediments are either taken up by the plants and incorporated into living biomass or accumulated in underground sediment as the salt marsh accretes (Teal 1986). Likewise, refuge wetlands filter sediments, nutrients, and heavy metals from terrestrial runoff, groundwater, and rain before the water reaches the Chesapeake Bay. Serving in this function, refuge wetlands contribute to improving the water quality of the estuaries surrounding the refuge.

Limiting disturbance in the maritime shrubland, dune, sandy beach, and mudflat habitats would have minor to moderate, direct and indirect, long-term benefits on water resources. Sand beach and dune ecosystems protect coastlines by reducing the force and effect of waves (Barbier et al. 2011). Beaches and dunes also stabilize sediments in vegetation root structure, which prevents sediment eroding into the surrounding water (Barbier et al. 2011). Further, beaches and dunes store and filter water through sand, providing water catchment and purification services to the surrounding estuaries (Barbier et al. 2011). Therefore, limiting disturbance to these habitats contributes to improving water quality.

Public Use and Access

None identified.

Adverse Impacts

Habitat Protection and Management

Refuge staff and partners conducting annual biological surveys and site visits to assess hazards associated with unexploded ordnance would have negligible, direct, and short-term impacts on local water resources. Refuge staff performing this work would access the refuge by motorized boat. Motorized boats have a wide variety of physical, chemical, and biological impacts on water resources, including resuspension of sediments, introduction of hydrocarbon compounds into the water column and sediments, and damage to aquatic organisms (Mosisch and Arthington 1998). We would minimize impacts to water resources by conducting surveys and site visits using the minimum number of people, boats, and ground-disturbing equipment necessary to complete the task.

Public Use and Access

The refuge's waterfowl hunt would result in negligible, direct, short-term impacts on local water resources. Refuge waterfowl hunt participants and staff maintaining the waterfowl hunt blinds would access Cow Island by motorized boat. Motorized boats have a wide variety of physical, chemical, and biological impacts on water resources, including resuspension of sediments, introduction of hydrocarbon compounds into the water column and sediments, and damage to aquatic organisms (Mosisch and Arthington 1998). We would minimize impacts on local water quality by limiting public access to the refuge waterfowl hunt blinds on Cow Island and by limiting the dates of the waterfowl hunt.

Impacts of Alternative B

Beneficial Impacts

Habitat Protection and Management

In addition to the impacts detailed under alternative A, controlling the spread of phragmites would have minor, indirect, short-term benefits to local water resources. The colonization of a wetland by phragmites

replaces native vegetation, alters the hydrology of the marsh (Windham and Lathrop 1999), and affects nutrient cycles in the wetland (Meyerson et al. 1999). Monitoring and controlling existing phragmites stands would protect the integrity of the refuge habitats, enabling these habitats to decrease sedimentation and contribute to water quality.

Regularly conducting quantitative shoreline surveys to assess accretion and erosion would provide minor, indirect, short-term impacts to local water resources. Collecting quantitative information on the condition and rates of accretion and erosion on the shoreline would allow us to understand how severe shoreline accretion and erosion events are in specific areas, and what protection efforts would be appropriate given the site conditions.

Public Use and Access

Interpretation of the refuge's habitats would provide a negligible, indirect, long-term impact on local water resources. At the designated public use area, interpretation programs explaining the important role that salt marsh vegetation plays in air and water purification, storm abatement, flood control, and nutrient cycling have the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Adverse Impacts

Habitat Protection and Management

Increased biological research activities and control of invasive species on the refuge would result in negligible, direct, short-term impacts to local water resources because of the increased motorized boat use and potential for herbicides to enter local waters. Staff conducting biological research activities and treating invasive species would access the refuge by motorized boat. Such boats have a wide variety of physical, chemical, and biological impacts on water resources, including resuspension of sediments, introduction of hydrocarbon compounds into the water column and sediments, and damage to aquatic organisms (Mosisch and Arthington 1998). Staff conducting biological research activities and treating invasive species would minimize the potential for adverse impacts on water resources by reducing boat speeds when approaching the refuge, limiting boating through areas of SAV, limiting the time that motorized boats idle, and following best management practices for herbicide application.

Public Use and Access

In addition to the impacts detailed under alternative A, designating a kayak and canoe landing area on Cow Island (estimated to be 0.5-acre for this analysis) for new public use opportunities would result in minor, direct, short- and long-term impacts on water quality. In the short term, transforming waterfowl hunt blind #2 on Cow Island to

serve also as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. Construction activities would include creating a motorized boat landing on the shore, staging construction materials, installing posts, and constructing the structure. Construction activities would be completed in less than a month. We would illustrate and promote conservation principles by incorporating ecologically sensitive design concepts, using sustainable construction materials, and employing best management practices. The footprint of the wildlife observation platform and waterfowl hunt blind would be sufficient to support up to 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists use this site. This increased access would result in increased soil destabilization and erosion, as well as damage to native plants. We would use signage to delineate clearly the bounds of the designated public use area, and we would monitor conditions at the designated public use area. Regularly conducting quantitative shoreline surveys would allow us to determine if additional management actions are necessary to protect water quality.

4.5 Soils

We evaluated and compared the management actions proposed under each alternative for their potential to benefit or adversely affect soils.

We compared the benefits of the alternatives from actions that would protect soils from erosion, compaction, or contamination or that would restore eroded, compacted, or contaminated soils, including:

- Following best management practices for soils protection and containment.
- Limiting public access through permits and designating public use areas.

The potential adverse soil effects of the refuge management alternatives that were evaluated included impacts from:

- Construction activities.
- Habitat management and research activities.
- Public uses, such as walking and hunting in designated public use areas.

Impacts of Alternative A**Beneficial Impacts***Habitat protection and management*

Limiting disturbance in refuge habitats would have minor, direct and indirect, long-term benefits to refuge soils. Coastal soils develop under dynamic conditions and are vulnerable to disruption by human activities (Gedan et al. 2009). Boating and shoreline disturbances can exacerbate shoreline change by destabilizing loose soils, damaging native plants, and altering nutrient availability (Mosisch and Arthington 1998). Disturbed areas are highly vulnerable to invasive plants, including phragmites (Silliman and Bertness 2004). Limiting disturbance in all refuge habitats would protect refuge soils and enable ecosystem processes to function naturally.

Limiting disturbance in the 2,027 acres of salt marsh on the refuge would have moderate, direct and indirect, long-term impacts on refuge soils by preventing coastal erosion. Salt marshes store excess water (EPA 2006), reduce flow rates (Mitsch and Gosselink 2000), and reduce wave height and energy (Moeller et al. 1996, Morgan et al. 2009, Gedan et al. 2011), thereby stabilizing soils and protecting the coastline. Additionally, suspended sediments in the water are deposited on the marsh surface (Leonard and Luther 1995) as salt marsh vegetation slows water passing through the marsh (Morgan et al. 2009), contributing to soil accumulation and salt marsh accretion. Belowground vegetative root systems bind sediments, while aboveground biomass adds organic material to the sediment, further contributing to marsh accretion. Limiting disturbance in the salt marsh would protect the salt marsh vegetation and the functioning of salt marsh sedimentation processes, thereby protecting refuge soils.

Limiting disturbance in the maritime shrubland, dune, sandy beach, and mudflat habitats would have minor to moderate, direct and indirect, long-term impacts on refuge soils. Sand beach and dune ecosystems protect coastlines from erosion by reducing the force and effect of waves (Barbier et al. 2011). Beaches and dunes also stabilize sediments in vegetation root structure, which prevents sediment erosion (Barbier et al. 2011).

Public use and access

None identified.

Adverse Impacts*Habitat Protection and Management*

Refuge staff and partners conducting annual biological surveys and site visits to assess hazards associated with unexploded ordnance would have localized, negligible, direct, short-term impacts on refuge soils. Boating and shoreline disturbances can exacerbate shoreline change by destabilizing loose soils, damaging native plants, and altering nutrient availability (Mosisch and Arthington 1998).

Assessing and occasionally removing hazards associated with unexploded ordnance would directly disturb soils and impact vegetation that stabilizes soils. We would minimize impacts to refuge soils by conducting surveys and site visits using the minimum number of people, boats, and ground-disturbing equipment necessary to complete the task.

Public Use and Access

The refuge's waterfowl hunt would have negligible, direct, short-term, local impacts on refuge soils. Coastal soils develop under dynamic conditions and are vulnerable to disruption by human activities (Gedan et al. 2009). Boating to the waterfowl hunt blinds would create boat wakes that could destabilize loose soils and damage native plants (Mosisch and Arthington 1998), resulting in increased loss of refuge soils from erosion. Foot traffic on the shore of Cow Island would cause soil compaction and impacts to dune vegetation, which is vulnerable to trampling (Liddle and Greig-Smith 1975). We would minimize impacts by limiting the number of public hunt days to no more than 30 annually, designating specific hunt locations, and limiting the number of boats and hunters at each hunt location.

Impacts of Alternative B

Beneficial Impacts

In addition to the impacts detailed under alternative A, controlling the spread of phragmites would have minor, indirect, short-term benefits to refuge soils. Long-term stability of salt marshes is dependent on the relative rates of sediment accretion and coastal submergence (Mitsch and Gosselink 1993). The greatest threats to salt marsh soils are invasive species, excessive pressure from herbivores, and sea level rise because each has been shown to alter natural soil biogeochemistry and physical characteristics (Gedan et al. 2009). The colonization of a wetland by phragmites results in lower surface soil salinity, a lower water level, and less pronounced microtopographic relief (Windham and Lathrop 1999). The invasion of phragmites also alters nutrient cycles in wetland soils (Meyerson et al. 1999). Monitoring and controlling existing phragmites stands would protect the integrity of refuge habitats, enabling these habitats to maintain natural soil biogeochemistry and physical characteristics.

Regularly conducting quantitative shoreline surveys to assess accretion and erosion would provide minor, indirect, short-term impacts on refuge soils. Collecting quantitative information on the condition and rates of accretion and erosion on the shoreline would allow us to understand how severe shoreline accretion and erosion events are in specific areas, and what protection efforts would be appropriate given the site conditions.

Public use and access

Interpretation of the refuge's habitats would provide a negligible,

indirect, long-term impact on refuge soils. At the designated public use area, interpretation programs explaining the important role that salt marsh soils play in air and water purification, storm abatement, flood control, and nutrient cycling have the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Adverse Impacts

Habitat Protection and Management

In addition to the impacts detailed under alternative A, an increase in research activities and invasive plant control efforts would result in negligible, direct, short-term impacts on refuge soils. The increase in research activities and invasive species control efforts would increase the frequency of boats accessing and landing on the refuge as well as the number of staff visiting sites on the refuge. We would minimize the impacts of boat wakes, boat landings, and foot traffic by limiting the number of research access areas to a minimal number of specific locations and by conducting multiple surveys during visits to the refuge whenever possible.

Public Use and Access

In addition to the impacts detailed under alternative A, designating a kayak and canoe landing area on Cow Island (estimated to be 0.5-acre for this analysis) for new public use opportunities would result in minor, direct, short- and long-term impacts on refuge soils. In the short term, transforming waterfowl hunt blind #2 on Cow Island to serve also as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. Construction activities would include creating a motorized boat landing on the shore, staging construction materials, installing posts, and constructing the structure. Construction activities would be completed in less than a month.

We would illustrate and promote conservation principles by incorporating ecologically sensitive design concepts, using sustainable construction materials, and employing best management practices. The footprint of the wildlife observation platform and waterfowl hunt blind would be sufficient to support up to 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. This increased use would result in increased soil destabilization and erosion, as well as damage to native plants.

We would use signage to delineate clearly the bounds of the designated public use area, and we would monitor soil conditions at the designated public use area. Regularly conducting quantitative shoreline surveys would allow us to determine if additional management actions are necessary to protect soils.

4.6 Vegetation

The refuge habitats provide diverse habitat components to support breeding birds and other wildlife. We evaluated the benefits and adverse impacts of the management actions under both alternatives on habitats. We considered the benefits from:

- Conserving areas within the refuge's acquisition boundary.
- Conducting native and invasive species management and monitoring.
- Limiting human disturbance on the refuge.
- Developing and implementing an IMP.

We considered the potential for adverse impacts from increased visitation for public use on and adjacent to the refuge, including the construction of visitor use facilities on the refuge.

Impacts of Alternative A

Beneficial Impacts

Habitat Protection and Management

Limiting disturbance in the 2,027 acres of salt marsh on the refuge would provide minor to moderate, direct, long-term benefits to refuge vegetation. Salt marshes are exceptionally productive ecosystems, rivaling that of productive agricultural lands (Odum 1959). Salt marshes along marine coasts require sufficient shelter to ensure sedimentation processes function naturally and to reduce erosion from wave action (Beefink 1977). Salt marsh sediments come from river or creek silt, organic productivity in the marsh, or deposition by tides. Suspended sediments in the water are deposited on the marsh surface (Leonard and Luther 1995), where nutrients and heavy metals in the sediments are either taken up by plants and incorporated into living biomass or accumulated in underground sediment as the salt marsh accretes (Teal 1986). Sedimentation increases marsh elevation, further protecting vegetation from wave action, and provides salt marsh vegetation with vital nutrient inputs (Mitsch and Gosselink 2000). Additionally, because wetland plants have varying degrees of salinity tolerance, the reduction of wave activity in the salt marsh changes salinity levels across the marsh and promotes higher plant diversity on the refuge. Limiting disturbance in the salt marsh enables the marsh to function naturally, promoting overall vegetative growth and diversity.

Limiting disturbance in the maritime shrubland, dune, sandy beach, and mudflat habitats would provide minor to moderate, direct, local, long-term impacts on the refuge's salt marsh and dune vegetation. Sand beach and dune ecosystems protect coastlines by reducing the force and effect of waves (Barbier et al. 2011). Beaches and dunes also stabilize sediments in vegetation root structure, which prevents sediment eroding into the surrounding water (Barbier et al. 2011). Protecting the beach and dune habitats will protect the salt marsh vegetation from the impacts of wave energy and erosion. Dune vegetation is vulnerable to trampling and driving activities (Liddle and Grieg-Smith 1975, Rickard et al. 1994). The loss of dune vegetation results in sediment destabilization, increased erosion, and further loss of dune vegetation. Limiting disturbance in the maritime shrubland, dune, sandy beach, and mudflat habitats would support the natural functioning of those habitats, thereby protecting refuge vegetation.

Limiting disturbance throughout refuge habitats would have minor, direct and indirect, long-term impacts on refuge vegetation by protecting SAV. Disturbance of sediments by currents and waves lead to patchy beds or the complete absence of SAV (Koch et al. 2006). SAV is a critically important component of the aquatic environment in the Chesapeake Bay, and its presence and condition are indicators of good water quality. SAV is a major food source for wildlife, including migratory waterfowl; provides refuge for juvenile crabs and fish; stabilizes sediments preventing shoreline erosion and excessive suspended materials in the water column; and produces oxygen in the water column. SAV can only thrive in shallow depths where light reaches the benthic zone (i.e., bottom of the waterbody). Limiting disturbance throughout the refuge would prevent erosion and decrease sedimentation, thereby promoting the success of SAV.

Public Use and Access

None identified.

Adverse Impacts

Habitat Protection and Management

Refuge staff and partners conducting annual biological surveys and site visits to assess hazards associated with the PTI Range FUDS would have localized, negligible, direct, short-term impacts on refuge vegetation. Boating and shoreline disturbances can exacerbate shoreline change by destabilizing loose soils, damaging native plants, and altering nutrient availability (Mosisch and Arthington 1998). Assessing and occasionally removing UXO hazards to protect refuge staff and partners conducting annual biological surveys and site visits would affect vegetation by removing or trampling plants. We would minimize impacts to refuge vegetation by conducting surveys and site visits using the minimum number of people, boats, and ground-disturbing equipment necessary to complete the task.

Due to staffing and resource limitations, our inability to manage invasive species under this alternative would result in localized, minor, indirect, long-term impacts on the refuge's salt marsh, maritime shrubland, and dune habitats. If left uncontrolled, phragmites infestations would alter wetland hydrology (Blossey 1999, Windham and Lathrop 1999) and decrease the diversity and abundance of native plant species in those wetlands (Meyerson et al. 2000). Over time, the colonization of phragmites would affect nutrient cycles in the wetland (Meyerson et al. 1999) and outcompete native vegetation.

Although nutria have not yet been detected on the refuge, we would monitor the refuge's habitats for signs of nutria presence and activity because nutria can cause dramatic changes in wetlands by eating roots and stems of wetland plants, which then results in conversion of marshes into unvegetated mudflats (Ehrlich 1962, Holm et al. 2011).

Public Use and Access

The refuge's waterfowl hunt would result in negligible, direct, short-term impacts on refuge vegetation near each of the hunt blinds on Cow Island. Compaction of soils and trampling of vegetation may result from hunt participants accessing the refuge's hunt blinds, anchoring boats, or retrieving waterfowl. To avoid or minimize the potential for adverse impacts on refuge vegetation, we would limit waterfowl hunting to no more than 30 days within the State's waterfowl hunt season (late October through late January). Vegetation is dormant through most of this hunting season, thereby limiting the potential for permanent loss or damage to vegetation.

Impacts of Alternative B

Beneficial Impacts

Habitat Protection and Management

In addition to the impacts detailed under alternative A, initiation of invasive species control efforts would have a negligible to minor, direct, long-term local benefits to refuge vegetation. Known infestations of phragmites in the refuge's salt marsh, maritime shrubland, and dune habitats are of concern because phragmites infestations alter wetland hydrology (Blossey 1999, Windham and Lathrop 1999) and decrease the diversity and abundance of native plant species in those wetlands (Meyerson et al. 2000). phragmites control efforts would prevent further spread and colonization of the salt marsh, maritime shrubland, and dune habitats, preventing the displacement of native vegetation.

Initiating the Salt Marsh Integrity Index would provide minor, indirect, long-term regional benefits to refuge vegetation. Many national wildlife refuges have been established in coastal areas to protect large tracts of salt marsh and wetland-dependent species because salt marshes are highly productive ecosystems (Odum 1959); protect coastal shorelines from wave energy and erosion (Moeller et

al. 1996, Mitsch and Gosselink 2000, Morgan et al. 2009, Gedan et al. 2011); purify water and increase water quality (Teal 1986); and provide habitat for a diverse array of species. At coastal refuges along the North Atlantic Ocean, Service employees are measuring a suite of metrics (such as vegetation, water level and elevation, salinity, nekton, and breeding birds) to assess salt marsh integrity and management decisions (Neckles et al. 2013). Under alternative B, we would initiate the Salt Marsh Integrity Index at the refuge. By acquiring this baseline information about the integrity of the salt marsh, we would be able to monitor changes, such as accretion and erosion occurring in the marsh habitat, assess the severity of those changes, and determine whether management actions are necessary.

Regularly conducting quantitative shoreline surveys to assess accretion and erosion would provide minor, indirect, short-term impacts on refuge vegetation. Collecting quantitative information on the condition and rates of accretion and erosion on the shoreline would allow us to understand how severe shoreline accretion and erosion events are in specific areas, how accretion and erosion are affecting vegetative communities, and what protection efforts would be appropriate given the site conditions.

Public Use and Access

Interpretation of the refuge's habitats would provide a negligible, indirect, long-term impact on refuge vegetation. At the designated public use area, interpretation programs explaining the important role that salt marsh vegetation plays in air and water purification, storm abatement, flood control, and nutrient cycling has the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Adverse Impacts

Habitat Protection and Management

In addition to the impacts detailed under alternative A, an increase in research activities and invasive plant control efforts would result in negligible, direct, short-term impacts on refuge vegetation. The increase in research activities and invasive species control efforts would increase the frequency of boats accessing and landing on the refuge as well as the number of staff visiting sites on the refuge. We would minimize the impacts of boat wakes, boat landings, and foot traffic by limiting the number of research access areas to a minimal number of specific locations and by conducting multiple surveys during visits to the refuge whenever possible.

Invasive species control efforts would also have negligible, direct, short-term impacts on refuge vegetation. Treating phragmites stands mechanically or by applying herbicides has the potential for accidental kill of native plants nearby that inadvertently receive treatment. We

would minimize the impacts of accidental kill by following best management practices and recommendations for chemical application to protect native plants.

Public Use and Access

In addition to the impacts detailed under alternative A, designating a kayak and canoe landing area on Cow Island (estimated to be 0.5-acre for this analysis) for new public use opportunities would result in minor, direct, short- and long-term impacts on refuge vegetation. In the short term, transforming waterfowl hunt blind #2 on Cow Island to serve also as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. Construction activities would include creating a motorized boat landing on the shore, staging construction materials, installing posts, and constructing the structure. Construction activities would be completed in less than a month. We would illustrate and promote conservation principles by incorporating ecologically sensitive design concepts, using sustainable construction materials, and employing best management practices. The footprint of the wildlife observation platform and waterfowl hunt blind would be sufficient to support up to 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists use this site. This increased use would result in increased soil destabilization and erosion, as well as damage to native plants. We would use signage to delineate clearly the bounds of the designated public use area, and we would monitor vegetation condition at the designated public use area. Regularly conducting quantitative shoreline surveys would allow us to determine if additional management actions are necessary to protect vegetation.

4.7 Birds

We evaluated the management actions we proposed in the alternatives for their potential to benefit bald eagles and other bird species by protecting them or their potential habitat. The benefits we considered included

- Protection, enhancement, and restoration of habitats.
- Reduction in invasive plants.
- Development and implementation of an IMP.

The potential adverse effects of the alternatives that we evaluated included impacts from:

- Increased visitation.
- Invasive species control activities.

Impacts of Alternative A

Beneficial Impacts

Habitat Protection and Management

Limiting disturbance in the refuge's salt marsh habitat would continue to provide moderate, direct, long-term impacts on breeding, migrating, and wintering birds along the Atlantic Flyway. American black ducks are found in their highest densities within the least disturbed salt marshes in the Chesapeake Bay (Watts 1999). These habitats provide optimal breeding habitat, migratory feeding grounds, and wintering grounds for black ducks (Longcore et al. 2000). As the largest contiguous salt marsh habitat in the southern Chesapeake Bay, the refuge is also important nesting habitat for saltmarsh sparrows and clapper rails because other wetlands have been ditched and drained or are degrading (ACJV 2008, Watts 2006). The refuge is part of the Western Shore Marshes IBA because the marsh habitat supports clapper rails, seaside sparrows, marsh wrens, sedge wrens, northern harriers, prairie warblers, eastern meadowlarks and many other breeding and migrant shorebirds and waterbirds. The isolation of the marsh from human disturbance is especially important to colonial waterbirds such as American black ducks, American oystercatchers, snowy egrets, herring gulls, and boat-tailed grackles (Watts 2006). As human disturbance of colonial waterbirds is a primary threat to this IBA (Watts 2006), we would continue to limit disturbance in the refuge's salt marsh to promote avian use of the refuge for breeding, resting, and foraging.

Limiting disturbance in the maritime shrubland and dune habitat has minor, direct, long-term impacts on breeding, migrating, and wintering bird populations on the refuge. Dominant shrub and tree species within this habitat type support a variety of migratory birds, including eagles, raptors, and songbirds. Bald eagles roost in trees that are taller, of larger diameter, and have a wider canopy than other adjacent trees; are located close to water; and are preferably at least 1,640 feet (500 meters) from paved roads or buildings (Buehler et al. 1991). Other raptors and migratory species use the upland forested areas surrounding the refuge's salt marsh habitat for roosting and nesting (Watts 2006). Natural forested uplands along the Atlantic Coast have been identified as important stopover sites for migratory songbirds along the northeastern U.S. (Buler and Dawson 2014). The dunes within this habitat type are important to breeding and roosting shorebirds, such as least terns and American oystercatchers (Watts 2006, Nol and Humphry 2012). Human disturbance and development of outer coast beach habitats is thought to be the cause of a habitat shift by American oystercatchers to use beaches that are more interior. Outside of their breeding season, roosting areas are

concentrated on dunes near abundant food sources (Nol and Humphry 2012), like what is provided by the oyster beds and mudflats adjacent to the refuge. Therefore, we would continue to limit disturbance in the refuge's maritime shrubland and dune habitat for the benefit of breeding, migrating, and wintering birds.

Continuing to limit disturbance in the sandy beach and mudflat habitat would have moderate, direct, long-term impacts on nesting and migrating birds, specifically waterbirds and shorebirds. Because exposed mudflats are considered one of the most important foraging habitats for non-breeding shorebirds (Harrington and Perry 1995), limiting disturbance in intertidal areas is critically important for shorebirds during the spring and fall migration seasons. Additionally, intertidal areas have high importance to breeding waterbird populations because of their proximity to principle foraging areas. The sandy beaches near large tidal mudflat and estuary habitats have higher abundance and diversity of shorebirds as compared to other beach systems (Neuman et al. 2008, Colwell and Sundeen 2008), and many high priority shorebirds along the Atlantic Flyway depend on these beaches and mudflats as staging areas during their spring and fall migrations. Protection of these habitats includes minimizing disturbance on nesting beaches, migratory stopovers, and wintering locations (ACJV 2008).

Limiting disturbance in all refuge habitats would protect the estuaries and SAV beds adjacent to the refuge, and would have moderate, indirect, long-term impacts on wintering waterfowl species because these areas provide critical foraging areas for a number of priority wintering waterfowl species, such as the canvasback and redhead (ACJV 2008). In the Chesapeake Bay, female wintering canvasbacks and redheads primarily use shallow bays and bays with sandy substrates (Rhodes 1989, Woodin and Michot 2002); bays adjacent to the refuge are shallow and have sandy substrates. Canvasbacks and redheads forage primarily on coastal plants if available during the winter and migration seasons (Mowbray 2002, Woodin and Michot 2002). Although shoal grass is the preferred diet of the redhead, they will forage on other SAV species (e.g., *Potamogeton*, *Ruppia*, *Zostera*, *Najas* spp.) where shoal grass is not found (Stewart 1962, Perry et al. 1981). Reduced availability of SAV due to high sediment loads and nutrient runoff is thought to be linked to the dietary shifts in canvasbacks; Rhodes (1989) also found that canvasbacks in the Chesapeake Bay have shifted to a clam diet. We would continue to limit disturbance of refuge habitats to protect important wintering foraging habitats for these to Atlantic Flyway priority species adjacent to the refuge.

Public Use and Access
None identified.

Adverse Impacts

Habitat Protection and Management

Due to staffing and resource limitations, our inability to manage invasive species under this alternative would result in localized, minor, indirect, long-term impacts on birds that depend on the refuge's salt marsh, maritime shrubland, and dune habitats. Known infestations of phragmites in the refuge's salt marsh, maritime shrubland, and dune habitats would have localized, minor, indirect, long-term impacts on birds. Habitat loss due to phragmites infestation was identified as the primary threat to the Western Shore Marshes IBA (Watts 2006). Although phragmites had not caused extensive damage to these habitats as of 2006, this aggressively invasive species can spread rapidly and create unsuitable conditions for nesting birds that rely on dune and marshes (Watts 2006) by altering wetland hydrology, nutrient cycling, and native plant communities (Blossey 1999; Windham and Lathrop 1999; Meyerson et al. 1999; and Meyerson et al. 2000).

Although nutria have not yet been detected on the refuge, we would monitor the refuge's habitats for signs of nutria presence and activity because nutria can cause dramatic changes in wetlands by eating roots and stems of wetland plants, which then results in conversion of marshes into unvegetated mudflats (Ehrlich 1962, Holm et al. 2011).

Public Use and Access

The refuge's waterfowl hunt would continue to result in a negligible, direct, short-term impact on waterfowl species that are permitted to be hunted. The harvesting of wildlife on refuges is carefully regulated to ensure equilibrium between population levels and wildlife habitat. Prior to opening to waterfowl hunting for the 1999 to 2000 season, the Service's Office of Migratory Birds determined that sufficient populations of waterfowl existed to permit hunting at Plum Tree Island NWR (USFWS 1999). Also, refuge hunt participants harvested approximately half as many ducks or geese per hunter use day as compared to the national harvest (1.25 versus 2.3 ducks or geese, respectively; USFWS 2012b). A total of 66 ducks or geese were reported to be harvested by refuge waterfowl hunt participants between 2009 and 2012 (USFWS 2012b).

The hunt program would have minor, direct, short-term impacts on non-target birds because hunting season occurs outside of the breeding and migratory seasons for shorebirds and waterbirds. Impacts would be minimized by enforcement of State and Federal regulations, including the use of non-toxic shot for waterfowl hunting (4VAC15-260-140 and 50 CFR 20.21, respectively), and refuge-specific regulations that limit the number of public hunt days, hunt locations, hunting party composition, and hunting practices (50 CFR 32.66). We limit human disturbance in the majority of the refuge by only allowing waterfowl hunting to occur at six designated locations on

Cow Island, affecting up to 211 acres of the 3,502-acre refuge. On non-hunting days, waterfowl can rest, feed, and move throughout the entire refuge without the influence of human disturbance.

Impacts of Alternative B

Beneficial Impacts

Habitat Protection and Management

In addition to the impacts detailed under alternative A, control of invasive species would provide negligible, direct, long-term local benefits to waterbirds and shorebirds that nest in the salt marsh, maritime shrubland, and dune habitats. Habitat loss due to phragmites infestation was identified as the primary threat to the Western Shore Marshes IBA (Watts 2006). Although phragmites had not caused extensive damage to these habitats as of 2006, this aggressively invasive species can spread rapidly and create unsuitable conditions for nesting birds that rely on dune and marshes (Watts 2006).

Inventorying and monitoring priority refuge resources of concern (appendix A) would have minor, indirect, long-term benefits on all bird species that use the refuge for nesting, migration, or wintering. Through the IMP, we would monitor the following surrogate species: clapper rails, saltmarsh sparrows, American black ducks, and nesting black skimmers. We would also monitor other breeding and migrating shorebirds and waterbirds. This information would enable biologists and managers to recognize population trends within these species and identify potential changes in management that may be needed to protect the species or the habitat on which these birds depend.

Public Use and Access

Expanding the refuge's waterfowl hunt to include youth opportunities and improved hunt administration would provide negligible, indirect, long-term regional benefits to waterfowl populations because our program engages the public and builds appreciation for the species. Encouraging youth participation aims to support a tradition. The improved hunt administration would enable more local hunters to be involved in the refuge hunt program.

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, long-term regional, benefits to bird populations. Observing birds and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Adverse Impacts

Habitat Protection and Management

Control of invasive species would provide negligible, indirect, short-

term impacts to waterbirds and shorebirds that nest in the salt marsh, maritime shrubland, and dune habitats. During active treatment of phragmites, birds may be temporarily disturbed. The prime treatment time for phragmites is August through October (Swearingen et al. 2010), which lies outside of the prime breeding season for marsh and dune breeding birds on the refuge (Rush et al. 2012, Greenlaw and Rising 1994, Gochfeld and Burger 1994). We would follow best management practices and label instructions for wetland chemical application, and follow guidelines for invasive plant control activities as detailed in the refuge's invasive species management plan.

Inventorying and monitoring priority refuge resources of concern (appendix A) would have minor, direct, short-term impacts on all bird species that use the refuge for nesting, migration, or wintering. Increased human activity in the area would result in temporary disturbance to bird species near the research sites. We would minimize the potential for impacts by limiting the number of site visits, duration of visits, and the number of researchers.

Public Use and Access

Adding a youth waterfowl hunt day under alternative B would result in no new adverse impacts on birds; waterfowl hunting impacts on target and non-target bird species would be the similar to those detailed under alternative A.

Designating a kayak and canoe landing area on Cow Island (estimated to be 0.5-acre for this analysis) for new public use opportunities would result in minor, direct, short- and long-term impacts on birds. Because the refuge is only open to limited waterfowl hunting, birds on the refuge experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to serve also as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists use this site. The time of year when access occurs can greatly affect birds that have historically used closed areas for foraging, nesting, or roosting (ACJV 2008). To minimize disturbance of birds in adjacent areas, we would clearly mark the boundaries of the designated public use area. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities.

4.8 Fisheries

We compared the management actions in the alternatives based on their potential to benefit or adversely affect the refuge's fishery,

including actions to help maintain and improve the water quality of the Chesapeake Bay, the refuge wetlands, and the watershed. We evaluated the actions that would benefit the fishery by reducing sedimentation and erosion, protecting or restoring riverine functions influenced by vegetation and hydrology, and maintaining or improving water quality. These actions include:

- Maintaining natural habitats.
- Coordinating with Federal and State partners to influence water quality in the watershed and protect fisheries and aquatic resources.

We compared the impacts of these refuge management actions with the potential to cause adverse effects on the fishery, particularly by altering refuge hydrology or degrading water quality. The actions we evaluated include:

- Applying herbicides to manage invasive species.
- Constructing and maintaining facilities.

Impacts of Alternative A

Beneficial Impacts

Habitat Protection and Management

Limiting disturbance in the 2,027 acres of salt marsh on the refuge would have minor, direct and indirect, long-term benefits to fisheries by protecting the habitat features that boost production of ecologically important fishery species, such as shrimp, oysters, and fishes (Boesch and Turner 1984). Because salt marshes have a complex and tightly packed plant structure that is mostly inaccessible to larger fishes, marshes protect and shelter young fishes, shrimp, and shellfish for increased growth and survival (Boesch and Turner 1984). Accessing the vegetated marsh surface is beneficial to fish diets and growth rates (MacKenzie and Dionne 2008). As discussed in the water resources, soils, and vegetation impacts sections, limiting disturbance in the salt marsh would prevent erosion and protect the integrity of the ecosystem, thereby protecting the habitat features that support migratory and resident fish of various life stages.

Limiting disturbance in the salt marsh, maritime shrubland, dune, sandy beach, and mudflat habitats would have minor, direct and indirect, long-term impacts on fisheries by protecting SAV, which serves as habitat for species such as scallops, shrimp, crabs, and juvenile fish (Barbier et al. 2011). Disturbance of sediments by currents and waves lead to patchy beds or the complete absence of SAV (Koch et al. 2006). SAV beds nourish fishery species through leaves, detritus, and epiphytes while also protecting them from predators (Barbier et al. 2011). Limiting disturbance in these habitats would prevent erosion and decrease sedimentation, further promoting

the success of SAV and supporting juvenile fish species.

Public Use and Access

None identified.

Adverse Impacts

Habitat Protection and Management

Due to staffing and resource limitations, our inability to manage invasive species under this alternative would result in localized, minor, indirect, and long-term impacts on fisheries. If left uncontrolled, phragmites infestations would alter wetland hydrology (Blossey 1999, Windham and Lathrop 1999) and decrease the diversity and abundance of native plant species in those wetlands (Meyerson et al. 2000). Over time, the colonization of phragmites would affect nutrient cycles in the wetland (Meyerson et al. 1999) and outcompete native vegetation.

Although nutria have not yet been detected on the refuge, we would monitor the refuge's habitats for signs of nutria presence and activity because nutria can cause dramatic changes in wetlands by eating roots and stems of wetland plants, which then results in conversion of marshes into unvegetated mudflats (Ehrlich 1962, Holm et al. 2011).

Public Use and Access

The refuge's waterfowl hunt would result in minor, direct and indirect, short- and long-term adverse impacts on fisheries. Refuge waterfowl hunt participants and staff maintaining the waterfowl hunt blinds would access Cow Island by motorized boat. Such boats have a wide variety of physical, chemical, and biological impacts on fish species and their habitats, including resuspension of sediments, introduction of hydrocarbon compounds into the water column and sediments, and damage to aquatic organisms (Mosisch and Arthington 1998). In shallow waters, human actions can negatively affect fish due to the instinctual survival response of the species. When in close proximity to humans, fish will react by fleeing and discontinue their current activity (feeding or resting). We would minimize impacts on fishery species by limiting public access to the refuge to the refuge waterfowl hunt blinds on Cow Island and limiting the number of refuge waterfowl hunt days.

Impacts of Alternative B

Beneficial Impacts

Habitat Protection and Management

In addition to the impacts detailed under alternative A, controlling the spread of phragmites would have minor, indirect, short- and long-term impacts on fisheries. The colonization of a wetland by phragmites replaces native vegetation, alters the hydrology of the marsh (Windham and Lathrop 1999), and affects nutrient cycles in the wetland (Meyerson et al. 1999). These changes in the marsh could alter the ability of migratory and resident fish of various life stages to

use that habitat. Monitoring and controlling existing phragmites stands will protect the integrity of the salt marsh, maritime shrubland, dune, sandy beach, and mudflat habitats, enabling these habitats to support young fishery species.

Inventorying and monitoring priority refuge resources of concern (appendix A) would have negligible, indirect, long-term benefits on fishery species that use the refuge for foraging or shelter. Although no fish species are identified as priority refuge resources of concern, they use the salt marsh habitats that will be monitored under the Salt Marsh Integrity Index. The Salt Marsh Integrity Index includes surveys of marsh vegetation and nekton, which are important components of the fishery. This information would enable biologists and managers to recognize population trends within these species and identify potential changes in management that may be needed to protect the species or the habitat on which fish depend.

Regularly conducting quantitative shoreline surveys to assess accretion and erosion would provide minor, indirect, short-term benefits to fisheries. Collecting quantitative information on the condition and rates of accretion and erosion on the shoreline would allow us to understand how severe shoreline accretion and erosion events are in specific areas, how those events may be affecting SAV, and what protection efforts would be appropriate given the site conditions.

Public Use and Access

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, long-term regional benefits to fish populations. Observing fish and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Adverse Impacts

Habitat Protection and Management

Increased biological research activities and control of invasive species on the refuge would result in negligible, direct, short-term impacts to fisheries because of the increased motorized boat use and potential for herbicides to enter local waters. Staff conducting biological research activities and treating invasive species would access the refuge by motorized boat. Such boats have a wide variety of physical, chemical, and biological impacts on fish species and their habitats, including resuspension of sediments, introduction of hydrocarbon compounds into the water column and sediments, and damage to aquatic organisms (Mosisch and Arthington 1998). Increased boat access resulting in increased sedimentation could also lead to patchy or absent SAV beds (Koch et al. 2006) in the areas surrounding the

access locations. Staff conducting biological research activities and treating invasive species would minimize the potential for adverse impacts on fish by reducing boat speeds when approaching the refuge, limiting boating through areas of SAV, limiting the time that motorized boats idle, and following best management practices for herbicide application.

Public Use and Access

In addition to the impacts detailed under alternative A, designating a kayak and canoe landing area on Cow Island (estimated to be 0.5-acre for this analysis) for new public use opportunities would result in minor, direct, short- and long-term impacts on fishery species. In the short term, transforming waterfowl hunt blind #2 on Cow Island to serve also as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists use this site. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In an effort to avoid or minimize the potential for expanded long-term adverse impacts to fishery species and their habitats, we would monitor conditions at the estimated 0.5-acre designated public use area.

4.9 Mammals

We compared the management actions in the alternatives based on their potential to benefit or adversely affect the refuge's mammals. The benefits we considered included:

- Protection of native habitats
- Invasive species management.

The potential adverse effects of the alternatives that we evaluated included impacts from increased visitation.

Impacts of Alternative A

Beneficial Impacts

Habitat Protection and Management

Limiting disturbance in salt marsh habitat would have minor, direct, long-term benefits for mammals on the refuge. Limiting disturbance protects the native plants and animals in the salt marsh that the muskrat depends on, such as wetland plants, crustaceans, and fish (<http://www.dgif.virginia.gov/wildlife/problems/musk rats>; accessed May 2014).

Limiting disturbance of maritime shrubland and dune habitat would provide negligible to minor, direct, long-term benefit to local mammals that use the shrubs and trees as roosting and foraging areas, such as red bats. This species uses trees and leaf litter for roosting year-round and feed on mosquitoes, moths, beetles, and other insects (Harvey et al. 2011). Limiting disturbance in wooded areas on the refuge would also be beneficial to other mammals like white-tailed deer, raccoon, and red fox that use those habitat types for cover and foraging.

Public Use and Access

None identified.

Adverse Impacts

Habitat Protection and Management

Due to staffing and resource limitations, our inability to manage invasive species under this alternative would result in localized, minor, indirect, and long-term impacts on mammals. If left uncontrolled, phragmites infestations would alter wetland hydrology (Blossey 1999, Windham and Lathrop 1999) and decrease the diversity and abundance of native plant species in those wetlands (Meyerson et al. 2000). Over time, the colonization of phragmites would affect nutrient cycles in the wetland (Meyerson et al. 1999) and outcompete native vegetation.

Although nutria have not yet been detected on the refuge, we would monitor the refuge's habitats for signs of nutria presence and activity because nutria can cause dramatic changes in wetlands by eating roots and stems of wetland plants, which then results in conversion of marshes into unvegetated mudflats (Ehrlich 1962, Holm et al. 2011).

Public Use and Access

The hunt program would have minor, direct, short-term impacts on mammals. Impacts would be minimized by enforcement of State and Federal regulations, including refuge-specific regulations that limit the number of public hunt days, hunt locations, hunting party composition, and hunting practices (50 CFR 32.66). Each hunting party is allowed to have one retrieval dog; however, retrieval dogs should be under the control of their owners and interactions with refuge mammals should be minimal (USFWS 2007b). We limit human disturbance in the majority of the refuge by only allowing waterfowl hunting to occur at six designated locations on Cow Island, affecting up to 211 acres of the 3,502-acre refuge. On non-hunting days, mammals can rest, feed, and move throughout the entire refuge without the influence of human disturbance.

Impacts of Alternative B

Beneficial Impacts

Habitat Protection and Management

In addition to the impacts detailed under alternative A, control of

invasive species would provide negligible to minor, direct, local, long-term benefit to native mammals that depend on the wetland habitats. With approximately 20 acres currently infested with phragmites, the refuge would have limited impact from its removal. Native mammal species, like the muskrat, are dependent on the wetland plants for cover and as a dominant part of their diet (May 2004; <http://www.dgif.virginia.gov/wildlife/problems/muskkrats>; accessed May 2014). If phragmites is allowed to spread, it would develop a monoculture stand that would eliminate the plant diversity needed by these wildlife species for cover and foraging (Swearingen et al. 2010). If a larger infestation arises in the future, we would increase control efforts to protect and restore native species in impacted habitats.

Inventorying and monitoring priority refuge resources of concern (appendix A) would have negligible, indirect, long-term benefits to mammal species that use the refuge for foraging or shelter. Although no mammal species are identified as priority refuge resources of concern, they use habitats that will be monitored under the Salt Marsh Integrity Index. Habitat monitoring would enable biologists and managers to recognize population trends within these species and identify potential changes in management that may be needed to protect the species or the habitat on which mammals depend.

Public Use and Access

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to mammal populations. Observing mammals and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Adverse Impacts

Habitat Protection and Management

Control of invasive species would provide negligible, indirect, local, short-term impacts to mammals in the salt marsh, maritime shrubland, and dune habitats. During active treatment of phragmites, mammals may be temporarily disturbed. We would conduct invasive plant control in small patches and with as few trips as needed. We would follow best management practices, label instructions for wetland chemical application, and follow guidelines for invasive plant control activities as detailed in the refuge's invasive species management plan. We would also minimize the potential for impacts by limiting the number of site visits and duration of visits.

Inventorying and monitoring priority refuge resources of concern (appendix A) would have minor, direct, short-term impacts on mammals that use the refuge for foraging and cover. Increased human activity in the area would result in temporary disturbance to mammals

near the research sites. We would minimize the potential for impacts by limiting the number of site visits, duration of visits, and the number of researchers.

Public Use and Access

Adding a youth waterfowl hunt day under alternative B would result in no new impacts on mammals; waterfowl hunting impacts on mammals would be the similar to those detailed under alternative A.

Designating a kayak and canoe landing area on Cow Island (estimated to be 0.5-acre for this analysis) for new public use opportunities would result in minor, direct, short- and long-term impacts on mammals. Because the refuge is only open to limited waterfowl hunting, mammals on the refuge currently experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to serve also as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists use this site. Human disturbance would potentially cause mammals to flee (Knight and Cole 1991). Females with young are more likely to flee from disturbance than those without young (Hammitt and Cole 1998). To minimize disturbance of mammals in adjacent areas, we would clearly mark the boundaries of the designated public use area. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities.

4.10 Reptiles

We compared the management actions in the alternatives based on their potential to benefit or adversely affect the refuge's reptiles. The benefits we considered included:

- Protecting native habitats
- Reducing invasive plants
- Limiting human disturbance.

The potential adverse effects of the alternatives that we evaluated included impacts from:

- Mechanical removal and herbicide application for invasive species control
- Increased visitation.

Impacts of Alternative A

Beneficial Impacts

Habitat Protection and Management

Limiting disturbance of the salt marsh habitat would have minor, direct, long-term benefits to reptile species, especially the diamondback terrapin because it relies on the coastal salt marsh for its complete life cycle. Protecting the native habitat of the salt marsh includes protecting salt marshes from extreme wave and storm erosion, allowing sedimentation to build the marsh and nourish vegetation, and coastal subsidence (Mitsch and Gosselink 2000). These processes are important to the wildlife species within this habitat, including prey species of terrapins (e.g., fiddler crabs, mussels, snails). Terrapins feeding keep prey populations in check and help maintain the natural balance of the salt marsh ecosystem.

Limiting disturbance in maritime shrubland and dune habitat would have a minor, direct, long-term benefit for reptile species, such as the hognose snake. Alteration of the hognose snake's preferred woodland habitat that has sandy soils along coastal areas is thought to be a contributor to this population's decline (<http://srelherp.uga.edu/snakes/hetpla.htm>; accessed December 2014).

Limiting disturbance on sandy beaches and mudflats habitat would have moderate, direct, long-term benefits for diamondback terrapins that use this habitat for nesting. Nesting habitat for terrapins is already limited in the Chesapeake Bay because sandy beach stretches are narrow, discontinuous, and interspersed with sections of salt marsh (Brennessel 2006). Habitat destruction is one of the major contributing factors that has made diamondback terrapin populations vulnerable (Baker et al. 2012).

Public Use and Access

None identified.

Adverse Impacts

Habitat Protection and Management

Due to staffing and resource limitations, our inability to manage invasive species under this alternative would result in minor, indirect, long-term local impacts on reptiles. If left uncontrolled, phragmites infestations would alter wetland hydrology (Blossey 1999, Windham and Lathrop 1999) and decrease the diversity and abundance of native plant species in those wetlands (Meyerson et al. 2000). Over time, phragmites colonization would affect nutrient cycles in the wetland (Meyerson et al. 1999) and outcompete native vegetation.

Although nutria have not yet been detected on the refuge, we would monitor the refuge's habitats for signs of nutria presence and activity because nutria can cause dramatic changes in wetlands by eating roots and stems of wetland plants, which then results in conversion of

marshes into unvegetated mudflats (Ehrlich 1962, Holm et al. 2011).

Public Use and Access

None identified.

Impacts of Alternative B

Beneficial Impacts

Habitat Protection and Management

In addition to the impacts detailed under alternative A, control of phragmites in the salt marsh, sandy beach, and dune habitats has minor, indirect, long-term benefits for reptiles, such as diamondback terrapins. Though the phragmites infestation is small (approximately 20 non-contiguous acres), it could deteriorate nesting habitat if allowed to spread. Other terrapin nesting habitats along the mid-Atlantic coast have reported that dense mats of phragmites above and below the ground surface reduces the availability of suitable nesting areas for terrapins (Simoes and Chambers 1999). Controlling the spread of phragmites is critically important for protecting diamondback terrapin nesting habitat.

Inventorying and monitoring priority refuge resources of concern (appendix A) would have minor, indirect, long-term benefits for reptile species that use the refuge for foraging, shelter, and nesting. Through the IMP, we would monitor diamondback terrapin as a surrogate species. This information would enable biologists and managers to recognize population trends within these species and identify potential changes in management that may be needed to protect the species or the habitat on which reptiles depend.

Public Use and Access

In addition to the impacts detailed under alternative A, opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to reptile populations. Observing reptiles and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Adverse Impacts

Habitat Protection and Management

Control of invasive species would provide negligible, direct, local, short-term impacts on reptiles in the shrubland, dune, and salt marsh habitats. During active treatment of phragmites, there may be disturbance to the reptiles in the dune and marsh habitat. Female diamondback terrapins lay their eggs from April through July, and the young may remain in the nest through their first winter to emerge the following year in April and May (<http://www.arkive.org/diamondback-terrapin/malaclemys-terrapin/>; accessed December 2014).

Phragmites control efforts may affect young terrapins that overwinter in the dune nests. The prime treatment time for phragmites is August through October (Swearingen et al. 2010). Adverse impacts on diamondback terrapins would be minimized to the maximum extent practicable by monitoring terrapin habitat conditions and nesting activities. This information would allow refuge staff to plan and conduct phragmites control efforts with minimal impact on terrapins. All management actions will follow best management practices, label instructions for wetland chemical application, and will follow guidelines in the refuge's invasive species management plan.

Development and implementation of inventory and monitoring of priority refuge resources of concern (appendix A) would have minor, direct, short-term impacts on reptiles that use the refuge for foraging, nesting, and cover. Increased biological inventories, monitoring, and research activity in the area will cause minor disturbance to reptile species that use the refuge habitats; however, monitoring trips will be limited by weather conditions, remoteness, and limited staffing.

Public Use and Access

Designating a kayak and canoe landing area on Cow Island (estimated to be 0.5-acre for this analysis) for new public use opportunities would result in minor, direct, short- and long-term impacts on reptiles. Because the refuge is only open to limited waterfowl hunting, reptiles on the refuge currently experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to serve also as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists use this site. Human disturbance would potentially cause reptiles to flee. Because reptiles are relatively small and can easily be captured, losing species to collectors is a possibility and threat to viable populations. The time of year when access occurs can greatly affect reptiles that have historically used the area. Reptiles are more active in the warmer months, and we anticipate public use would also be highest during the warmer months. To minimize disturbance of reptiles in adjacent areas, we would clearly mark the boundaries of the designated public use area. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities.

4.11 Invertebrates

We compared the management actions in the alternatives based on their potential to benefit or adversely affect the refuge's invertebrates. The benefits we considered included:

- Protecting native habitats
- Reducing invasive plants

The potential adverse effects of the alternatives that we evaluated included impacts from:

- Herbicide application for invasive species control
- Increased visitation

Impacts of Alternative A

Beneficial Impacts

Habitat Protection and Management

Limiting disturbance in the salt marsh habitat would continue to provide moderate, direct, long-term benefits to invertebrate species. The natural processes of subsidence and sedimentation build up marsh vegetation and provide nutrients into the marsh. More than 100 species of herbivorous insects have been associated with salt marsh habitat (Mitsch and Gosselink 2000). In addition, blue crabs require healthy salt marsh habitat for part of their live cycle (Mitsch and Gosselink 2000). The 2015 Chesapeake Bay Blue Crab Advisory Report (Chesapeake Bay Stock Assessment Committee 2015) recommends that Virginia consider the establishment of a year-round sanctuary for mature female blue crabs in the lower Chesapeake Bay to protect populations throughout the spawning season and improve recruitment. Therefore, our ongoing protection and limited human disturbance of the refuge's salt marsh is essential for this ecologically, culturally, and commercially valuable crustacean.

Limiting disturbance on the dune and sandy beach habitats would have moderate, direct, short- and long-term benefits to the federally threatened northeastern beach tiger beetle population. Human activities are known to disturb foraging, mating, and ovipositing adult beetles (Knisley et al. 1987). Beetle larvae are even more sensitive to disturbance than adults are. The larvae are easily disturbed by vibrations, movements, or shadows (Knisley et al. 1987). The larvae are present year-round, so limiting disturbance of the beaches from the mean low water line to the base of the dune system would prevent permanent loss of habitat and mortality to individuals of this federally threatened species (USFWS 2009b). As a Federal trust resource, we have an obligation to protect federally listed species and avoid the potential for harm to individuals of the listed species, including disturbance of foraging activities, or degradation of their critical habitat. Pursuant to the ESA, such disruptions would meet the legal definition of harm (7 U.S.C. 136, 16 U.S.C. 1531 et seq.). In accordance with the Compatible Use Policy (603 FW 2), refuges may not allow public uses that would violate applicable laws, including the ESA.

Annual monitoring of the northeastern beach tiger beetle population

would result in minor, indirect, long-term local and regional benefit to this species because data would be used to inform refuge management actions, contribute to regionwide population estimates for this species, and inform preferred habitat characteristics for other areas of future protection (USFWS 1994). Continuing to conduct beetle surveys on the refuge is consistent with conservation recommendations made by our Ecological Services Office in the biological opinion issued for the USACE to conduct a remedial investigation at Plum Tree Island NWR (USFWS 2009b).

Public Use and Access

None identified.

Adverse Impacts

Habitat Protection and Management

When activities are proposed to occur within known northeastern beach tiger beetle habitat on the refuge, our Ecological Services Office is consulted to assess the potential to affect the federally threatened beetles and their habitat. Specific strategies to avoid such impacts on the refuge's beetles are identified. For example, limiting the amount of activity, materials, and equipment on the beach is known to be protective of the refuge's larval beetles (USFWS 2009b). We would employ additional protective measures as recommended or required by our Ecological Services Office.

Due to staffing and resource limitations, our inability to manage invasive species under this alternative would result in localized, minor, indirect, long-term impacts on invertebrates. If left uncontrolled, phragmites infestations would alter wetland hydrology (Blossey 1999, Windham and Lathrop 1999) and decrease the diversity and abundance of native plant species in those wetlands (Meyerson et al. 2000). Over time, the colonization of phragmites would affect nutrient cycles in the wetland (Meyerson et al. 1999) and outcompete native vegetation.

Although nutria have not yet been detected on the refuge, we would monitor the refuge's habitats for signs of nutria presence and activity because nutria can cause dramatic changes in wetlands by eating roots and stems of wetland plants, which then results in conversion of marshes into unvegetated mudflats (Ehrlich 1962, Holm et al. 2011).

Public Use and Access

None identified.

Impacts of Alternative B

Beneficial Impacts

Habitat Protection and Management

In addition to the impacts detailed under alternative A, performing quantitative shoreline surveys would provide negligible, indirect, long-

term local benefit to invertebrates. Monitoring these changing shorelines would benefit the tiger beetle because documenting the available and changing habitat for this species would help the Service track the species' recovery and determine if new protective areas or actions are warranted.

Control of invasive species would provide negligible to minor, direct, long-term local benefit to native invertebrates that depend on the wetland habitats. Though the phragmites infestation is small (approximately 20 non-contiguous acres), it could deteriorate invertebrate microhabitats if allowed to spread. Native invertebrate species depend on native wetland species for forage and cover (Mitsch and Gosselink 2000). If phragmites is allowed to spread, it would develop a monoculture stand that would eliminate the plant diversity needed by these wildlife species for cover and foraging (Swearingen et al. 2010).

Inventorying and monitoring priority refuge resources of concern (appendix A) would have negligible, indirect, long-term benefits to invertebrate species that use the refuge for foraging or shelter. The northeastern beach tiger beetle is a priority refuge species of concern that would be monitored in the sandy beaches and mudflats habitat. This information would enable biologists and managers to identify potential changes in management that may be needed to protect the habitat on which this beetle depends.

Public Use and Access

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to invertebrate populations. Observing invertebrates and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can in turn promote an appreciation for, and connection with, nature.

Adverse Impacts

Habitat Protection and Management

Control of invasive species would provide negligible, indirect, local, short-term impacts to invertebrates in the shrubland, dune, and salt marsh habitats. During active treatment of phragmites, there will be disturbance to the invertebrate species in the dune and marsh habitat. However, intrusion on populations should be minor because treatment would only need to occur in small patches and with limited trips. All management actions would follow best management practices, label instructions for wetland chemical application, and guidelines in the refuge's invasive species management plan.

Development and implementation of inventory and monitoring of priority refuge resources of concern (appendix A) would have minor,

direct, short-term impacts on invertebrates that use the refuge for foraging and cover. Increased biology staff activity in the area would cause minor disturbance to invertebrate species that use the refuge habitats; however, monitoring trips would be limited by weather conditions, remoteness, and limited staffing.

Public Use and Access

Designating a kayak and canoe landing area on Cow Island (estimated to be 0.5-acre for this analysis) for new public use opportunities would result in minor, direct, short- and long-term impacts on invertebrates. Because the refuge is open only to limited waterfowl hunting, invertebrates on the refuge currently experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to serve also as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists use this site. This increase in boat traffic along the north side of Cow Island has strong potential to directly impact the SAV that occurs in the highest density class (<http://web.vims.edu/bio/sav/index.html>; accessed January 2016), as well as shallow sand and mud flats that have been documented as important to the blue crab production in adjoining salt marshes (http://www.vims.edu/people/seitz_rd/pubs/lipcius_et_al_crab_Seagr_2005.pdf; accessed January 2016). Degradation of this habitat would have minor, indirect impacts on the crab population of Plum Tree Island NWR because we are limiting public use to an estimated 0.5-acre public use area.

Human disturbance would only minimally affect invertebrates because of their ability to flee. The time of year when access occurs can greatly affect invertebrates that have historically used the area. Invertebrates are more active in the warmer months, and we anticipate public use would also be highest during the warmer months. It is critically important that we not adversely affect habitats occupied by the federally threatened tiger beetle. During the summer of 2014, refuge staff conducted a site visit to the waterfowl hunting blind location #2 on Cow Island, where we propose to open the refuge to wildlife observation, photography, environmental education, and interpretation by commercial and non-commercial service providers. Although the proposed access site is estimated to be a 0.5-acre sandy beach spit, refuge staff determined that there is no northeastern beach tiger beetle population at this site and no population in close proximity that would likely re-establish here (Mowbray and Brame 2014 personal communications). Our Ecological Services Office staff confirmed our findings and recommended periodic monitoring at this

location to assess beetle use of the area (Drummond 2014 personal communication). Use of the designated public use area would be modified if necessary to protect the northeastern beach tiger beetle.

To minimize disturbance of invertebrates in adjacent areas, we would clearly mark the boundaries of the designated public use area. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities.

4.12 Public Use and Access

The Improvement Act identifies six priority wildlife-dependent public uses that should receive enhanced consideration when planning on national wildlife refuges: hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Because the Service holds refuge lands in the public trust, access generally is allowed for compatible, priority wildlife-dependent public uses. Uses are limited when Federal trust resources would be impacted; the activity would detract from achieving refuge purposes or the Refuge System mission; or when administrative resources are not available to ensure a safe, quality experience.

Hunting and interpretation have been identified as two of the public use areas of emphasis for the Refuge Complex as a whole (USFWS 2010b). Plum Tree Island NWR is currently open to waterfowl hunting only.

We evaluated the following management actions for their potential beneficial or adverse impacts on hunting that would result from implementing of the alternatives:

- Habitat management activities.
- Opening existing refuge areas for approved public access and appropriate, wildlife-dependent activities.
- Improving or constructing visitor infrastructure.
- Collaborating in partnerships with local, regional, and State recreation interests.
- Improving outreach and Service visibility.

We considered the following potential short- and long-term direct and indirect impacts on public use and access that could result from the actions above:

- Conflicts among users-both actual (e.g., consumptive vs. non-consumptive) and perceived (e.g., outreach for one activity may deter the interest of other users).

- Conflicts among uses (e.g., conflicts about safety and access).
- Changes in use.
- More informed public (e.g., about species, their habitats, and their conservation).
- More supportive public (e.g., of the refuge, the Refuge System, and the Service).
- Increases in visitation and its associated effects on the quality of the experiences and our ability to meet the demand.

Regardless of the alternative selected, we would continue to allow access to the refuge for one of the six priority public uses on the refuge, specifically waterfowl hunting. Refuge staff would continue to maintain the refuge's existing waterfowl hunting blinds on Cow Island.

Impacts of Alternative A

Beneficial Impacts

Habitat Protection and Management

Limiting human disturbance to wildlife habitats would provide a minor, direct, long-term benefit to the waterfowl hunt program. Protecting the salt marsh, estuarine, sandy beach, and mudflat habitats would be beneficial to migratory waterfowl. Based on what we currently know, these habitats are in good condition and support breeding, migrating, and wintering waterfowl by offering an abundance of food sources (USFWS 1999, Mowbray 2014 personal communication). The broad intertidal zones surrounding the more elevated interior sections of the marsh consist primarily of saltmarsh cordgrass and black needlerush. Much of the interior portions of the marsh are dominated by saltmeadow hay and saltgrass meadows (Silberhorn 1974). These two types of salt marshes “have the highest values in productivity and wildfowl and wildlife utility and are closely associated with fish spawning and nursery areas” (Silberhorn 1981). Food for migrating and wintering waterfowl appears to be abundant with the wigeon grass and invertebrates associated with the saltmeadow hay interior. There is also abundant floating or attached marine algae along the marsh edge. In addition, large beds of eelgrass, an important food of American brant, grow in the clear, shallow waters just offshore of the refuge (USFWS 1999). Minimizing the potential for human disturbance of refuge habitats helps to ensure that waterfowl species will continue to use the refuge in perpetuity and that quality waterfowl hunt opportunities would continue to be available on the refuge.

Public Use and Access

Continuing to offer limited waterfowl hunting opportunities on the refuge provides a negligible, direct, short-term benefit to the hunting community within the lower Chesapeake Bay area, particularly for

individuals who are not members of private hunt clubs, do not maintain stationary or float blinds, or are new to hunting (Brame 2014 personal communication). Prior to opening Cow Island to limited waterfowl hunting, there were no publicly owned, traditional hunting lands in eastern Poquoson (USFWS 1999). Cow Island was opened to waterfowl hunting in 1999 because this use was determined to not detract materially from the refuge's purposes.

Adverse Impacts

Habitat Protection and Management

None identified.

Public Use and Access

None identified.

Impacts of Alternative B

Beneficial Impacts

Habitat Protection and Management

Conducting more intense habitat management activities and more frequent biological surveys would result in direct and indirect, short- and long-term benefits to the quality of wildlife-dependent recreational opportunities on the refuge. Our increasing knowledge and understanding about wildlife and habitat conditions on the refuge would inform development of quality educational and interpretive materials available on the refuge's signage, staff and partners leading tours on the refuge, staff and partners at off-refuge programs and events, and our refuge Web site.

Public Use and Access

In addition to the impacts detailed under alternative A, administrative changes to our existing waterfowl hunting program would provide minor, direct, long-term benefit to the local waterfowl hunting community because more hunters may be interested in participating in our hunt and more hunters would be able to participate in our hunt days. Data collected during the 2009 to 2012 seasons indicates that only 24 percent of lottery-selected hunters actually participate in the refuge's waterfowl hunt. If we make changes to the way we administer the hunt, we anticipate increasing hunter participation. For example, one administrative change we could make to the program would be to offer interested hunters the opportunity to hunt if the lottery-selected hunter does not report to the refuge on their specified hunt day. Making these opportunities available to local, interested waterfowl hunters would improve our hunt participation and satisfy the public's desire for more waterfowl hunting opportunities on the refuge (Brame 2014 personal communication). A second change to our existing waterfowl hunt program would be to promote Apprentice Hunter opportunities. An experienced waterfowl hunter would share their knowledge and experience with less experienced hunters. Because we allow hunting parties to be comprised of up to three hunters per hunt

location, we could help waterfowl hunters of all different experience levels get to know each other and hunt together cooperatively. Third, we would offer one youth waterfowl hunt day annually. The additional emphasis on youth involvement would provide minor, direct, local, short-term benefits to the local waterfowl hunting community because young hunters would otherwise not have any opportunities to hunt on public lands. Youth participation in the refuge's waterfowl hunt would connect young sportsmen to the natural world. Lastly, we would investigate the potential to establish five new waterfowl hunting locations on the refuge to meet the public's request for more waterfowl hunting opportunities.

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually, at a designated public use area on Cow Island, would have minor to moderate, direct, local, long-term benefits to those who want to engage in these activities on the refuge. Since refuge establishment, the public has expressed interest in safely visit the refuge, enjoy the beauty of its scenery, observe the diversity of wildlife and habitats, and be enveloped in the relaxing atmosphere of boating on the Chesapeake Bay.

Overall, the increased public awareness and promotion of public use programs allowed on the refuge, specifically hunting, would provide a negligible, direct, local benefit to the interested public. When we expand visitor use public uses, more people would become aware that low levels of visitation (up to 15 people at any one time) have been deemed compatible with the habitat and wildlife management objectives for this refuge.

Adverse Impacts

Habitat Protection and Management

Inventory and monitoring efforts, as well as invasive species management, would have a negligible, indirect, short-term impact on wildlife-dependent recreational opportunities at and immediately adjacent to the designated public use area on Cow Island. We would minimize the potential for scheduling conflicts between conducting refuge management activities and planned visits by commercial tour groups.

Public Use and Access

Potential for conflict exists primarily between commercial and non-commercial wildlife observation, photography, environmental education, and interpretation visitors at the designated public use area. For example, the designated location could be visited by up to 15 visitors participating in noncommercial visit and 15 visitors participating in a commercially guided tour. Up to 15 visitors can have a quality wildlife observation experience at the estimated 0.5-acre designated public use site. To minimize the potential for conflict, we

prepared compatible use stipulations for these commercial and non-commercial public uses, and we expect that participants will comply with the stipulations (see appendix B).

On an annual basis, the VDGIF designates a waterfowl youth hunt day. The exact date changes each year, but it typically is scheduled to occur in late October. We would close the designated public use area to wildlife observation, photography, environmental education, and interpretation uses on the designated youth waterfowl hunt day so that youth hunters and their adult companion could safely use the wildlife observation platform and waterfowl hunt blind on that day. To minimize the potential for conflict, we prepared compatible use stipulations for all of these uses, and we expect that participants will comply with the stipulations (see appendix B).

4.13 Socioeconomic Environment

As part of a refuge's CCP process, conducting an economic analysis provides a means of estimating how current management (alternative A) and the proposed management activities (alternative B) would potentially affect the local economy. This type of analysis provides two critical pieces of information:

- It illustrates a refuge's contribution to the local community.
- It can help in determining whether economic effects are or are not a real concern in choosing among management alternatives.

It is important to note that the economic value of a refuge encompasses more than just the impacts on the regional economy. Refuges also provide substantial values for items not exchanged in established markets, such as maintaining endangered and threatened species, preserving wetlands, educating future generations, and adding stability to the ecosystem (Carver and Caudill 2007). However, quantifying these types of nonmarket values is beyond the scope of this study.

The refuge management activities of economic concern in this analysis are:

- Refuge purchases of goods and services within the local community;
- Refuge personnel salary spending;
- Spending in the local community by refuge visitors; and
- Revenues generated from the Refuge Revenue Sharing Program.

Impacts of Alternative A

Beneficial Impacts

Our continued annual payments would result in direct, long-term benefits to the City of Poquoson. The refuge would continue to pay revenue to the City of Poquoson as part of the Refuge Revenue Sharing Program. As discussed in section 2.8.2, national wildlife refuges contribute to local economies through shared revenue payments. Under the provisions of the Refuge Revenue Sharing Act (the Act of June 15, 1935; 16 U.S.C. 715s), the Service pays an annual refuge revenue sharing payment at a rate set by Congress to municipalities that contain lands the Service administers. Plum Tree Island NWR's revenue payments to the City of Poquoson are listed in table 2.10 for 2007 to 2015.

Habitat Protection and Management

Protecting the refuge and its habitats provides minor to moderate, direct, long-term socioeconomic benefits to the City of Poquoson because protection of the refuge's wildlife, habitats, and ecological services is consistent with the City of Poquoson's Comprehensive Management Plan for 2008–2028 (2008) to the maximum extent practicable. The Comprehensive Management Plan aims to define what building “a livable and sustainable community” means to the community and its leaders. It identified the following goals for the community:

- Preserve and enhance both the natural and manmade environment of Poquoson, while permitting development to occur in accordance with the Comprehensive Plan.
- Maintain and keep current all Federal and State regulations and ordinances relevant to the restoration, preservation, and maintenance of Poquoson's natural environment.
- Reduce hazards to persons, property, and the environment caused by stormwater runoff from developed areas.
- Protect coastal wetlands, marshes, rivers, inlets, and other bodies of water from degradation associated with land development.
- Attempt to enhance wildlife habitat in and adjacent to the Plum Tree Island NWR, with cooperation and assistance from the DOI.
- Improve the high level of environmental quality in Poquoson.
- Enhance the public awareness and understanding of the importance of environmental conservation and preservation.
- Improve the quality of life by limiting noise and light trespass associated with nonresidential development.

- Achieve and maintain regional attainment with the National Ambient Air Quality Standards.

Public Use and Access

The refuge's limited waterfowl hunting opportunities provide a negligible, direct, long-term benefit to the local economy because hunt participants purchase supplies, food, and lodging near the refuge. In 2011, migratory bird hunting in the U.S. accounted for \$3.4 billion of the \$38.3 billion in total retail sales for all hunting revenues combined (Southwick Associates 2012). Economic contributions from all types of hunting in the U.S. in 2011 accounted for \$26 billion in salaries and wages, 680,937 jobs, and generates over \$1.2 billion sales tax, state income tax, and Federal income tax revenues for government agencies (Southwick Associates 2012). Each of the 13.6 million hunters in the U.S. spent an average of \$280 on hunting-related expenditures annually (Southwick Associates 2012).

The 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation found that in Virginia, hunters 16 years and older spent a total of \$877,038 in 2011, of which nearly \$279,241 was related to trip expenses; the remainder was for equipment and other expenses (DOI et al. 2011). On average, a typical hunter was found to spend an average of \$37 per day (DOI et al. 2011).

Adverse Impacts

Habitat Protection and Management

None identified.

Public Use and Access

None identified.

Impacts of Alternative B

Beneficial Impacts

Habitat Protection and Management

Under alternative B, there is the potential for additional minor, indirect, long-term benefits to the local economy from staff and partners working more frequently at the refuge and purchasing fuel, food, materials, and equipment from the City of Poquoson retailers. Additionally, refuge staff and partners may conduct multi-day visits on the refuge and secure lodging accommodations within the City of Poquoson.

Public Use and Access

Opening the refuge to non-commercial and commercial wildlife observation, photography, environmental education, and interpretation programs on Cow Island would have minor to moderate, indirect, long-term benefits to the local economy. Although the City of Poquoson has realized an increase in recreation expenditures since 1996, total expenditures were 11 percent below the

average level of expenditures incurred by other Virginia localities (City of Poquoson 2008). Opening the refuge to these new uses is consistent with the City of Poquoson's Comprehensive Management Plan for 2008–2028 (2008), which states “Poquoson's waterways are an asset and should be protected, maintained and accessible for both commercial and recreational uses.”

Economic benefit would be gained by any local businesses providing guided wildlife observation, photography, environmental education, and interpretation tour services or businesses that rent or sell items in support of those services (e.g., watercraft, fuel, snacks, bird guides). The 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation found that wildlife watchers aged 16 years and older spent \$54,890,272 on associated expenses, including \$ 17,274,675 on trip-related expenses and \$ 37,615,597 on equipment (DOI et al. 2011). Economic impacts would also result from expenditures made on behalf of the 324,000 Virginia residents between 6 and 15 years old who watch wildlife (DOI et al. 2011).

Adverse Impacts

Same as the impacts detailed under alternative A.

4.14 Cultural and Historic Resources

Methodology for Assessment of Effect

Regardless of the alternative, the Service is responsible for managing and protecting cultural resources found on national wildlife refuges. The consequences of past, current, and proposed management on known cultural resources are the same across all alternatives. None of the found known archaeological sites on the refuge has been subject to systematic archaeological survey, testing, or evaluation. The purpose of the impact analysis here is to identify areas of resource impact at an early stage and outline additional cultural resource work involved in further planning and implementation. The RHPO regularly reviews refuge proposals to conduct ground-disturbing activity or alterations to structures more than 50 years old.

In consultation with the SHPO, during the planning stages of any proposed projects the Service RHPO contracts or conducts archaeological and architectural surveys, evaluates sites, and avoids or mitigates impacts to resources it determines eligible for the National Register. Any ground disturbing activities outlined in this plan will receive this further review and study.

Potential for Adverse Effects

Habitat Protection and Management

Land-disturbing activities (e.g., construction of a wildlife observation platform and waterfowl hunting blind near site 44YO165, sign installation) have the potential to affect the cultural resources of the refuge. Known archaeological sites, cultural resources, and cultural

landscapes would continue to be protected from unintended impacts. By continuing to coordinate with the RHPO, the SHPO, and other partners, we would continue to increase our knowledge, understanding, and appreciation of the refuge's cultural resources and rich history as part of the lower Chesapeake Bay region.

Public Use and Access

Refuge visitors may inadvertently or even intentionally damage or disturb known or undiscovered cultural artifacts or historic properties. We would continue our vigilance in looking for this problem and use law enforcement where necessary. Removal of artifacts from refuge lands is unlawful and may be subject to penalty (16 U.S.C. 470aa–470mm; Public Law 96–95, as amended). We would continue our outreach and education efforts with local Virginia Indian Tribes and the NPS.

Avoidance, Minimization, and Mitigation Strategies

For compliance with Section 106 of the NHPA, the refuge staff would consult the RHPO during the early planning stages of proposed new actions when new ground-altering activities are proposed, evaluate existing structures for National Register eligibility before altering, and require compliance with standard terms and conditions for cultural resource protection as applicable. We would provide a description and location of all projects, activities, routine maintenance, and operations that affect ground and structures, details on requests for compatible uses, and the range of alternatives considered. The RHPO would analyze those proposed undertakings for their potential to affect historic and prehistoric sites, and consult with the SHPO and other parties as appropriate. We would notify the State and local government officials to identify concerns about the impacts of those proposed undertakings.

Section 106 Summary for Both Alternatives

After applying the Advisory Council on Historic Preservation criteria of adverse effects, the Service concluded that implementation of alternative A would have no effect on cultural resources and alternative B would have the potential to result in an adverse impact on cultural resources that may be eligible for listing in the National Register. As described above, we would use management practices that avoid or resolve adverse impacts on cultural resources in accordance with the NHPA.

4.15 Cumulative Impacts

According to the CEQ regulations on implementing NEPA (40 CFR 1508.7), a cumulative impact is an impact on the environment that 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 the other actions. Cumulative impacts can result from individually minor but

collectively significant actions taking place over time.

Our cumulative impacts assessment includes the actions of other agencies or organizations, if they are interrelated and influence the same environment. This analysis considers the interaction of activities at the refuge with other actions occurring adjacent to the refuge and over a larger state and regional spatial and temporal frame of reference.

Natural Environment

Air Quality

Air quality is generally good in the refuge vicinity, and the Virginia Beach–Norfolk–Newport News CBSA met the attainment criteria for various air pollutants. None of the actions proposed in this CCP would result in rendering the MSA in nonattainment for those pollutants. Actions proposed in this CCP would be implemented in accordance with all applicable standards and practices for the protection of air quality, including following guidance provided to control dust and adherence to permit requirements when required for fuel-burning activities. Protection, restoration, and enhancement of native vegetation should generate beneficial impacts to air quality locally. These beneficial impacts would derive from the refuge’s capacity to continue to filter out many air pollutants harmful to humans, wildlife, and the environment. We strive to reduce energy consumption with green infrastructure and products associated with refuge activities.

In addition, with the new Service goal of achieving carbon neutrality by 2020, the refuge would be undertaking aggressive efforts to reduce the energy use and carbon footprint of our buildings, facilities, vehicle fleet, and workforce to the maximum extent possible. We would also be exploring ways to offset our residual carbon footprint by integrating carbon sequestration awareness into conservation actions for wildlife and other habitat management activities to contribute a noticeable, beneficial increment to air quality and humans within the Virginia Beach–Norfolk–Newport News CBSA.

In summary, none of the actions we propose is expected to contribute to regional exceedances of Clean Air Act air quality standards, and no Class I air quality areas would be affected.

Water Quality

All of the tidal areas in the refuge vicinity are classified as 303(d)-listed impaired waterways. None of the actions proposed in this CCP would alter that classification for any waterways in the refuge vicinity. Actions proposed in this CCP would be implemented in accordance with applicable standards to prevent further degradation of water quality in the refuge vicinity, including development of an approval of sediment and erosion control plan for land-disturbing activities.

Protection, restoration, and enhancement of native vegetation should generate beneficial impacts to water quality locally. These beneficial impacts would derive from the refuge's capacity to continue to filter out many water pollutants harmful to humans, wildlife, and the environment.

In accordance with EO 13514, Energy Independence and Security Act, and EO 13508, Chesapeake Bay Protection and Restoration, all Federal facilities are required to demonstrate leadership and commitment to controlling pollution, leveraging their expertise and resources to contribute significantly to improving the health of the Chesapeake Bay. We would enhance contact with State agencies to take all actions necessary to ensure that refuge activities avoid or minimize the potential for affecting receiving water quality. Water quality protection of wetlands and waterways of the Chesapeake Bay would be included in environmental education and interpretive programs offered both on and off the refuge. Our efforts would contribute to the overall beneficial impacts on water quality in the refuge vicinity and Chesapeake Bay Estuary.

In summary, none of the activities proposed would contribute to adversely affecting local or regional hydrology and water quality. No proposed activities would violate Federal or State standards for contributing pollutants to water sources and all would comply with the Clean Water Act.

Biological Integrity, Diversity, and Environmental Health

None of our proposed management activities should adversely affect biological integrity, diversity, and environmental health either individually or when considered along with other activities on other ownerships in the region. In fact, our management actions strive to benefit and sustain these ecosystem components. The Improvement Act states that in administering the Refuge System, the Service shall "...ensure that the biological integrity, diversity, and environmental health of the System are maintained." Biological integrity refers to the composition, structure, and function of habitats and communities or ecosystems and the natural processes that shape them.

Biological diversity is the variety of all living things. Environmental health encompasses the structure, function, and health of soil, water, air, and other abiotic elements. We based our proposed actions on consideration of other Federal, State, and conservation partner management plans after determining how the refuge could best contribute to the regional conservation landscape. In evaluating our impacts in this section, we considered how we would affect perpetuating, maintaining, or restoring the biological integrity, diversity, and environmental health of the refuge.

Under the preferred alternative, we would work with partners in the

lower Chesapeake Bay to protect biological integrity by maintaining and restoring native habitats and ecological communities, limiting human disturbance in those habitats and communities, and actively controlling invasive plants and animals. We would continue to prevent the transportation of invasive plants elsewhere on the refuge by using best management practices, continuing to survey for invasive species, controlling existing populations, and educating the public about these invaders. For those refuge projects that have regional implications, we would serve as a demonstration area and work with our partners to establish a long-term monitoring program. Data and information would be shared to monitor the regional implications of climate change.

Wildlife species diversity would be maintained through native habitat protection and restoration, limiting public access into sensitive habitat areas, and protecting and restoring habitats for federally listed species and species of conservation concern. Many of our conservation partners in the area are engaged in similar activities, and collectively this has resulted in gains to certain wildlife populations. Coordinated management, research, and monitoring in the lower Chesapeake Bay has benefitted populations of migratory waterfowl.

With regard to environmental health, we would ensure that refuge activities do not affect hydrological or soil processes, or adversely impact water quality in the lower Chesapeake Bay. Refuge activities that have the potential to impact soils would be closely monitored. We would continue to work with partners to monitor water quality in the Chesapeake Bay and document any concerns. We would also continue our work to protect the integrity of the refuge's natural habitats, thereby reducing our contribution of sediment into the Chesapeake Bay.

When visitors come to the refuge, we would continue to promote and demonstrate best management practices and a conservation ethic in hopes that visitors would go back to their local communities and effect positive change.

Biological Resources

Both of the alternatives would maintain or improve Service trust resources and other native wildlife and plants in the region, although to varying degrees. As discussed in section 1.4, a wide variety of existing national, regional, and local plans and priority guidance documents directly influenced development of the biological resource management objectives in this draft CCP and EA. The combination of our management actions with other organization's actions could result in significant, beneficial cumulative effects to biological resources by:

- Increasing the conservation and management of federally and State-listed threatened and endangered species and other species

of concern and associated habitats, through protection and maintenance of ecologically important terrestrial and aquatic habitats;

- Using adaptive management and the best science available to manage and promote regionally important habitats and natural communities;
- Controlling invasive plants and animals that are not native to the area; and
- Partnering with others to offer educational and interpretive programs that help refuge visitors understand issues related to the biological integrity and environmental health of the Chesapeake Bay, and foster their interest in stewardship of those resources.

Below, we highlight particular Service activities that have the potential to cumulatively affect biological resources in the region.

Native Plants and Wildlife

Acquiring necessary information to monitor native wildlife habitats and species would add to the body of knowledge the Service would collect and share with other conservation partners, benefitting and improving natural resource decisions, resulting in cumulative benefits on the biological environment over a broader landscape. In general, native habitat management would benefit the biological environment as we expect to enhance the quality of habitats for native species of priority refuge wildlife of concern. Native plant management cumulatively benefits the biological environment by increasing and enhancing healthy soil biota; restoring and enhancing native plant resources; increasing resident wildlife populations of mammals, fish, reptiles, and amphibians; and enhancing invertebrate production to sustain and perpetuate migratory bird resources.

Invasive Plants and Animals

Certain biological resources that we would manage to control, prevent, or eliminate (i.e., invasive plants and animals) are not native components to habitats on the refuge. We do not consider the loss of these biotic elements to be an adverse impact. However, not controlling invasive species on the refuge would contribute adversely to the local biological environment. Alternative B has stronger biological monitoring components, with increased efforts in surveying wildlife species and habitats and research coordination with others.

Controlling exotic and invasive plants may involve the use of chemical herbicides. The selective use of herbicides would be based upon an integrated pest management strategy that incorporates pest ecology, the size and distribution of the population, site-specific conditions, and known efficacy under similar site conditions. Best management practices would reduce potential effects to non-target species,

sensitive habitats, and quality of surface water and groundwater. Herbicide applications would be targeted to control discreet pest populations in localized areas. Herbicides applied on the refuge would be short-lived, resulting from environmental and microbial breakdown to less or non-hazardous degradation products.

Public Use

The land use immediately adjacent to the refuge is residential. As detailed under section 4.15.2, the anticipated population and employment increases by 2040 would likely result in an increased demand for public use, which may have cumulative impacts on the biological environment. The management objectives presented in the alternatives are our attempts to strike a feasible balance that ensures the refuge effectively protects the biological environment for the long term, while offering wildlife dependent recreational opportunities on the refuge.

Public waterfowl hunting results in the direct loss of individual wildlife; on average, 22 geese or ducks were harvested annually from the refuge between 2009 and 2012 (USFWS 2012b). However, the limited waterfowl hunting on the refuge would contribute negligibly to the local biological environment because the primary purpose of this refuge is as one of many important migratory bird stopover sites along the Atlantic Flyway, providing protected breeding habitat for State-listed threatened and endangered species, as well as many neotropical migrant bird species. We describe the site-specific impacts of the public hunting programs earlier in this chapter and in appendix B.

Cumulative impacts from research activities are not expected, but they could occur if multiple research projects were occurring on the same resources at the same time or if the duration of the research was excessive. We describe the site-specific impacts of the biological research earlier in this chapter and in appendix B.

Climate Change

DOI Secretarial Order 3226 (January 16, 2009) 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 considerations into long-term planning documents, such as this CCP.

The Wildlife Society published a technical review report in 2004 titled “Global Climate Change and Wildlife in North America” (Inkley et al. 2004). The Wildlife Society report interprets results and details from such publications as the IPCC reports (1996 to 2002) and describes the potential impacts and implications on wildlife and habitats. It mentions that projecting the impacts of climate change is hugely complex

because it important not only to predict changing precipitation and temperature patterns, but also, more importantly, to predict their rate of change, as well as the exacerbated effects of other stressors on ecosystems. Those stressors include loss of wildlife habitat to urban sprawl and other developed land uses, pollution, ozone depletion, exotic species, disease, and other factors.

The effects of climate change on populations and range distributions of wildlife are expected to be species specific and highly variable, with some species benefiting and others vulnerable to extirpation or extinction. Generally, the prediction in North America is that the ranges of habitats and wildlife would generally move upward in elevation and northward as temperature rises (Inkley et al. 2004, Rodenhouse et al. 2008). However, The Wildlife Society report emphasizes that developing precise predictions for local areas is not possible due to the scale and accuracy of current climate models, which is further confounded by the lack of information concerning species-level responses to ecosystem changes, their interactions with other species, and the impacts from other stressors in the environment.

To help meet the climate change challenge, the Service drafted a Climate Change Strategic Plan (USFWS 2009c). The plan employs three key strategies to address climate change: adaptation, mitigation, and engagement. The Association of Fish and Wildlife Agencies (AFWA) developed guidance for states as they update and implement their respective WAPs (AFWA 2009). This publication, “Voluntary Guidance for States to Incorporate Climate Change into State Wildlife Action Plans and Other Management Plans,” also includes strategies that would help conserve fish and wildlife species and their habitats and ecosystems as climate conditions change. The broad spatial and temporal scales associated with climate change suggest that management efforts that are coordinated on at least the regional scale likely would lead to greater success.

The Wildlife Society report provides 18 recommendations to assist land and resource managers in meeting the challenges of climate change when working to conserve wildlife resources (Inkley et al. 2004). Their position is that if land and resource managers collectively implement these recommendations, then cumulatively there would be a positive impact of addressing climate change. We discuss our actions relative to addressing some of these recommendations:

Recognize Climate Change as a Factor in Wildlife Conservation

The Service is taking a major role among Federal agencies in distributing and interpreting information on climate change. There is a dedicated Web site to this issue at:

<http://www.fws.gov/home/climatechange> (accessed May 2011), which links to the Service’s recently released Strategic Plan for Climate

Change. The strategic plan includes two key elements: LCCs and a National Fish and Wildlife Climate Adaptation Strategy; both elements bring together conservation partners to address climate change in a concerted effort. Strategies for adapting to and mitigating climate change are included in this CCP. Specific steps taken by the refuge would help reduce our greenhouse gas emissions, including using energy efficient equipment and vehicles where feasible; building and maintaining any structures using sustainable, green building technologies; and conduct energy audits. In addition, we would rely on the habitat and species vulnerability assessments and other climate change research such as the SLAMM model already developed for Plum Tree Island NWR (Clough and Larson 2009).

Manage for Diverse Conditions

The habitat management actions described in chapter 3 are intended to promote healthy, functioning native habitats, protect biological integrity, and maintain the resiliency within these systems to adapt to changing conditions. We would implement an adaptive management approach as new information becomes available.

Do Not Rely Solely on Historical Weather and Species Data for Future Projections without Taking into Account Climate Change
Historical climate, habitat, and wildlife conditions are less reliable predictors as climate changes. For example, there may be a need to initiate shoreline surveys for nesting sea turtles as waters warm or adjust survey transects for northeastern beach tiger beetles as sands shift. We are aware of these implications and plan to build these considerations into our IMP so that we can make adjustments accordingly. We would incorporate climate change monitoring (such as phenology, timing of bird migrations, flooding regimes, and sea level rise) into our IMP.

Expect Surprises, Including Extreme Events

This CCP has incorporated extreme events (such as drought and increasing flood frequency) into future management strategies. We would continue to incorporate new information in future planning with the development of HMP, the IMP, and the VSP.

Reduce Non-climate Stressors on the Ecosystem

The objectives of our habitat management program are to maintain and enhance the biological integrity, diversity, and health of refuge lands. Objectives to conserve the coastal estuarine ecosystem and to cultivate partnerships to further conservation of the refuge's natural resources would help maintain resilience in the face of climate change.

Maintain Healthy, Connected, Genetically Diverse Populations

Small, isolated populations are more prone to extirpations than larger, healthy, more widespread populations. Larger tracts of protected land facilitate more robust species populations and can offer better habitat

quality in core areas. We would continue to work with our many conservation partners at the State and regional levels to support and complement restoration and protection efforts in the Chesapeake Bay watershed.

Translocate Individuals

It may sometimes be necessary physically to move wildlife from one area to another to maintain species viability. However, this tool has potential consequences and should be used only in severely limited circumstances as a conservation strategy. In the case of Atlantic sturgeon and American shad, the Service supports efforts to bolster population levels through egg-taking, hatchery rearing, and stocking to establish breeding populations in the wild. The Service would support the translocation of other species to establish or restore populations on or near the refuge, if feasible, and evidence would indicate that it would not affect the ecological integrity of the refuge.

Protect Coastal Wetlands and Accommodate Sea Level Rise

We would continue to work with our conservation partners around the refuge and lower Chesapeake Bay to conserve the coastal estuarine ecosystem. The refuge's salt marsh is predicted to be resilient to sea level rise of up to 0.4 meters by 2100, at which point the vast majority will be lost (Clough and Larson 2009). In scenarios of greater than 0.4 meters sea level rise, between 74 and 99 percent of the salt marsh within the refuge will become regularly flooded. The refuge's irregularly flooded, brackish marsh does not show much resilience to sea level rise; regardless of the sea level rise scenario used, between 62 and 99 percent of the present-day brackish marsh will be lost (Clough and Larson 2009). The refuge is one of many coastal refuges along the North Atlantic Ocean that would implement the Salt Marsh Integrity Index to assess salt marsh integrity and inform management decisions (Neckles et al. 2013). Because of this, the refuge may serve as an important indicator for the effects of climate on plants and animals. We would use the information gathered from our monitoring programs to adapt management to reduce the threat and maintain critical natural resources in the Chesapeake Bay.

Reduce Likelihood of Catastrophic Events Affecting Populations

Increased intensity of severe weather can put wildlife at risk. While the severe weather cannot be controlled, it may be possible to minimize the effects by supporting multiple, widely spaced populations to offset losses. We can help reduce this risk by managing for diverse conditions; biological integrity, diversity, and environmental health; and connected genetically diverse populations. Under both alternatives, the refuge would work with regional partners to conserve and manage sufficient large patches of high-quality habitat that are connected by suitable travel corridors. This is a focus of the Service's newly formed North Atlantic LCC.

Prevent and Control Invasive Species

Climate change may increase opportunities for invasive species to spread because of their adaptability to disturbance. Invasive species control would be essential, including extensive monitoring and control to preclude larger impacts. Invasive species control is a major initiative within the Service. The Northeast Region in particular has taken an active stand. In chapter 2, we describe the current extent of invasive species on the refuge, and in chapter 3, we include strategies for controlling existing and future invasive plant infestations. We also describe monitoring and inventorying strategies to protect against any new infestations.

Account for Known Climatic Conditions

Monitoring key resources through predictable short-term periodic weather phenomena, such as El Niño, can aid in future management efforts. We plan to develop a monitoring program that would help us evaluate our hypotheses, assumptions, and successes in achieving objectives, as well as help us make future management decisions. Any restoration activities or proactive habitat management actions would be carefully planned and their effectiveness monitored and documented so we can use this information in future management decisions.

Select and Manage Conservation Areas Appropriately

The establishment of refuges, parks, and reserves is used as a conservation strategy to try to minimize the decline of wildlife and habitats in North America. Decisions on locating future conservation areas should take potential climate change and variability into account. For example, it is suggested that decisions on new acquisitions consider the anticipated northward migrations of many species, or the northern portion of species ranges. Managers of existing conservation lands should consider climate change in future planning. We would continue to work with our conservation partners in the Chesapeake Bay watershed to identify and protect areas that maintain connectivity and biological integrity in the face of climate change and other stressors.

Ensure Ecosystem Processes

Managers may need to enhance or replace diminished or lost ecosystem processes. Manually dispersing seed, reintroducing pollinators, and treating invasive plants and pests are among the examples used. Our habitat goals and associated objectives include an emphasis on maintaining the ecological integrity of intact habitats on the refuge by continuing to limit human disturbance, controlling invasive species, and conducting biological surveys and research in partnership with others to gain a better understanding of ecosystem conditions and trends.

Use Monitoring and Adaptive Management

Managers should monitor climate and its effects on wildlife and their habitats and use this information to adjust management techniques and strategies. Given the uncertainty with climate change and its impacts on the environment, relying on traditional methods of management may become less effective. We agree that an effective and well-planned monitoring program, coupled with an adaptive management approach, would be essential to dealing with the future uncertainty of climate change. We have built both aspects into our CCP. We would develop a detailed IMP designed to test our assumptions and management effectiveness in light of ongoing changes. With that information in hand, we would either adapt our management techniques, or reevaluate or refine our objectives as needed.

Human Environment**Public Use and Access**

Allowing public use where appropriate and compatible is part of the Service mandate. The two alternatives currently allow public access to the refuge. However, alternative B would allow for more and new opportunities, albeit limited. Therefore, both alternatives provide long-term beneficial impacts by allowing current and new audiences to experience the refuge. Because Plum Tree Island NWR is located in the urbanized Hampton Roads corridor, on- and offsite opportunities would be offered to those who may not have access to nature. Therefore, the refuge can contribute to building a connection to the outdoors, and the local community would gain an appreciation for wildlife.

Socioeconomic Resources

None of the actions proposed in this CCP would require the City of Poquoson to reclassify land use designations for refuge lands. We expect beneficial impacts on the socioeconomic environment would result from maintaining and enhancing wildlife populations, improving native wildlife habitats, and protecting the biological integrity, diversity, and environmental health of refuge lands, which sustain and provide numerous ecosystem services that benefit wildlife and humans. We anticipate contributing beneficially to the growing residential community and visiting public's appreciation for natural areas and understanding of our collective stewardship responsibilities to protect areas of notable natural and cultural importance. The population of the City of Poquoson is expected to grow almost 9.5 percent by 2020, and the employment rate is expected to grow 11 percent (Virginia Employment Commission 2013).

We anticipate increased motorized boating in deeper waters adjacent to the refuge and increased kayaking and canoeing in the tidal creeks within the refuge. Under alternative B, we would support partners and coordinate efforts, as time and resources allow, to provide

recreation opportunities near the refuge and in the Lower Chesapeake Bay that increase the appreciation for the refuge and its mission. We would also coordinate and collaborate with partners and adjacent landowners to investigate potential viewing platforms for mainland public access to participate in appropriate and compatible public uses. Under alternative B, our working relationships with existing partners and new partners would improve in terms of responsiveness to inquiries and speed of joint projects. That improvement mainly would result from the increased staffing in key areas such as biology, public use, and maintenance. The overall coordination and communication with the public would improve under alternative B because a new staff position would address public use and public information.

An increased emphasis on environmental education in alternative B would foster greater understanding and appreciation of the refuge's natural and cultural resources at the local and regional levels, and potentially lead to increased support for and funding of partner-sponsored environmental education and interpretive programming. Ultimately, these efforts would benefit fish and wildlife resources on the refuge in the long term. This increased outreach could also positively affect land use decisions outside the refuge by local governments and private landowners, and lead to increased fish and wildlife populations over a broader area.

Cultural Resources

Overall, both alternatives would contribute beneficially toward protection of cultural resources on the refuge, although to varying degrees.

Under alternative B:

- We expect beneficial impacts of implementing recommendations provided by the SHPO and RHPO to protect cultural resources throughout the State and the Refuge System;
- Our proactive approach to Section 110 compliance would contribute an additional, noticeable increment to the overall effort by the SHPO and RHPO to protect cultural resources on refuges. Plum Tree Island NWR would become one of the few refuges in the Service's Northeast Region taking a proactive approach toward cultural resource protection; and
- We expect beneficial impacts to derive from improved partnerships for the interpretation of the refuge's cultural landscape within the context of the Captain John Smith Chesapeake NHT. In partnership with the NPS and others, we would offer opportunities for the public to experience these landscapes while instilling an ethic for cultural resource protection and stewardship to ensure their enjoyment by future generations.

4.16 Relationship between Short-term Uses of the Human Environment and Enhancement of Long-term Productivity

In this section, we examined the relationship between local, short-term uses of the human environment and maintaining the long-term productivity of the environment. Long-term captures impacts that would extend beyond the 15-year period of this CCP.

None of the soil types on the refuge are soils associated with designated prime farmlands or farmland of statewide importance (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1187178.pdf; accessed November 2013). Therefore, neither of the alternatives would adversely affect designated prime farmlands or farmland of statewide importance.

Under both alternatives, our primary aim is to maintain or enhance the long-term productivity and sustainability of natural resources on the refuge, in the Commonwealth of Virginia, and in the Mid-Atlantic ecoregion. The alternatives strive to provide habitat for species of concern and the habitats that they depend on. The key difference between the two alternatives that has the greatest potential to impact long-term productivity is the potential to construct new visitor use facilities at one designated location on the refuge under alternative B.

Our habitat management actions would contribute positively to maintaining and enhancing the long-term productivity of the refuge's natural resources with sustainable beneficial cumulative and long-term benefits to the environment surrounding the refuge, with minimal inconvenience or loss of opportunity for the American public.

4.17 Unavoidable Adverse Impacts

Unavoidable adverse impacts are the effects of those actions that could cause harm to the human environment and cannot be avoided, even with mitigation measures. Either of the alternatives would result in some minor, localized, unavoidable adverse impacts. For example, biological monitoring or control of invasive species would produce minor, short-term, localized adverse impacts. However, none of those impacts would rise to a considerable level, and in the long term, they would have beneficial impacts. Furthermore, we would mitigate all those impacts with best management practices, resulting in none of the alternatives causing significant, unavoidable cumulative impacts.

Proposed public uses may have unavoidable adverse impacts on vegetation, soils, and wildlife. However, we minimize these impacts to the extent possible by limiting access to only the designated public use area (except during hunting) and to less sensitive areas, and using best management practices. Alternative B would have adverse impacts to a certain segment of the public that does not desire any change in current habitat management or public use programs. Some of these

impacts to particular habitats are unavoidable, but our responsibility is to manage the refuge with an emphasis on maintaining and restoring the ecological integrity and natural processes of the refuge. We believe we have sought a fair balance in minimizing and mitigating adverse impacts while optimizing wildlife conservation and providing excellent wildlife observation, photography, and interpretive opportunities to the public.

4.18 Potential Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be reversed except perhaps in extreme long-term or unpredictable circumstances. An example of an irreversible commitment is an action that contributes to a species' extinction. Once extinct, that species can never be replaced. No irreversible commitments of resources are predicted as a result of management activities on Plum Tree Island NWR.

In comparison, irretrievable commitments of resources are those that can be reversed, given sufficient time and resources, but represent a loss in production or use for a period of time. In our professional judgment there are only a few actions proposed that could be considered irretrievable and primarily relate to the construction of new facilities to support refuge operations and public use that are listed in appendix D. They are considered irretrievable because, in the future, any facility we construct could potentially be dismantled and the site restored; however, while standing, they represent a loss in habitat productivity.

In our professional judgment, the overall local and regional benefits to the human environment outweigh the loss of productivity on less than 1 refuge acre.

4.19 Energy Efficiency

President Obama signed EO 13514, "Federal Leadership in Environmental, Energy, and Economic Performance" on October 5, 2009, to establish an integrated strategy towards sustainability in the Federal government and making reductions in greenhouse gas emissions a priority for Federal agencies. In 2010, President Obama announced two targets for the Federal government to reduce its greenhouse gas emissions. The first target is a reduction in direct greenhouse gas emissions, such as those from fuels and building energy use, by 28 percent by 2020. The second target is a reduction in indirect greenhouse gas emissions, such as those from employee business travel and employee commuting, by 13 percent by 2020. The Federal government estimates that by meeting these two goals, by 2020 they could save up to \$11 billion in energy costs and eliminate the equivalent of 235 million barrels of oil from their activities. As of 2010, the Federal government had reduced greenhouse gas pollution by 2.5 million metric tons of carbon dioxide emissions compared to its 2008

baseline, and it is on track to meet 2020 Federal greenhouse gas pollution reduction targets (<http://sustainability.performance.gov>; accessed November 2013).

To demonstrate proactive leadership among government agencies, the Service adopted a commitment to become carbon neutral by 2020 in “Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change” (referred to as the Strategic Plan; USFWS 2009c). The Service implements strategies to achieve the goal of carbon neutrality through policy outlined in 565 FW 1.

Outlined in 565 FW 1 are three categories where Service activities should consider approaches that are sustainable and work towards the goal of carbon neutrality: minimize energy use, improve planning, and improve work practices.

Under all alternatives, we would minimize energy use to the maximum extent practicable by:

- moving toward eliminating the use of fossil fuels;
- increasing the use of renewable energy;
- using high performance sustainable building design, construction, operation and management, maintenance, and deconstruction;
- managing electronic assets in an environmentally sound and energy efficient manner throughout their life cycle; and
- improving efficiencies in our fleet and transportation management.

By improving our planning, we aim to:

- reduce or eliminate the quantity of toxic and hazardous chemicals and materials we acquire, generate, use, and dispose of;
- participate in regional and local integrated planning;
- reduce pollution;
- implement formal Environmental Management Systems at all appropriate organizational levels;
- increase the diversion of solid waste and maintain cost-effective waste prevention and recycling programs in Service facilities;
- improve wastewater management; and
- reduce water consumption.

By improving our work practices, we would continue to:

- advance sustainable acquisition of goods and services;
- implement sustainable landscaping practices;
- promote workforce practices that minimize greenhouse gas emissions;
- ensure we have environmental leaders in our organization; and
- ensure our concession and commercial visitor service operators conduct sound environmental management.

In our professional judgment, the overall impact of these practices to the local and regional environment would be beneficial.

4.20 Environmental Justice

President Clinton signed EO 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 impacts of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment, and to provide minority and low-income communities with access to public information and participation in matters relating to human health or the environment.

The 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 decisionmaking process to have a healthy environment in which to live, learn, and work.

(<http://www.epa.gov/environmentaljustice>; accessed September 2013).

To facilitate this, Federal agencies should also consider if a significant portion of the affected community is linguistically isolated and, as warranted, provide translated documents and other appropriate

outreach materials. Less than 5 percent of the City of Poquoson's population is considered a minority, low-income, or linguistically isolated (table 2.8). Based on our socioeconomic and environmental consequences analysis, neither of the alternatives in this plan would place a disproportionately high, adverse environmental, economic, social, or health affect these populations because:

- The CCP and EA Planning Team actively solicited public participation as part of the planning process and considered equally all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- Implementation of the proposed alternatives would not result in any identifiable adverse human health effects. Therefore, there would be no direct or indirect adverse impacts on any minority or low-income population.
- The impacts associated with implementation of the proposed alternatives would not disproportionately affect any minority or low-income population or community.
- Any impacts to the socioeconomic environment would not appreciably alter the physical and social structure of the nearby communities.

Beneficial impacts include maintaining natural vegetation that improves air and water quality through filtering, paying refuge revenue sharing payments to the City of Poquoson, and providing enhanced public use opportunities 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 the alternatives would be open to all members of the public. The Service is also an equal opportunity employer.

4.21 Summary of Environmental Consequences

The following table 4.1 summarizes the benefits and adverse impacts we described in this chapter for specific resources or programs proposed for Plum Tree Island NWR under all of the alternatives. Please refer to the narratives above 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.

Table 4.1 Summary of Environmental Consequences

Service Resource or Program	Alternative A. Current Management (No Action Alternative)	Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
Air Quality	<p>Beneficial Impacts That Would Not Vary by Alternative</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • None of our proposed management activities would result in long-term local or regional air quality impacts or alter the status of the Virginia Beach–Norfolk–Newport News CBSA as an attainment area for ground-level ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, or fine and coarse particulate matter. • We would continue to follow applicable Federal or State regulations regarding the regular updates to the refuge’s prescribed fire management plan. • We would continue to ensure that any management actions would comply with the State’s smoke management plan. • We would continue to adhere to State and Federal standard safety regulations for applying herbicides under certain weather conditions, as required. • We would continue to consult as needed with VDEQ’s Division of Air Program Coordination and VDEQ’s Piedmont Regional Office for guidance and requirements for any needed air quality permits. • All refuge management activities would be conducted in compliance with the Clean Air Act. • Neither alternative would violate EPA standards for criteria air pollutants. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • No beneficial impacts that would not vary between alternatives. <p>Adverse Impacts That Would Not Vary by Alternative</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Both alternatives would result in localized, short-term impacts on air quality from emissions from mechanical equipment used for habitat management and research activities. • Both alternatives would result in localized, short-term impacts on air quality from applying herbicides to control invasive plants. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • No adverse impacts that would not vary between alternatives. 	
	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Limiting disturbance in the salt marsh habitat within the refuge’s boundary would result in minor, indirect, long-term benefits on local air quality by maintaining the ability of the marsh to sequester carbon. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • None identified. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Emissions from motorized boats used by refuge staff conducting visual surveys of shoreline erosion and biological surveys would result in direct, negligible, short-term impacts on local air quality through the release of hydrocarbons by burning fuel. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • Emissions from motorized boats used by refuge staff to prepare and maintain waterfowl hunt blinds, as well as boat use by waterfowl hunt participants, would result in direct, negligible, short-term impacts on local air quality through the release of hydrocarbons by burning fuel. 	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Same as the impacts detailed under alternative A. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • Interpretation of the refuge’s habitats would provide a negligible, indirect, long-term impact on refuge air quality by increasing appreciation for the role of marsh habitat in supporting environmental health. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • In addition to the impacts detailed under alternative A, increasing the frequency of motorized boat use by refuge staff to conduct habitat management, research, public use programs, and law enforcement activities would result in negligible, direct, short-term adverse impacts on local air quality through the release of hydrocarbons by burning fuel. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • In addition to the impacts detailed under alternative A, increasing fuel-burning equipment use by refuge visitors, refuge staff, and law enforcement officers would result in negligible to minor, direct, short- and long-term adverse impacts on local air quality through the release of hydrocarbons.

Service Resource or Program	Alternative A. Current Management (No Action Alternative)	Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
Water Resources	<p>Beneficial Impacts That Would Not Vary by Alternative</p> <ul style="list-style-type: none"> Both alternatives would involve management activities that would not adversely affect local or regional hydrology and water quality. Both alternatives would comply with Federal or State standards regarding pollutant contribution to water sources. We would continue to comply with the Clean Water Act. <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> We would continue to take steps to ensure that we have sufficient scientific data to support management decisions regarding refuge water resources. We would continue to consult with VDCR Regional Office; VDCR Division of Stormwater Management, Local Implementation Office; VDEQ Division of Water Quality Programs, Office of Wetlands and Water Protection/Compliance; VDEQ's Division of Land Protection and Revitalization; and VMRC to help protect land and water quality in the refuge vicinity. We would continue to consider recommendations from the VDEQ regarding land-disturbing activities. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> No beneficial impacts that would not vary between alternatives. <p>Adverse Impacts That Would Not Vary by Alternative</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> No adverse impacts that would not vary between alternatives. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> No adverse impacts that would not vary between alternatives. 	
	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Limiting disturbance in the 2,027 acres of salt marsh on the refuge would have moderate, direct and indirect, long-term benefits on water resources by preventing coastal erosion, stabilizing sediments suspended in water, and removing pollutants from water runoff. Limiting disturbance in the maritime shrubland, dune, sandy beach, and mudflat habitats would have minor to moderate, direct and indirect, long-term benefits on water resources by reducing erosion from wave action. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> None identified. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Refuge staff and partners conducting annual biological surveys and site visits to assess hazards associated with unexploded ordnance would have negligible, direct, and short-term impacts on local water resources boats caused re-suspension of sediments and the potential release of hydrocarbons. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> The refuge's waterfowl hunt would result in negligible, direct, short-term impacts on local water resources caused re-suspension of sediments and the 	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> In addition to the impacts detailed under alternative A, controlling the spread of phragmites would have minor, indirect, short-term benefits to local water resources by protecting habitat integrity. Regularly conducting quantitative shoreline surveys to assess accretion and erosion would provide minor, indirect, short-term impacts to local water resources by identifying problem areas and selecting the appropriate techniques to address erosion. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> Interpretation of the refuge's habitats would provide a negligible, indirect, long-term impact on local water resources by increasing appreciation for the role of marsh habitat in supporting environmental health. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Increased biological research activities and control of invasive species on the refuge would result in negligible, direct, short-term impacts to local water resources because of the increased motorized boat use and potential for herbicides to enter local waters. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> In addition to the impacts detailed under alternative A, designating a kayak and canoe landing area on Cow Island (estimated to be 0.5-acre for this analysis)

4.21 Summary of Environmental Consequences

Service Resource or Program	Alternative A. Current Management (No Action Alternative)	Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
	potential release of hydrocarbons.	for new public use opportunities would result in minor, direct, short- and long-term impacts on water quality through temporary soil disturbance during construction and annual increase in boat traffic and visitors.
Soils	<p>Beneficial Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Limiting disturbance in refuge habitats would have minor, direct and indirect, long-term benefits to refuge soils by reducing or prevent soil erosion. Limiting disturbance in the 2,027 acres of salt marsh on the refuge would have moderate, direct and indirect, long-term impacts on refuge soils by preventing coastal erosion. Limiting disturbance in the maritime shrubland, dune, sandy beach, and mudflat habitats would have minor to moderate, direct and indirect, long-term impacts on refuge soils by protecting the shoreline from wave energy. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> None identified. <p>Adverse Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Refuge staff and partners conducting annual biological surveys and site visits to assess hazards associated with unexploded ordnance would have localized, negligible, direct, and short-term impacts on refuge soils through increase vehicle and equipment use to survey for and remove unexploded ordnance. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> The refuge’s waterfowl hunt would have negligible, direct, short-term, local impacts on refuge soils through human activities during the hunting season. 	<p>Beneficial Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> In addition to the impacts detailed under alternative A, controlling the spread of phragmites would have minor, indirect, short-term benefits to refuge soils through the protection of the soil’s natural biogeochemistry and physical characteristics. Regularly conducting quantitative shoreline surveys to assess accretion and erosion would provide minor, indirect, short-term impacts on refuge soils by identifying problems areas and selecting the appropriate techniques to address erosion. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> Interpretation of the refuge’s habitats would provide a negligible, indirect, long-term impact on refuge soils by increasing appreciation for the role of marsh habitat in supporting environmental health. <p>Adverse Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> In addition to the impacts detailed under alternative A, increasing research activities and invasive plant control efforts would result in negligible, direct, short-term impacts on refuge soils through increased boat traffic. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> In addition to the impacts detailed under alternative A, designating an estimated 0.5-acre public use area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on refuge soils through temporary soil disturbance during construction and annual increase in boat traffic and visitors.
Vegetation	<p>Beneficial Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Limiting disturbance in the 2,027 acres of salt marsh on the refuge would provide minor to moderate, direct, long-term benefits to refuge vegetation protecting the natural function of the marsh and promoting vegetation growth and diversity. Limiting disturbance in the maritime shrubland, dune, sandy beach, and mudflat habitats would provide minor to moderate, direct, local, long-term impacts on the refuge’s salt marsh and dune vegetation by protecting the habitats that prevent shoreline erosion of the refuge marsh. Limiting disturbance throughout refuge habitats 	<p>Beneficial Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> In addition to the impacts detailed under alternative A, initiating invasive species control efforts would have a negligible to minor, direct, long-term local benefits to refuge vegetation by preventing further spread of invasive species and displacement of native vegetation. Initiating the Salt Marsh Integrity Index would provide minor, indirect, long-term regional benefits to refuge vegetation through monitoring baseline conditions, detecting changes, and determining the appropriate management actions. Regularly conducting quantitative shoreline surveys

Service Resource or Program	Alternative A. Current Management (No Action Alternative)	Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
	<p>would have minor, direct and indirect, long-term impacts on refuge vegetation by protecting SAV and preventing sedimentation that reduces light penetration.</p> <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • None identified. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Refuge staff and partners conducting annual biological surveys and site visits to assess hazards associated with the PTI Range FUDS would have localized, negligible, direct, short-term impacts on refuge vegetation through increase vehicle and equipment use to survey for and remove unexploded ordinance. • Limited staff and resources to manage invasive species would result in localized, minor, indirect, long-term impacts on the refuge’s salt marsh, maritime shrubland, and dune habitats due to an inability to prevent invasive species establishment and spread. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • The refuge’s waterfowl hunt would result in negligible, direct, short-term impacts on refuge vegetation near each of the hunt blinds on Cow Island because hunts would primarily occur when vegetation is dormant. 	<p>to assess accretion and erosion would provide minor, indirect, short-term impacts on refuge vegetation through monitoring baseline conditions, detecting changes in accretion and erosion, and determining the appropriate management actions.</p> <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • Interpretation of the refuge’s habitats would provide a negligible, indirect, long-term impact on refuge vegetation by increasing appreciation for the role of the refuge’s habitats in supporting environmental health. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • In addition to the impacts detailed under alternative A, increasing research activities and invasive plant control efforts would result in negligible, direct, short-term impacts on refuge vegetation through increased boat traffic. • Invasive species control efforts would also have negligible, direct, short-term impacts on refuge vegetation through inadvertent killing of native vegetation during treatments. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • In addition to the impacts detailed under alternative A, designating an estimated 0.5-acre public use area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on refuge vegetation through temporary soil disturbance during construction and annual increase in boat traffic and visitors.
Birds	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Limiting disturbance in the refuge’s salt marsh habitat would continue to provide moderate, direct, long-term impacts on breeding, migrating, and wintering birds along the Atlantic Flyway by maintaining the isolation from human activities that these birds prefer. • Limiting disturbance in the maritime shrubland and dune habitat has minor, direct, long-term impacts on breeding, migrating, and wintering bird populations on the refuge through habitat protection. • Continuing to limit disturbance in the sandy beach and mudflat habitat would have moderate, direct, long-term impacts on nesting and migrating birds, specifically waterbirds and shorebirds because this habitat is important for waterbird and shorebird foraging. • Limiting disturbance in all refuge habitats would protect the estuaries and SAV beds adjacent to the refuge, and would have moderate, indirect, long-term impacts on wintering waterfowl species because 	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • In addition to the impacts detailed under alternative A, controlling invasive species would provide negligible, direct, long-term local benefits to waterbirds and shorebirds that nest in the salt marsh, maritime shrubland, and dune habitats by prevent habitat loss and/or degradation. • Inventorying and monitoring priority refuge resources of concern would have minor, indirect, long-term benefits on all bird species that use the refuge for nesting, migration, or wintering by monitoring population trends and identifying if management actions are required. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • Expanding the refuge’s waterfowl hunt to include youth opportunities and improved hunt administration would provide negligible, indirect, long-term regional benefits to waterfowl populations because the program engages the public and builds appreciation for the species.

Service Resource or Program	Alternative A. Current Management (No Action Alternative)	Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
	<p>these areas provide critical foraging areas for a number of priority wintering waterfowl species.</p> <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • None identified. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Limited staff and resources to manage invasive species would result in localized, minor, indirect, long-term impacts on birds that depend on the refuge’s salt marsh, maritime shrubland, and dune habitats due to an inability to prevent invasive species establishment and spread. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • The refuge’s waterfowl hunt would continue to result in a negligible, direct, short-term impact on waterfowl species that are permitted to be hunted due to technical support from the Service’s Office of Migratory Birds on population trends and allowable harvest levels. • The hunt program would have minor, direct, short-term impacts on non-target birds because hunting season occurs outside of the breeding and migratory seasons for shorebirds and waterbirds. 	<ul style="list-style-type: none"> • Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, long-term regional, benefits to bird populations because it helps to build appreciation for these species and the role of the refuge. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Control of invasive species would provide negligible, indirect, short-term impacts to waterbirds and shorebirds that nest in the salt marsh, maritime shrubland, and dune habitats because treatment would typically occur outside of the breeding season and best management practices would be used for chemical application. • Inventorying and monitoring priority refuge resources of concern would have minor, direct, short-term impacts on all bird species that use the refuge for nesting, migration, or wintering through temporary disturbance during monitoring activities. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • Adding a youth waterfowl hunt day would result in no new adverse impacts on birds. Waterfowl hunting impacts on target and non-target bird species would be the similar to those detailed under alternative A. • Designating an estimated 0.5-acre public use area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on birds through temporary disturbance during construction and annual increase in boat traffic and visitors.
<p>Fisheries</p>	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Limiting disturbance in the 2,027 acres of salt marsh on the refuge would have minor, direct and indirect, long-term benefits to fisheries by protecting the habitat features that boost production of ecologically important fishery species, such as shrimp, oysters, and fish. • Limiting disturbance in the salt marsh, maritime shrubland, dune, sandy beach, and mudflat habitats would have minor, direct and indirect, long-term impacts on fisheries by protecting SAV, which serves as habitat for many aquatic species. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • None identified. <p>Adverse Impacts</p>	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • In addition to the impacts detailed under alternative A, controlling the spread of phragmites would have minor, indirect, short- and long-term impacts on fisheries by preventing habitat loss and/or degradation. • Inventorying and monitoring priority refuge resources of concern would have negligible, indirect, long-term benefits on fishery species that use the refuge for foraging or shelter by monitoring habitat attributes for other species, management actions may be identified. • Regularly conducting quantitative shoreline surveys to assess accretion and erosion would provide minor, indirect, short-term benefits to fisheries through monitoring baseline conditions, detecting changes in accretion and erosion, and determining the appropriate management actions to protect SAV, an

Service Resource or Program	Alternative A. Current Management (No Action Alternative)	Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
	<p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Limited staff and resources to manage invasive species would result in localized, minor, indirect, and long-term impacts on fisheries due to an inability to prevent invasive species establishment and spread. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> The refuge’s waterfowl hunt would result in minor, direct and indirect, short- and long-term adverse impacts on fisheries through boats re-suspending sediments and disturbing fish from feeding or resting. 	<p>important component to fish habitat.</p> <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, long-term regional benefits to fish populations because it helps to build appreciation for fish species and the role of the refuge. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Increasing biological research activities and control of invasive species on the refuge would result in negligible, direct, short-term impacts to fisheries because of the increased motorized boat use and potential for herbicides to enter local waters. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> In addition to the impacts detailed under alternative A, designating an estimated 0.5-acre public use area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on fishery species during construction and annual increase in boat traffic and visitors.
Mammals	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Limiting disturbance in salt marsh habitat would have minor, direct, long-term benefits for mammals on the refuge through protection of their habitat. Limiting disturbance of maritime shrubland and dune habitat would provide negligible to minor, direct, long-term benefit to local mammals that use the shrubs and trees as roosting and foraging areas, such as red bats. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> None identified. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Limited staff and resources to manage invasive species would result in localized, minor, indirect, and long-term impacts on mammals due to an inability to prevent invasive species establishment and spread. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> The hunt program would have minor, direct, short-term impacts on mammals through the enforcement of hunting regulations and limited hunting days. 	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> In addition to the impacts detailed under alternative A, controlling of invasive species would provide negligible to minor, direct, local, long-term benefit to native mammals that depend on the wetland habitats by preventing habitat loss and/or degradation. Inventorying and monitoring priority refuge resources of concern would have negligible, indirect, long-term benefits to mammal species that use the refuge for foraging or shelter by monitoring habitat attributes for other species, management actions may be identified. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to mammal populations because it helps to build appreciation for mammal species and the role of the refuge. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Controlling invasive species would provide negligible, indirect, local, short-term impacts to mammals in the

Service Resource or Program	Alternative A. Current Management (No Action Alternative)	Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
		<p>salt marsh, maritime shrubland, and dune habitats by temporary disturbance during chemical application.</p> <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • Adding a youth waterfowl hunt day under alternative B would result in no new impacts on mammals; waterfowl hunting impacts on mammals would be the similar to those detailed under alternative A. • Designating an estimated 0.5-acre public use area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on mammals during construction and annual increase in boat traffic and visitors.
<p>Reptiles</p>	<p>Beneficial Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Limiting disturbance of the salt marsh habitat would have minor, direct, long-term benefits to reptile species, especially the diamondback terrapin because it relies on the coastal salt marsh for its complete life cycle. • Limiting disturbance in maritime shrubland and dune habitat would have a minor, direct, long-term benefit for reptile species, such as the hognose snake through habitat protection. • Limiting disturbance on sandy beaches and mudflats habitat would have moderate, direct, long-term benefits for diamondback terrapins because this represents nesting habitat. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • None identified. <p>Adverse Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Limited staff and resources to manage invasive species would result in minor, indirect, long-term local impacts on reptiles due to an inability to prevent invasive species establishment and spread. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • None identified. 	<p>Beneficial Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • In addition to the impacts detailed under alternative A, controlling phragmites in the salt marsh, sandy beach, and dune habitats has minor, indirect, long-term benefits for reptiles, such as diamondback terrapins by preventing habitat loss and/or degradation. • Inventorying and monitoring priority refuge resources of concern (appendix A) would have minor, indirect, long-term benefits for reptile species that use the refuge for foraging, shelter, and nesting by monitoring population trends and identifying if management actions are required. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • In addition to the impacts detailed under alternative A, opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to reptile populations because it helps to build appreciation for reptile species and the role of the refuge. <p>Adverse Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> • Controlling invasive species would provide negligible, direct, local, short-term impacts on reptiles in the shrubland, dune, and salt marsh habitats by temporary disturbance during chemical application. • Development and implementation of inventory and monitoring of priority refuge resources of concern would have minor, direct, short-term impacts on reptiles that use the refuge for foraging, nesting, and cover through temporary disturbance during monitoring activities. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> • Designating an estimated 0.5-acre public use area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts

Service Resource or Program	Alternative A. Current Management (No Action Alternative)	Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
		on reptiles during construction and annual increase in boat traffic and visitors.
Invertebrates	<p>Beneficial Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Limiting disturbance in the salt marsh habitat would continue to provide moderate, direct, long-term benefits to invertebrate species by allowing the natural process of subsidence and sedimentation to maintain vegetation. Limiting disturbance on the dune and sandy beach habitats would have moderate, direct, short- and long-term benefits to the federally threatened northeastern beach tiger beetle population by preventing human disturbance during foraging, mating, and egg laying activities. Annual monitoring of the northeastern beach tiger beetle population would result in minor, indirect, long-term local and regional benefit to this species because data would be used to inform refuge management actions, contribute to regionwide population estimates for this species, and inform preferred habitat characteristics for other areas of future protection. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> None identified. <p>Adverse Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Limited staff and resources to manage invasive species would result in localized, minor, indirect, long-term impacts on invertebrates due to an inability to prevent invasive species establishment and spread. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> None identified. 	<p>Beneficial Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> In addition to the impacts detailed under alternative A, performing quantitative shoreline surveys would provide negligible, indirect, long-term local benefit to invertebrates because documenting habitat changes helps to determine species recovery and potential management actions. Controlling invasive species would provide negligible to minor, direct, long-term local benefit to native invertebrates that depend on the wetland habitats by preventing habitat loss and/or degradation. Inventorying and monitoring priority refuge resources of concern would have negligible, indirect, long-term benefits to invertebrate species that use the refuge for foraging or shelter by monitoring population trends and identifying if management actions are required. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to invertebrate populations it helps to build appreciation for invertebrate species and the role of the refuge. <p>Adverse Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Controlling invasive species would provide negligible, indirect, local, short-term impacts to invertebrates in the shrubland, dune, and salt marsh habitats by temporary disturbance during chemical application. Development and implementation of inventory and monitoring of priority refuge resources of concern would have minor, direct, short-term impacts on invertebrates that use the refuge for foraging and cover through temporary disturbance during monitoring activities. <p><u>Public Use and Access</u></p> <p>Designating an estimated 0.5-acre public use area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on invertebrates during construction and annual increase in boat traffic and visitors.</p>
Public Use and Access	<p>Beneficial Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Limiting human disturbance to wildlife habitats would provide a minor, direct, long-term benefit to the waterfowl hunt program by providing resources 	<p>Beneficial Impacts <u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Conducting more intense habitat management activities and more frequent biological surveys would result in direct and indirect, short- and long-term

Service Resource or Program	Alternative A. Current Management (No Action Alternative)	Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
	<p>that waterfowl would use and continue to waterfowl hunting opportunities.</p> <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> Continuing to offer limited waterfowl hunting opportunities on the refuge provides a negligible, direct, short-term benefit to the hunting community within the lower Chesapeake Bay area because it provides opportunities for individuals who are not members of private hunt clubs, do not maintain stationary or float blinds, or are new to hunting. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> None identified. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> None identified. 	<p>benefits to the quality of wildlife-dependent recreational opportunities on the refuge through increased knowledge of the refuge and its wildlife, which can be communicated through improved educational and interpretative materials.</p> <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> In addition to the impacts detailed under alternative A, administrative changes to our existing waterfowl hunting program would provide minor, direct, long-term benefit to the local waterfowl hunting community because more hunters may be interested in and able to participate in waterfowl hunting. Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually, at a designated public use area on Cow Island, would have minor to moderate, direct, local, long-term benefits to those who want to engage in these activities on the refuge because since its establishment, the public has expressed desire to access the refuge. Increased public awareness and promotion of public use programs allowed on the refuge, specifically hunting, would provide a negligible, direct, local benefit to the interested public because it provides a message that low levels of public use are compatible with refuge habitat and wildlife management. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Inventory and monitoring efforts, as well as invasive species management, would have a negligible, indirect, short-term impact on wildlife-dependent recreational opportunities at and immediately adjacent to the designated public use area on Cow Island through scheduling activities to avoid conflicts with refuge visitors. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> Compliance and enforcement of commercial and non-commercial public use stipulations would minimize the potential for conflict among various user groups
<p>Socioeconomic Environment</p>	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Our continued annual payments would result in direct, long-term benefits to the City of Poquoson through funds from the Refuge Revenue Sharing Program. Protecting the refuge and its habitats provides minor to moderate, direct, long-term socioeconomic benefits to the City of Poquoson because protection of the refuge's wildlife, habitats, and ecological services is consistent as possible to existing city planning documents. 	<p>Beneficial Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Increasing staff and partner management activities at the refuge would result in minor, indirect, long-term benefits to the local economy through increased purchasing of fuel, food, materials, and equipment from the City of Poquoson retailers. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> Opening the refuge to non-commercial and commercial wildlife observation, photography, environmental education, and interpretation programs on Cow Island would have minor to moderate,

Service Resource or Program	Alternative A. Current Management (No Action Alternative)	Alternative B. Increased Ecosystem Monitoring, Partnerships, and Public Use (Service-preferred Alternative)
	<p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> The refuge’s limited waterfowl hunting opportunities provide a negligible, direct, long-term benefit to the local economy because hunt participants purchase supplies, food, and lodging near the refuge. <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> None identified. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> None identified. 	<p>indirect, long-term benefits to the local economy through opportunities to provide guided services or equipment rental to visitors.</p> <p>Adverse Impacts</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Same as the impacts detailed under alternative A. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> Same as the impacts detailed under alternative A.
Cultural and Historic Resources	<p>Adverse Impacts That Would Not Vary by Alternative</p> <p><u>Habitat Protection and Management</u></p> <ul style="list-style-type: none"> Land-disturbing activities have the potential to impact adversely affect the cultural resources of the refuge. Known archaeological sites, cultural resources, and cultural landscapes would continue to be protected from unintended impacts. By continuing to coordinate with the RHPO, the SHPO, and other partners, we would continue to increase our knowledge, understanding, and appreciation of the refuge’s cultural resources and rich history as part of the lower Chesapeake Bay region. <p><u>Public Use and Access</u></p> <ul style="list-style-type: none"> Refuge visitors may inadvertently or even intentionally damage or disturb known or undiscovered cultural artifacts or historic properties. We would continue our vigilance in looking for this problem, use law enforcement where necessary, and continue our outreach and education efforts with local Virginia Indian Tribes and the NPS. <p><u>Avoidance, Minimization, and Mitigation Strategies</u></p> <ul style="list-style-type: none"> For compliance with Section 106 of the NHPA, the refuge staff would consult the RHPO during the early planning stages of proposed new actions when new ground-altering activities are proposed, evaluate existing structures for National Register eligibility before altering, and require compliance with standard terms and conditions for cultural resource protection as applicable. We would provide a description and location of all projects, activities, routine maintenance, and operations that affect ground and structures, details on requests for compatible uses, and the range of alternatives considered. The RHPO would analyze those proposed undertakings for their potential to affect historic and prehistoric sites, and consult with the SHPO and other parties as appropriate. We would notify the State and local government officials to identify concerns about the impacts of those proposed undertakings. <p><u>Section 106 Summary for All Alternatives</u></p> <ul style="list-style-type: none"> After applying the Advisory Council on Historic Preservation criteria of adverse effects, the Service concluded that implementation of alternative A would have no effect on cultural resources and alternative B would have the potential to result in an adverse impact on cultural resources that may be eligible for listing in the National Register. As described above, we would use management practices that avoid or resolve adverse impacts on cultural resources in accordance with the NHPA. 	

Chapter 5



USFWS

Public scoping meeting participants discussing concerns with CCP Team Members

Consultation, Coordination, and Preparation

- 5.1 Introduction
- 5.2 Planning Process
- 5.3 List of Preparers

5.1 Introduction

This chapter describes how we engaged others in developing this draft CCP and 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-governmental conservation and education organizations, and user groups. It also identifies who contributed significantly to the content or writing of the plan.

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.

5.2 Planning Process

January 10, 2012	Notice of Intent to prepare CCP published in the <i>Federal Register</i> (77 FR 1500).
June 27, 2012	Kick-off meeting for CCP Core Team members, including representatives from the Service's Northeast Regional Office, Eastern Virginia Rivers NWR Complex, and Virginia Field Office; USACE and their contractor Shaw Environmental, Inc.; NPS; VDEQ; and VDGIF.
August 28, 2012	Distributed planning newsletter (#1) to 416 contacts on mailing list.
September 9–10, 2012	Articles published in the Richmond Times-Dispatch, Virginian-Pilot, and The Daily Press.
September 13, 2012	Hosted a government and agency partners scoping meeting in Poquoson, Virginia.
September 13–14, 2012	Hosted two public open house scoping meetings in Poquoson, Virginia, along with representatives from USACE, VDEQ, VDGIF, and meeting facilitator (MAP Environmental, Inc.).
October 18–19, 2012	Informally discussed CCP development process and progress with attendees at the Poquoson Seafood Festival in Poquoson, Virginia.
November 14, 2012	Briefed the Poquoson Parks and Recreation Advisory Board and one Poquoson City Council member at a meeting held in Poquoson, Virginia.
November 30, 2012	Distributed planning newsletter (#2) to 451 contacts on mailing list.

December 23, 2013	Distributed planning newsletter (#3) to 476 contacts on mailing list.
February 5, 2014	Briefed the City of Poquoson's Mayor and Congressman Wittman's office at a meeting held in Washington, D.C.
April 14, 2014	Briefed the Poquoson City Council at a meeting held in Poquoson, Virginia.
July 30, 2014	Received letter from City of Poquoson regarding law enforcement patrol of unauthorized public use of Cow Island.
September 29, 2014	Response letter to City of Poquoson regarding law enforcement patrol of unauthorized public use of Cow Island.
October 17, 2012	Distributed planning newsletter (#4) to 474 contacts on mailing list.
October 17–18, 2014	Informally discussed CCP development process and progress with attendees at the Poquoson Seafood Festival in Poquoson, Virginia.
April 25, 2016	Visited Cow Island with Congressman Wittman, City of Poquoson Mayor Hunt, and Service Director Ashe to discuss the City of Poquoson's interest in allowing public uses on Cow Island.

5.3 List of Preparers

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Bibliography



Meghan Powell

Sunset view of White House Cove Marina in Poquoson

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Glossary, Acronyms, and Species Names



Cyrus Brame/USFWS

American oystercatchers, herring gulls, and various shorebirds in winter plumage

Glossary, Acronyms and Abbreviations, and Species Scientific Names

- **Glossary**
- **Acronyms and Abbreviations**
- **Species Scientific Names**

Glossary

adaptive management	Process in which projects are implemented within a framework of scientifically driven experiments to test predictions and assumptions outlined within the comprehensive conservation plan. Analysis of the outcome of project implementation helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.
abiotic	Nonliving; a physical feature of the environment such as climate, temperature, geology, soils.
accretion and erosion	Deposition and removal of sand along shorelines.
alternative	Set of objectives and strategies needed to achieve refuge goals and the desired future condition.
ambient	Of the surrounding area or outside environment.
anadromous fish	Fish that spend a large portion of their life cycle in the ocean and return to freshwater to breed.
appropriate use	Proposed or existing use on a refuge that meets at least one of the following three conditions: <ul style="list-style-type: none"> ● the use is a wildlife-dependent one. ● 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. ● the use has been determined appropriate as specified in section 1.11 of that act.
approved acquisition boundary	Project boundary that the Director of the U.S. Fish and Wildlife Service approves upon completion of the planning and environmental compliance process. An approved acquisition boundary only designates those lands which the Service has authority to acquire or manage through various agreements. The approval of an acquisition boundary does not grant the Service jurisdiction or control over lands within the boundary, and it does not make lands within the refuge boundary part of the National Wildlife Refuge System. Lands do not become part of the System until the Service buys them or they are placed under an agreement that provides for their management as part of the System.
avian	Of or having to do with birds.
basin	Surrounding land that drains into a water body.
bathymetry	Topography, contour, and/or elevations of the bottom or bed of a lake, river, or ocean; underwater equivalent of topography relative to the water surface.
best management practice	Land management practices that produce desired results, usually describing forestry or agricultural practices effective in reducing non-point source pollution.

biological diversity	Variety of life forms and its processes, including 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 natural biological processes that shape genomes, organisms, and communities.
bird conservation region	Ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues.
brackish	Brackish water is water that is more salty than freshwater, but less salty than seawater. It is generally defined as water with a salinity of 0.5 to 30 dissolved salts parts per thousand.
boreal	Subarctic climate characterized by long, cold winters and short, mild summers, roughly between latitude 45 degrees and 65 degrees north.
buffer	Lands bordering water bodies that reduce runoff and non-point source pollution.
canopy	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. Uppermost layers are called the overstory.
carbon neutrality	Achieving net zero carbon emissions by balancing a measured amount of carbon released with an equivalent amount that is sequestered.
carbon sequestration	Process through which agricultural and forestry practices remove carbon from the atmosphere. (656 FW 1)
categorical exclusion	Category of Federal agency actions that do not individually or cumulatively have a significant effect on the human environment.
climate change	Change in the state of the climate characterized by changes in the mean and/or the variance of its properties, persisting for an extended period, typically decades or longer. (IPCC 2007a)
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. (Public Law 105–57; 111 Stat. 1253)
compatibility determinations	Required determination for wildlife-dependent recreational uses or any public uses of a refuge.
Comprehensive Conservation Plan	(CCP) 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. (Public Law 105–57; 602 FW 1.4)

community	Distinct assemblage of plants that develops on sites characterized by particular climates and soils, and the species and populations of wild animals that depend on the plants for food, cover, and/or nesting.
conservation	Managing natural resources to prevent loss or waste. Management actions may include preservation, restoration, and enhancement.
cultural resource	Those parts of the physical environment—natural and built—that have cultural values to some sociocultural group or institution. Cultural resources include historic sites, archaeological sites and associated artifacts, sacred sites, buildings, and structures.
disturbance	Disruption in the natural plant succession of a community or ecosystem resulting in a new community.
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).
ecoregion	Territory defined by a combination of biological, social, and geographic criteria, rather than geopolitical considerations; generally, a system of related, interconnected ecosystems.
ecosystem	Dynamic and interrelated complex of plant and animal communities and their associated non-living environment.
endangered species	Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register.
Environmental Assessment	Systematic analysis to determine if proposed actions would result in a significant effect on the quality of the environment.
environmental health	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.
exotic species	Species that is not native to an area and has been introduced intentionally or unintentionally by humans.
extinction	Termination of existence of a lineage of organisms (e.g., a subspecies or species).
federally listed species	Species listed either as endangered, threatened, or species at risk (formerly a “candidate” species) under the Endangered Species Act.
fragmentation	Process of reducing the size and connectivity of habitat patches; the disruption of extensive habitats into isolated and small patches.
geographic information system	Computer system capable of storing and manipulating spatial mapping data; commonly referred to as GIS.

goals	Descriptive statements of desired future conditions.
habitat	Sum of the environmental factors—food, water, cover, and space—that each species needs to survive and reproduce in an area.
hammock	Dense, low-growing closed canopy forests with open shrubs and limited ground vegetation established on former coral beds exposed due to a drop in sea level. Light penetration is limited so herbaceous vegetation is primarily vines, climbing vegetation, or plants that grow on other plants.
hectare	Unit of area, equal to 2.47 acres.
historic conditions	Composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human-related changes to the landscape.
interjurisdictional fish	Populations of fish managed by two or more State, national, or tribal governments due to the scope of their geographic distributions or migrations.
invasive species	Non-native species whose introduction causes or is likely to cause economic or environmental harm or harm to human health.
issue	Any unsettled matter that requires a management decision. For example, a resource management problem, concern, a threat to natural resources, a conflict in uses, or in the presence of an undesirable resource condition.
marl	An unconsolidated sedimentary rock or soil consisting of clay and lime.
mast	The fruit of forest trees, such as acorns and other nuts.
migratory bird	Bird species that migrates between wintering and breeding grounds.
munitions constituents	Explosives and propellants originating from military munitions, or materials used in war, especially weapons and ammunition.
National Wildlife Refuge System	All lands, waters, and interests therein administered by the U.S. Fish and Wildlife Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish, wildlife and plant resources.
nekton	Aquatic animals that can swim and move independently of water currents.
non-point source pollution	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.
objectives	Actions to be accomplished to achieve a desired outcome or goal. Objectives are more specific, and generally more measurable, than goals.
oviposit	To lay eggs.

pannes	Depressions in salt marshes that can retain seawater after floodwaters recede and therefore usually have high salinity levels and salt-tolerant plants.
phenology	Study of how the biological world times natural events.
physiographic area	Bird conservation planning unit with relatively uniform vegetative communities, bird populations, and species assemblages, as well as land use and conservation issues, developed by Partners in Flight.
piscivorous	Carnivorous animal which eats primarily fish.
Plum Tree Island Range	One of the more than 2,700 properties nationwide that the Department of Defense is responsible for cleaning up under the Formerly Used Defense Sites Program.
point source pollution	Source of pollution that involves discharge of waste from an identifiable point, such as a smokestack or sewage-treatment plant.
polity	Form of government.
preferred alternative	The U.S. Fish and Wildlife Service's selected alternative identified in the Draft Comprehensive Conservation Plan.
prescribed burning/fire	Application of fire to wildland fuels, either by natural or intentional ignition, to achieve identified land use objectives.
priority public use	Compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation.
priority refuge species and habitats	Suite of plants, animals, and their habitats whose restoration, management, or maintenance at the refuge fulfills the refuge purposes and/or can contribute beneficially toward the maintenance or recovery of species currently under review for inclusion on the Federal Endangered or Threatened Species list or for whom range-wide conservation concern exists (see appendix A).
range	Geographic area within which a particular species is found.
restoration	Management of a disturbed or degraded habitat that results in the recovery of its original state (e.g., restoration may involve planting native species, removing invasive shrubs, prescribed burning).
riparian right	Right of an owner bordering on water the right to use that water so long as he does not unreasonably affect the usage of other riparian land owners.
scoping	Process for determining the scope of issues to be addressed by a comprehensive conservation plan and for identifying the significant issues. Involved in the scoping process are Federal, state, and local agencies; private organizations; and individuals.
sedentism	Process of settling down to live in groups for periods of time.
spawn	Fish reproduction—the mixing of the sperm from the male fish and the eggs of a female fish.

special use permit	Permit authorized by the refuge manager for an activity that is not usually available to the general public.
species	Distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. In taxonomy, a category of biological classification that refers to one or more populations of similar organisms that can reproduce with each other but is reproductively isolated from—that is, incapable of interbreeding with—all other kinds of organisms.
species of conservation concern	Species that are declining or appear to be in need of conservation. Also referred to as species of concern.
species richness	Simple measure of species diversity calculated as the total number of species in a habitat or community.
step-down management plan	Plan for addressing specific refuge management subjects, strategies, and schedules, (e.g., cropland, wilderness, and fire). (602 FW 1.4)
stopover site	Habitat where birds rest and feed during migration; also called staging area.
strategies	General approaches or specific actions to achieve objectives.
structure	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	Natural, sequential change of species composition of a community in a given area.
surrogate species	Species that represent other species or aspects of the environment. Such identified species are used for comprehensive conservation planning that supports multiple species and habitats within a defined landscape or geographic area.
terrestrial	Living on land.
threatened species	Plant or animal species likely to become endangered species throughout all of or a significant portion of their range within the foreseeable future. A plant or animal identified and defined in accordance with the Endangered Species Act and published in the Federal Register.
trust resources	National resources entrusted by Congress to the U.S. Fish and Wildlife Service for conservation and protection. These “trust resources” include migratory birds, federally listed endangered and threatened species, inter-jurisdictional fishes, wetlands, and certain marine mammals.
watershed	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.
Wilderness Area	Area designated by Congress as part of the National Wilderness Preservation System.

wilderness study area	Lands and waters identified by inventory as meeting the definition of wilderness and being evaluated for a recommendation that they be included in the Wilderness System.
wildfire	Unplanned, unwanted wildland fires including unauthorized human-caused fires, escaped wildland fires, escaped prescribed fires, and all other wildland fires where the objective is to put the fire out.
wildland fire	Any non-structure fire that occurs in the wildland. Three distinct types of wildfire fire have been defined and include wildfire, wildland fire use, and prescribed fire.
wildlife-dependent recreation	Use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, environmental education, or interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority general public uses of the National Wildlife Refuge System.

Acronyms and Abbreviations

°C	Degrees Celsius
°F	Degrees Fahrenheit
ACJV	Atlantic Coast Joint Venture
A.D.	(Medieval Latin) Anno domini, meaning “in the year of the Lord”
AGO	America’s Great Outdoors
AICUZ	Air Installation Compatible Use Zone
AFWA	Association of Fish and Wildlife Agencies
ARARs	Applicable or Relevant and Appropriate Requirements
ARPA	Archaeological Resources Protection Act
Bay Act	Chesapeake Bay Preservation Act
BCR	Bird Conservation Region
ca.	Circa
CAA	Clean Air Act
CBC	Christmas Bird Count
CBGN	Chesapeake Bay Gateways and Watertrails Network
CBSA	Core Based Statistical Area
CCB	Center for Conservation Biology
CCP	Comprehensive Conservation Plan
CD	Compatibility Determination
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cm	Centimeter
CPR	Cardiopulmonary resuscitation
CZMA	Coastal Zone Management Act
DOD	United States Department of Defense
DOI	United States Department of the Interior
EA	Environmental Assessment

EIS	Environmental Impact Statement
EO	Executive Order
EO Strategy	Executive Order # 13508: Strategy for Protecting and Restoring the Chesapeake Bay
EPA	Environmental Protection Agency
ESA	Endangered Species Act
et seq.	(Latin) et sequentes or et sequentia, meaning “and the following”
FONSI	Finding of No Significant Impact
FUDS	Formerly Used Defense Site
FR	Federal Register
FW	U.S. Fish and Wildlife Service Manual
GSA	General Services Administration
ha	Hectares
HMP	Habitat Management Plan
HUC	Hydrologic Unit Code
IBA	Important Bird Area
IMP	Inventory and Monitoring Plan
Improvement Act	National Wildlife Refuge Improvement Act
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JATO	Jet-assisted take-off
lb	Pound
LCC	Landscape Conservation Cooperative
LWCF	Land and Water Conservation Fund
m	Meter
MEC	Munitions and Explosives of Concern
MOBPH	Mobjack Bay segment of the Chesapeake Bay
MOU	Memorandum of Understanding
MPA	Marine Protected Area
mph	Miles per hour

Acronyms and Abbreviations

MSA	Metropolitan Statistical Area
NASA	National Aeronautics and Space Administration
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NERRS	National Estuarine Research Reserve System
NHPA	National Historic Preservation Act
NHT	National Historic Trail
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NWPS	National Wilderness Preservation System
NWR	National Wildlife Refuge
PTI	Plum Tree Island
ppm	Parts per million
refuge	Plum Tree Island National Wildlife Refuge
Refuge System	National Wildlife Refuge System
RHPO	Regional Historic Preservation Officer
RMA	Resource Management Area
ROC	Resources of concern
RONS	Refuge Operations Needs System
RPA	Resource Protection Area
SAMMS	Service Asset Maintenance Management System
SAV	Submerged Aquatic Vegetation
Service	United States Fish and Wildlife Service
SHC	Strategic Habitat Conservation
SHPO	State Historic Preservation Officer
SLAMM	Sea Level Affecting Marshes Model
SLR	Sea level rise
Stat.	Statute
SUP	Special Use Permit

TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
U.S.	United States
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UXO	Unexploded ordnance
VA	Virginia
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
VDHR	Virginia Department of Historic Resources
VDNH	Virginia Division of Natural Heritage
VDOF	Virginia Department of Forestry
VESCL	Virginia Erosion and Sediment Control Law
VMRC	Virginia Marine Resources Commission
VNHP	Virginia Natural Heritage Program
VOP	Virginia Outdoor Plan
VSP	Visitor Services Plan
WAP	Wildlife Action Plan
yr	Year

Species Scientific Names

Common Name	Scientific Name
Aaron's skipper butterfly	<i>Poanes aaroni</i>
Acadian flycatcher	<i>Empidonax virescens</i>
Allen's hummingbird	<i>Selasphorus sasin</i>
American avocet	<i>Recurvirostra americana</i>
American bittern	<i>Botaurus lentiginosus</i>
American black duck	<i>Anas rubripes</i>
American coot	<i>Fulica americana</i>
American eel	<i>Anguilla rostrata</i>
American goldfinch	<i>Carduelis tristis</i>
American kestrel	<i>Falco sparverius</i>
American oystercatcher	<i>Haematopus palliatus</i>
American pipit	<i>Anthus rubescens</i>
American redstart	<i>Setophaga ruticilla</i>
American robin	<i>Turdus migratorius</i>
American shad	<i>Alosa sapidissima</i>
American tree sparrow	<i>Spizella arborea</i>
American white pelican	<i>Pelecanus erythrorhynchos</i>
American wigeon	<i>Anas americana</i>
American woodcock	<i>Scolopax minor</i>
Atlantic bottlenose dolphin	<i>Tursiops truncatus</i>
Atlantic brant	<i>Branta bernicla</i>
Atlantic hawkbill	<i>Eretmochelys imbricata imbricata</i>
Atlantic sturgeon	<i>Acipenser oxyrinchus</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Baltimore oriole	<i>Icterus galbula</i>
Barking treefrog	<i>Hyla gratiosa</i>
Barn owl	<i>Tyto alba</i>

Barn swallow	<i>Hirundo rustica</i>
Barred owl	<i>Strix varia</i>
Belted kingfisher	<i>Megaceryle alcyon</i>
Bicknell's thrush	<i>Catharus bicknelli</i>
Black-and-white warbler	<i>Mniotilta varia</i>
Black-bellied plover	<i>Pluvialis squatarola</i>
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>
Black-crowned night-heron	<i>Nycticorax nycticorax</i>
Black dash butterfly	<i>Euphyes conspicua</i>
Black-legged kittiwake	<i>Rissa tridactyla</i>
Black-necked stilt	<i>Himantopus mexicanus</i>
Blackpoll warbler	<i>Dendroica striata</i>
Black rail	<i>Laterallus jamaicensis</i>
Black scoter	<i>Melanitta nigra</i>
Black skimmer	<i>Rynchops niger</i>
Black-throated blue warbler	<i>Dendroica caerulescens</i>
Black-throated green warbler	<i>Dendroica virens</i>
Black vulture	<i>Coragyps atratus</i>
Blue crab	<i>Callinectes sapidus</i>
Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>
Blue grosbeak	<i>Passerina caerulea</i>
Blue jay	<i>Cyanocitta cristata</i>
Blue-winged teal	<i>Anas discors</i>
Blue-winged warbler	<i>Vermivora pinus</i>
Boat-tailed grackle	<i>Quiscalus major</i>
Bonaparte's gull	<i>Chroicocephalus philadelphia</i>
Brown creeper	<i>Certhia americana</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Brown-headed nuthatch	<i>Sitta pusilla</i>

Species Scientific Names

Brown pelican	<i>Pelecanus occidentalis</i>
Brown thrasher	<i>Toxostoma rufum</i>
Bufflehead	<i>Bucephala albeola</i>
Canada goose	<i>Branta canadensis</i>
Canada warbler	<i>Wilsonia canadensis</i>
Canebrake rattlesnake	<i>Crotalus horridus</i>
Canvasback	<i>Aythya valisineria</i>
Carolina chickadee	<i>Poecile carolinensis</i>
Carolina wren	<i>Thryothorus ludovicianus</i>
Caspian tern	<i>Hydroprogne caspia</i>
Cattle egret	<i>Bubulcus ibis</i>
Cave swallow	<i>Petrochelidon fulva</i>
Cedar waxwing	<i>Bombycilla cedrorum</i>
Cerulean warbler	<i>Dendroica cerulea</i>
Chestnut-sided warbler	<i>Dendroica pensylvanica</i>
Chimney swift	<i>Chaetura pelagica</i>
Chipping sparrow	<i>Spizella passerina</i>
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>
Clapper rail	<i>Rallus longirostris</i>
Common eider	<i>Somateria mollissima</i>
Common goldeneye	<i>Bucephala clangula</i>
Common grackle	<i>Quiscalus quiscula</i>
Common loon	<i>Gavia immer</i>
Common merganser	<i>Mergus merganser</i>
Common moorhen	<i>Gallinula chloropus</i>
Common nighthawk	<i>Chordeiles minor</i>
Common rainbow snake	<i>Farancia erythrogramma erythrogramma</i>
Common ribbon snake	<i>Thamnophis sauritus</i>
Common snipe	<i>Gallinago gallinago</i>

Common tern	<i>Sterna hirundo</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Cooper's hawk	<i>Accipiter cooperii</i>
Cotton mouse	<i>Peromyscus gossypinus</i>
Dark-eyed junco	<i>Junco hyemalis</i>
Dickcissel	<i>Spiza americana</i>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
Downy woodpecker	<i>Picoides pubescens</i>
Dunlin	<i>Calidris alpina</i>
Eastern bluebird	<i>Sialia sialis</i>
Eastern box turtle	<i>Terrapene carolina</i>
Eastern hog-nosed snake	<i>Heterodon platirhinos</i>
Eastern kingbird	<i>Tyrannus tyrannus</i>
Eastern meadowlark	<i>Sturnella magna</i>
Eastern mud salamander	<i>Pseudotriton montanus montanus</i>
Eastern painted turtle	<i>Chrysemys picta picta</i>
Eastern phoebe	<i>Sayornis phoebe</i>
Eastern red bat	<i>Lasiurus borealis</i>
Eastern screech-owl	<i>Megascops asio</i>
Eastern slender glass lizard	<i>Ophisaurus attenuates longicaudus</i>
Eastern spadefoot	<i>Scaphiopus holbrookii</i>
Eastern tiger salamander	<i>Ambystoma tigrinum</i>
Eastern towhee	<i>Pipilo erythrophthalmus</i>
Eastern wood-pewee	<i>Contopus virens</i>
Eurasian wigeon	<i>Anas penelope</i>
Evening grosbeak	<i>Coccothraustes vespertinus</i>
Field sparrow	<i>Spizella pusilla</i>
Forster's tern	<i>Sterna forsteri</i>
Fox sparrow	<i>Passerella iliaca</i>

Species Scientific Names

Franklin's gull	<i>Leucophaeus pipixcan</i>
Gadwall	<i>Anas strepera</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Golden-crowned kinglet	<i>Regulus satrapa</i>
Grasshopper sparrow	<i>Ammodramus savannarum</i>
Gray catbird	<i>Dumetella carolinensis</i>
Great black-backed gull	<i>Larus marinus</i>
Great blue heron	<i>Ardea herodias</i>
Great cormorant	<i>Phalacrocorax carbo</i>
Great crested flycatcher	<i>Myiarchus crinitus</i>
Great egret	<i>Ardea alba</i>
Great horned owl	<i>Bubo virginianus</i>
Greater scaup	<i>Aythya marila</i>
Greater siren	<i>Siren lacertina</i>
Greater yellowlegs	<i>Tringa melanoleuca</i>
Green heron	<i>Butorides virescens</i>
Green sea turtle	<i>Chelonia mydas</i>
Green-winged teal	<i>Anas crecca</i>
Gull-billed tern	<i>Gelochelidon nilotica</i>
Hairy woodpecker	<i>Picoides villosus</i>
Harbor seal	<i>Phoca vitulina</i>
Harlequin duck	<i>Histrionicus histrionicus</i>
Henslow's sparrow	<i>Ammodramus henslowii</i>
Hermit thrush	<i>Catharus guttatus</i>
Herring gull	<i>Larus argentatus</i>
Hickory shad	<i>Alosa mediocris</i>
Hoary bat	<i>Lasiurus cinereus</i>
Hooded merganser	<i>Lophodytes cucullatus</i>
Hooded warbler	<i>Wilsonia citrina</i>

Horned grebe	<i>Podiceps auritus</i>
Horned lark	<i>Eremophila alpestris</i>
Horseshoe crab	<i>Limulus polyphemus</i>
House finch	<i>Carpodacus mexicanus</i>
House wren	<i>Troglodytes aedon</i>
Hudsonian godwit	<i>Limosa haemastica</i>
Indigo bunting	<i>Passerina cyanea</i>
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>
Kentucky warbler	<i>Oporornis formosus</i>
Killdeer	<i>Charadrius vociferus</i>
Laughing gull	<i>Leucophaeus atricilla</i>
Least bittern	<i>Ixobrychus exilis</i>
Least sandpiper	<i>Calidris minutilla</i>
Least tern	<i>Sternula antillarum</i>
Leatherback sea turtle	<i>Dermochelys coriacea</i>
Lesser Black-backed gull	<i>Larus fuscus</i>
Lesser scaup	<i>Aythya affinis</i>
Lesser yellowlegs	<i>Tringa flavipes</i>
Little blue heron	<i>Egretta caerulea</i>
Little gull	<i>Hydrocoloeus minutus</i>
Loggerhead sea turtle	<i>Caretta caretta</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>
Long-tailed duck	<i>Clangula hyemalis</i>
Louisiana waterthrush	<i>Seiurus motacilla</i>
Mabee's salamander	<i>Amybstoma mabeei</i>
Magnolia warbler	<i>Dendroica magnolia</i>
Mallard	<i>Anas platyrhynchos</i>
Marbled godwit	<i>Limosa fedoa</i>

Species Scientific Names

Marbled salamander	<i>Ambystoma opacum</i>
Marl pennant	<i>Macrodiplax balteata</i>
Marsh rabbit	<i>Sylvilagus palustris</i>
Marsh wren	<i>Cistothorus palustris</i>
Merlin	<i>Falco columbarius</i>
Mourning dove	<i>Zenaida macroura</i>
Nashville warbler	<i>Vermivora ruficapilla</i>
Nelson's sparrow	<i>Ammodramus nelsoni</i>
Northeastern beach tiger beetle	<i>Cicindela dorsalis</i>
Northern bobwhite	<i>Colinus virginianus</i>
Northern cardinal	<i>Cardinalis cardinalis</i>
Northern diamondback terrapin	<i>Malaclemys terrapin terrapin</i>
Northern flicker	<i>Colaptes auratus</i>
Northern gannet	<i>Morus bassanus</i>
Northern harrier	<i>Circus cyaneus</i>
Northern mockingbird	<i>Mimus polyglottos</i>
Northern parula	<i>Parula americana</i>
Northern pintail	<i>Anas acuta</i>
Northern river otter	<i>Lontra canadensis</i>
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>
Northern saw-whet owl	<i>Aegolius acadicus</i>
Northern scarlet snake	<i>Cemophora coccinea copei</i>
Northern shoveler	<i>Anas clypeata</i>
Northern waterthrush	<i>Seiurus noveboracensis</i>
Oldsquaw	<i>Clangula hyemalis</i>
Orange-crowned warbler	<i>Vermivora celata</i>
Orchard oriole	<i>Icterus spurius</i>
Osprey	<i>Pandion haliaetus</i>
Ovenbird	<i>Seiurus aurocapillus</i>

Oyster	<i>Crassostrea virginica</i>
Palm warbler	<i>Dendroica palmarum</i>
Parasitic jaeger	<i>Stercorarius parasiticus</i>
Peregrine falcon	<i>Falco peregrinus</i>
Phragmites	<i>Phragmites australis</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Pine siskin	<i>Carduelis pinus</i>
Pine warbler	<i>Dendroica pinus</i>
Piping plover	<i>Charadrius melodus</i>
Pomarine jaeger	<i>Stercorarius pomarinus</i>
Prairie warbler	<i>Dendroica discolor</i>
Prothonotary warbler	<i>Protonotaria citrea</i>
Pungo white-footed mouse	<i>Peromyscus leucopus easti</i>
Purple finch	<i>Carpodacus purpureus</i>
Purple martin	<i>Progne subis</i>
Purple sandpiper	<i>Calidris maritima</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Red-breasted merganser	<i>Mergus serrator</i>
Red-breasted nuthatch	<i>Sitta canadensis</i>
Red-eyed vireo	<i>Vireo olivaceus</i>
Red knot	<i>Calidris canutus</i>
Redhead	<i>Aythya americana</i>
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
Red-necked grebe	<i>Podiceps grisegena</i>
Red-shouldered hawk	<i>Buteo lineatus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-throated loon	<i>Gavia stellata</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>

Species Scientific Names

Ring-billed gull	<i>Larus delawarensis</i>
Ring-necked duck	<i>Aythya collaris</i>
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
Rough-legged hawk	<i>Buteo lagopus</i>
Royal tern	<i>Thalasseus maximus</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
Ruby-throated hummingbird	<i>Archilochus colubris</i>
Ruddy duck	<i>Oxyura jamaicensis</i>
Ruddy turnstone	<i>Arenaria interpres</i>
Rufous hummingbird	<i>Selasphorus rufus</i>
Rusty blackbird	<i>Euphagus carolinus</i>
Saltmarsh sparrow	<i>Ammodramus caudacutus</i>
Sanderling	<i>Calidris alba</i>
Sandwich tern	<i>Thalasseus sandvicensis</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Scarlet tanager	<i>Piranga olivacea</i>
Scaup (species not specified)	<i>Aythya sp.</i>
Seaside sparrow	<i>Ammodramus maritimus</i>
Sedge wren	<i>Cistothorus platensis</i>
Semipalmated sandpiper	<i>Calidris pusilla</i>
Sharp-shinned hawk	<i>Accipiter striatus</i>
Short-billed dowitcher	<i>Limnodromus griseus</i>
Short-eared owl	<i>Asio flammeus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Snow bunting	<i>Plectrophenax nivalis</i>
Snow goose	<i>Chen caerulescens</i>
Snowy egret	<i>Egretta thula</i>
Song sparrow	<i>Melospiza melodia</i>
Sooty tern	<i>Onychoprion fuscatus</i>

Sora	<i>Porzana carolina</i>
Southeastern myotis	<i>Myotis austroriparius</i>
Southern bog lemming	<i>Synaptomys cooperi</i>
Southern chorus frog	<i>Pseudacris nigrita</i>
Spotted sandpiper	<i>Actitis macularius</i>
Spotted turtle	<i>Clemmys guttata</i>
Striped bass	<i>Morone saxatilis</i>
Summer tanager	<i>Piranga rubra</i>
Surf scoter	<i>Melanitta perspicillata</i>
Swainson's warbler	<i>Limnothlypis swainsonii</i>
Swamp sparrow	<i>Melospiza georgiana</i>
Tree swallow	<i>Tachycineta bicolor</i>
Tricolored heron	<i>Egretta tricolor</i>
Tufted titmouse	<i>Baeolophus bicolor</i>
Tundra swan	<i>Cygnus columbianus</i>
Turkey vulture	<i>Cathartes aura</i>
Upland sandpiper	<i>Bartramia longicauda</i>
Veery	<i>Catharus fuscescens</i>
Vesper sparrow	<i>Poocetes gramineus</i>
Virginia rail	<i>Rallus limicola</i>
Western sandpiper	<i>Calidris mauri</i>
Whimbrel	<i>Numenius phaeopus</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
White-breasted nuthatch	<i>Sitta carolinensis</i>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>
White-eyed vireo	<i>Vireo griseus</i>
White ibis	<i>Eudocimus albus</i>
White-throated sparrow	<i>Zonotrichia albicollis</i>
White-winged scoter	<i>Melanitta fusca</i>

Species Scientific Names

Willet	<i>Tringa semipalmata</i>
Willow flycatcher	<i>Empidonax traillii</i>
Wilson's phalarope	<i>Steganopus tricolor</i>
Wilson's plover	<i>Charadrius wilsonia</i>
Winter wren	<i>Troglodytes troglodytes</i>
Wood duck	<i>Aix sponsa</i>
Wood stork	<i>Mycteria americana</i>
Wood thrush	<i>Hylocichla mustelina</i>
Worm-eating warbler	<i>Helmitheros vermivorum</i>
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>
Yellow-bellied slider	<i>Trachemys scripta scripta</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Yellow-breasted chat	<i>Icteria virens</i>
Yellow-crowned night-heron	<i>Nyctanassa violacea</i>
Yellow rail	<i>Coturnicops noveboracensis</i>
Yellow-rumped warbler	<i>Dendroica coronata</i>
Yellow-throated vireo	<i>Vireo flavifrons</i>
Yellow-throated warbler	<i>Dendroica dominica</i>
Yellow warbler	<i>Dendroica petechial</i>

Appendix A



Kari-Lyn Sommers/USFWS

Northeastern beach tiger beetles

Resources of Concern

Introduction

Congress has entrusted the Service to conserve and protect migratory birds and fish, federally listed threatened and endangered species, inter-jurisdictional fishes, wetlands, and certain marine mammals. These are known as “trust resources.”

In addition to this Service mandate, each refuge has one or more purposes for which it was established that guide its management goals and objectives. Further, refuges support other elements of biological diversity including invertebrates, rare plants, unique natural communities, and ecological processes that contribute to biological diversity, integrity and environmental health at the refuge, ecosystem, and broader scales (USFWS 1999, USFWS 2003).

Given the multitude of purposes, mandates, policies, regional, and national plans that can apply to a refuge, there is a need to identify the potential resources of concern (ROC) and then prioritize those resources that the refuge is best suited to focus on in its management strategies. We followed the process detailed in “Identifying Refuge Resources of Concern and Management Priorities: A Handbook” (Pavaglio and Taylor 2010). The following narrative details the process we used to identify priority ROC and develop habitat goals, objectives, and strategies to benefit these resources associated with Plum Tree Island NWR.

I. What is a Resource of Concern?

The HMP policy (620 FW) defines “resources of concern” as

*All plant and/or animal **species, species groups, or communities** specifically identified in Refuge purpose(s), System mission, or international, national, regional, State, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect ‘migrating waterfowl and shorebirds.’ Federal or State threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts.*

II. Identifying Potential ROCs for the Plum Tree Island NWR

In collaboration with refuge planning staff and technical experts (see chapter 5), we developed a matrix of potential ROC for the refuge. To determine the potential ROCs that would guide the management priorities at Plum Tree Island NWR, we examined a multitude of guiding documents and other information sources. These documents, plans, or policies typically identify ROC, species groups, or habitats. These sources fall into four categories:

- Legal Mandates
- Service Trust Resources
- Biological Integrity, Diversity, and Environmental Health Policy
- Regional Conservation Plans

a. Legal Mandates

i. Statutory Authority

National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the Refuge Improvement Act provides guidelines and directives for administration and management of all areas in the system, including “*wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas.*”

The Refuge Improvement Act states that each refuge shall be managed to fulfill the mission of the Refuge System: “*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.*”

ii. Enabling Legislation

The enabling legislation is the legal authority used to establish a new refuge and acquire lands for that refuge.

Under the authority of the MBCA, Congress established Plum Tree Island NWR on April 24, 1972. The MBCA, Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4) and (b)(1)), and the GSA Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes (16 U.S.C. 667b) allowed for the transfer of lands from the DOD and acquisition of lands by the DOI for conservation purposes.

iii. Refuge Purpose

Purposes of a refuge are those specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit.

Plum Tree Island NWR was established for the following purposes:

“*...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds*” (MBCA, 16 U.S.C. 715d);

“*...for the development, advancement, management, conservation, and protection of fish and wildlife resources...*” (Fish and Wildlife Act of 1956, 16 U.S.C. 742f(a)(4));

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

“... particular value in carrying out the national migratory bird management program.” (General Services Administration [GSA] Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes, 16 U.S.C. 667b).

b. Service Trust Resources

Although the refuge purposes are the first obligation, managing for trust resources (defined above) is also a priority for the refuge. Trust resources are further defined as follows:

i. Migratory Birds

A list of all species of migratory birds protected by the Migratory Bird Treaty Act (16 U.S.C. 703–711) and subject to the regulations on migratory birds are contained in subchapter B of 50 CFR 10.13. The Migratory Birds Program also maintains subsets of this list that provide priorities at the national, regional, and ecoregional (bird conservation region) scales.

The primary sources of information that the refuge used to identify potential migratory birds species of concern included:

- ❖ The Mid-Atlantic/Southern New England draft implementation plan (Bird Conservation Region 30)
- ❖ Partners in Flight (PIF) Mid-Atlantic Coastal Plain Priority Species List (PIF 44)
- ❖ USFWS’s 2008 Birds of Conservation Concern list
- ❖ The North Atlantic Shorebird Plan
- ❖ The North American Waterbird Conservation Plan
- ❖ The Atlantic Coastal Joint Venture (ACJV) Waterfowl Implementation Plan
- ❖ Mid-Atlantic/New England/Maritimes (MANEM) Region Waterbird Focal Species
- ❖ MANEM Waterbird Conservation Plan

ii. Interjurisdictional Fish

This group includes those fish populations “...that two or more States, nations, or Native American tribal governments manage because of their geographic distribution or migratory patterns” (710 FW 1.5H). Examples include anadromous species of salmon and free-roaming species endemic to large river systems, such as American shad and blueback herring.

The primary sources of information that the refuge used to identify potential fish species of concern included:

- ❖ Federal Trust Fish list

- ❖ USFWS Priority Fisheries list
 - ❖ Atlantic States Marine Fisheries Commission list of interjurisdictional fish.
- iii. Marine Mammals
- The Marine Mammal Protection Act of 1972 (16 U.S.C. 1361–1407) prohibits, with certain exceptions, the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importing of marine mammals and marine mammal products into the U.S.

The following is a list of marine mammals under the jurisdiction of the Service:

- ❖ West Indian Manatee (Antillean and Florida)
- ❖ Polar Bear (Alaska Chukchi/Bering Seas and Beaufort Sea)
- ❖ Pacific Walrus (Alaska)
- ❖ Sea Otter (South Central Alaska, Southeast Alaska, Southwest Alaska, California, and Washington)

Plum Tree Island NWR is a coastal refuge at the mouth of the Chesapeake Bay, where many marine mammals are found; however none of these are the species listed under the Service jurisdiction.

- iv. Wetlands
- The Emergency Wetlands Resources Act of 1986 (Public Law 99–645; 100 Stat. 3582) authorizes the purchase of wetlands from Land and Water Conservation Fund monies, removing a prior prohibition on such acquisitions. It requires the Secretary to establish a National Wetlands Priority Conservation Plan, requires the States to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amounts equal to the import duties on arms and ammunition.

Plum Tree Island NWR wetlands are included in the list of wetlands that warrant protection (USFWS Regional Wetlands Concept Plan, Emergency Wetlands Resources Act, October 1990).

- v. Threatened and Endangered Species
- The ESA states that “The Secretary of the Interior ... is designated as the Management Authority and the Scientific Authority for purposes of the Convention and the respective functions of each such Authority shall be carried out through the United States Fish and Wildlife Service.” The ESA also requires all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act.

To identify Federal threatened or endangered species of relevance to Plum Tree Island NWR, we reviewed:

- ❖ Federal Threatened and Endangered Species
 - FWS Environmental Online Conservation System (ECOS) database
 - National Marine Fisheries list
- ❖ Recovery Plans for Federally listed species in our region

c. Biological Integrity, Diversity, and Environmental Health (BIDEH)

The Refuge System Improvement Act states that in administering the System the Service shall “... ensure that the biological integrity, diversity, and environmental health of the System are maintained...” (601 FW 3; also known as the “Integrity Policy”). The USFWS (2003) defines these terms as:

- Biological Diversity—the variety of life and its processes, including the variety of living organisms, the genetic differences between 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.
- Environmental Health—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.

Where possible management on the refuge restores or mimics natural ecosystem processes or functions and thereby maintains biological diversity, integrity, and environmental health. Given the continually changing environmental conditions and landscape patterns of the past and present (e.g., rapid development, climate change, sea level rise), relying on natural processes is not always feasible nor always the best management strategy for conserving wildlife resources. Uncertainty about the future requires that the refuge manage within a natural range of variability rather than emulating an arbitrary point in time. This maintains mechanisms that allow species, genetic strains, and natural communities to evolve with changing conditions, rather than necessarily trying to maintain stability.

As stated by Meretsky et al. (2006), the Integrity Policy directs refuges to assess their importance across landscape scales and to “forge solutions to problems arising outside refuge boundaries.” Some of these regional land use problems include habitat fragmentation/lack of connectivity, high levels of contaminants, and incompatible development or recreational activities.

To assess the historical condition, site capability, current regional landscape conditions, and biological diversity and environmental health data pertinent to Plum Tree Island NWR, we used the following resources:

- Current maps of the refuge with existing vegetative communities
- Descriptions from the Northeast Terrestrial Wildlife Habitat Classification (Gawler 2008).

Table A.1 describes the BIDEH elements for existing habitats on the refuge.

Table A.1 Summary of BIDEH Elements of Plum Tree Island NWR

Broad Habitat Type	Population/Habitat Attributes	Natural Processes Responsible for these Conditions	Limiting Factors
Salt Marsh	<p>Salt marshes vary in type and vegetation based primarily on their elevation. They are above the low tide and below the high tide. Lower marshes are regularly flooded and higher marshes are irregularly flooded; both are grass dominated, with species including smooth cordgrass, saltmeadow cordgrass, giant cordgrass, saltgrass, and glass wort. Depressions above these marshes, known as pannes, can retain seawater after floodwaters recede and therefore usually have high salinity levels and salt-tolerant plants.</p> <p><i>Potential Conservation Species:</i> <i>Aaron's skipper butterfly, American black duck, black rail, brown pelican, clapper rail, dragonfly spp., glossy ibis, great egret, greater yellowlegs, least bittern, lesser yellowlegs, marl pennant, marsh rabbit, northern harrier, northern pintail, northern river otter, saltmarsh sparrow, seaside sparrow, silver-haired bat, willet</i></p>	<p>Occurs on the bay side of barrier beaches and the outer mouth of tidal rivers. Freshwater input from rivers does not dilute the saltwater significantly and mostly contributes to the deposition and movement of sediment. Plant community diversity is created from differing inundation regimes and saltwater exposure.</p>	<p>Erosion or displacement of soils from normal wave and wind action and increased effects during tropical storms. Sea level rise would also alter salinity gradients and effect species composition or coverage.</p>
Estuarine and Marine Coastal	<p>Shallow saltwater zone located below the low tide elevation. Water depths range from 1 to 5 feet at mean high tide (MHT) and generally extends less than 100 feet into the lower Chesapeake Bay. Bottom is relatively flat with gradual changes in elevation. Species are adapted to saltwater conditions.</p> <p><i>Potential Conservation Species:</i> <i>American eel, American shad, Atlantic bottlenose dolphin, Atlantic sturgeon, bald eagle, black scoter, blue crab, harbor seal, hickory shad, horseshoe crab, oyster, striped bass</i></p>	<p>Occurs where the Chesapeake Bay dampens the wave energy and tidal fluctuations associated with the ocean. Primarily a saltwater-driven system.</p>	<p>Sea level rise as a result of climate change would create deeper water.</p>

Broad Habitat Type	Population/Habitat Attributes	Natural Processes Responsible for these Conditions	Limiting Factors
Sandy Beach and Mudflats	<p>Mudflats are located between the low and high tide elevations in quiet bays where sand-sized particles are mixed with soil. Daily tidal fluctuation keeps them inundated or moist and either unvegetated or sparsely covered with algae. Invertebrate abundance is high, providing a valuable food resource to shorebirds and waterbirds. Sandy beaches are located above high tide elevations and are impacted by wave action, high spring tides, and storm surges. Soil consists of sand and shell fragments, and is kept moist by constant salt spray and precipitation. Vegetation is limited to salt-tolerant, succulent annuals, such as sea-rocket and Russian thistle.</p> <p><i>Potential Conservation Species: American oystercatcher, black skimmer, common tern, least tern, northeastern beach tiger beetle, semipalmated sandpiper, short-billed dowitcher</i></p>	<p>Mudflats are restricted to quiet bays or extending from low energy beaches, deposition from tides and the neighboring rivers create this habitat.</p> <p>Sandy beaches consist of unstable sands that wind and high tide events constantly rework substrate.</p>	<p>Sea level rise as a result of climate change could transition mudflat habitat from intertidal to completely submerged. Large storm events with high wave activity have the potential to shift or remove flats.</p> <p>For sandy beaches, increasing high tides and large storm events that produce strong winds and wave action can displace this habitat dramatically or completely remove it.</p>
Maritime Shrubland and Dune	<p>This habitat occurs in areas above the high tide where herbaceous vegetation dominates. Upland and wetland species more tolerant of dry conditions can be present. Limited hammocks areas may have some support shrub and or tree species where natural succession has occurred. Though not influenced directly by lunar tides, these areas are subject to frequent salt spray, some flooding, and sand movement.</p> <p><i>Potential Conservation Species: eastern towhee, northern diamond back terrapin, prairie warbler, savannah sparrow</i></p>	<p>Dominant ecological processes are those associated with the maritime environment, including frequent salt spray, saltwater overwash, and sand movement.</p>	<p>Sea level rise as a result of climate change can increase saltwater inundation and change the plant community composition to more wetland plant species.</p>
Submerged Aquatic Vegetation	<p>These habitats exist in open water below the low tide elevation. These areas support a variety of rooted aquatic vegetation as well as marine algae.</p> <p><i>Potential Conservation Species: Atlantic brant, bufflehead, canvasback, loggerhead sea turtle</i></p>	<p>Beds occur in areas of low to moderate wave energy and consistent salinity levels.</p>	<p>Sea level rise can change low tide lines and water depths on current grass beds, which would reduce light penetration to the beds. Beds are also vulnerable to disturbance from strong wave action of tropical storms and pollution from oil spills or coastal run-off.</p>

d. Regional Conservation Plans

Plum Tree Island NWR exists within a larger conservation landscape. To evaluate the role that the refuge can play in supporting the priorities of other agencies, groups, and entities, other conservation plans were reviewed. The first priority for the refuge is to meet the obligations of its purpose and other legal mandates. Supporting other conservation priorities can be considered when they align within the framework of the refuge purpose and legal mandates.

The primary sources of information that the refuge used to identify other conservation priorities included:

- Mid-Atlantic Landscape Conservation Cooperative representative species list
- Virginia Wildlife Action Plan
- The Nature Conservancy Chesapeake Bay Lowlands Ecoregional Plan

e. Summary Table

Table A.2 is a comprehensive list of species potentially occurring or known to occur in the refuge vicinity that are considered to be conservation priorities by the Service, as well as other agencies, groups, or entities.

Guide to Table A.2

¹ Potential Priority Refuge ROCs

All species considered either priority refuge ROCs or other benefitting species.

² Refuge Occurrence

Species occurrence on the refuge provided by several physical surveys, observations, and species inventories compiled by the Service.

³ Federal T&E

Federal Endangered Species List. E—Endangered; T—Threatened; C—Candidate.

⁴ Virginia T&E

Virginia Endangered Species List. E—Endangered; T—Threatened.

⁵ Virginia NHP

Virginia Natural Heritage Program. S1—Extremely Rare; S2—Very Rare; S3—Rare; S4—Common; SH—Potentially Rediscoverable Species; SX—Extirpated; SU—Uncertain; S_S—Range of Rank; S_B—Breeding Status; S_B/S_N—Breeding and Nonbreeding Status.

⁶ BCR 30

Bird Conservation Region 30. HH—Highest Priority; H—High Priority; M—Moderate Priority.

⁷ PIF 44

Partners in Flight Mid-Atlantic Coastal Plain Priority Species Table. 1A—High Continental Priority, High Regional Responsibility; 1B—High

Continental Priority, Low Regional Responsibility; 2A—High Regional Concern; 2B—High Regional Responsibility; 2C—High Regional Threats; 3—National Priority (No Regional Priority).

⁸ Virginia 2005 Wildlife Action Plan

1—Critical Conservation Need (Tier 1); 2—Very High Conservation Need (Tier 2); 3—High Conservation Need (Tier 3); 4—Moderate Conservation Need (Tier 4).

⁹ USFWS Birds of Conservation Concern

All bird species considered to be of conservation concern.

¹⁰ North Atlantic Shorebird Plan

5—Highly Imperiled; 4—Species of High Concern; 3—Species of Moderate Concern; 2—Species of Low Concern; 1—Species Not at Risk

¹¹ North American Waterbird Plan

HH— Highest: Population declines and low population numbers; H— High: Population declines; M— Moderate: Population declines or stable population with potential threats but restricted distributions or small population and restricted distribution; L— Low: Populations stable with threats or populations increasing with threats and restricted distributions or large populations with threats and restricted distributions.

¹² ACJV Waterfowl Conservation Need

HH— Highest; H— High; MH— Moderately High; M— Moderate; ML— Moderately Low; L— Low. When both breeding and non-breeding populations occur, the highest ranking is used.

¹³ MANEM Waterbird Focal Species

HH— Highest (Species Imperiled); H— High; M— Moderate; L— Low (Low Priority)

¹⁴ MANEM Waterbird Conservation Plan

HH— Highest (Species Imperiled); H— High; M— Moderate; L— Low (Low Priority)

¹⁵ Federal Trust Fish

¹⁶ USFWS Priority Fisheries

¹⁷ TNC Chesapeake Bay Lowlands Ecoregional Plan

1—Primary Priority; 2—Secondary Priority.

¹⁸ Mid Atlantic LCC

X—Representative Species in Mid Atlantic Sub-region. Numerical values denote General Habitat Type in the plan that corresponds to habitat mapped on the refuge.

Table A.2 Comprehensive List of Refuge ROCs for Plum Tree Island NWR

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	ACJV Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
LANDBIRDS																			
Acadian flycatcher	X							2B											
Allen's hummingbird	X																		
American goldfinch	X		X																
American kestrel	X																		
American pipit	X																		
American redstart	X																		
American robin	X																		
American tree sparrow	X																		
Bald eagle	X		X			S2S3B/ S3N	M		II	X									
Baltimore oriole	X						H												
Barn owl	X					S3B/ S3N		4	III										
Barn swallow	X		X																
Barred owl	X							4											
Belted kingfisher	X		X																
Bicknell's thrush	X								IV										
Black vulture	X																		
Black-and-white warbler	X						H		IV										X
Black-billed cuckoo	X																		
Black-throated blue warbler	X																		
Black-throated green warbler	X								I										
Blackpoll warbler	X																		
Blue grosbeak	X																		
Blue jay	X																		
Blue-gray gnatcatcher	X																		
Blue-winged warbler	X					S3B	HH	1B	IV	X									X
Boat-tailed grackle	X		X																
Brown creeper	X					S3B/ S5N		4	IV									2	

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	AJV Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
Brown thrasher	X						H	2A	IV										X
Brown-headed cowbird	X		X																
Brown-headed nuthatch	X					S3S4	M	1B	IV	X								2	X
Canada warbler	X					S3S4B	M		IV										
Carolina chickadee	X							2A											
Carolina wren	X																		
Cave swallow	X																		
Cedar waxwing	X																		
Cerulean warbler	X					S3S4B	M	1B	II	X									
Chestnut-sided warbler	X																		
Chimney swift	X		X				H	2A	IV										
Chipping sparrow	X																		
Chuck-will's-widow	X							3B	IV										
Common grackle	X																		
Common nighthawk	X																		
Common yellowthroat	X		X																
Cooper's hawk	X					S3B/ S3N		4											
Dark-eyed junco	X																		
Dickcissel	X					S2S3B		4											
Downy woodpecker	X																		
Eastern bluebird								4											
Eastern kingbird	X		X				H	2A	IV										
Eastern meadowlark	X		X						IV										X
Eastern phoebe	X																		
Eastern screech-owl	X																		
Eastern towhee	X	X					H	2A	IV										22
Eastern wood-pewee	X							2A	IV										X
Evening grosbeak	X																		
Field sparrow	X						H	1A	IV										X
Fox sparrow	X																		

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	AJV Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
Golden-crowned kinglet	X					S2B/ S5N													
Grasshopper sparrow	X						M	2C	IV										X
Gray catbird	X		X				M	2A	IV										
Great crested flycatcher	X						H												
Great horned owl	X																		
Hairy woodpecker	X																		
Henslow's sparrow	X				T	S1B		1B	I	X									
Hermit thrush	X					S1B/ S5N		4											
Hooded warbler	X							1A										2	
Horned lark	X																		
House finch	X																		
House wren	X		X																
Indigo bunting	X		X																
Kentucky warbler	X						H	1A	IV	X								2	X
Loggerhead shrike	X				T	S2B/ S3N	M	4	I	X									
Louisiana waterthrush	X						H		IV										X
Magnolia warbler	X					S2B													
Marsh wren	X		X				H	2A	IV										14
Merlin	X																		
Mourning dove	X		X																
Nashville warbler	X					S1B													
Nelson's sparrow	X								III	X									14
Northern bobwhite			X				H	2A	IV										
Northern cardinal	X																		
Northern flicker	X						H												
Northern harrier	X	X	X			S1S2B/ S3N		4	III									2	
Northern mockingbird	X																		
Northern parula	X							4	IV										
Northern rough-winged swallow	X								IV										

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	A.C.J.V Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
Northern saw-whet owl	X					S1B/ S2N		4	II										
Northern waterthrush	X					S1B													
Orange-crowned warbler	X																		
Orchard oriole	X																		
Osprey	X		X																
Ovenbird	X								IV										X
Palm warbler	X																		
Peregrine falcon					T	S1B/ S2N		4	I	X									
Pileated woodpecker	X																		
Pine siskin	X																		
Pine warbler	X							2B											
Prairie warbler	X	X	X				HH	1A	IV	X									22
Prothonotary warbler	X						H	1A	IV									2	X
Purple finch	X					S1B/ S5N													
Purple martin	X		X																
Red-bellied woodpecker	X																		
Red-breasted nuthatch	X					S2B/ S4N		4											
Red-eyed vireo	X							4											
Red-headed woodpecker	X						M	3B		X									
Red-shouldered hawk	X		X					4											X
Red-tailed hawk	X																		
Red-winged blackbird			X																
Rose-breasted grosbeak	X								IV										
Rough-legged hawk	X																		
Rough-winged swallow			X						IV										
Ruby-crowned kinglet	X																		
Ruby-throated hummingbird	X																		
Rufous hummingbird	X																		
Rusty blackbird							H		IV	X									

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	AJV Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
Saltmarsh sparrow	X	X	X			S2B/ S3N	HH	1A	II	X									
Savannah sparrow	X	X				S3S4B/ S4N		4											
Scarlet tanager	X						H	1A	IV										
Seaside sparrow	X	X	X				HH	1A	IV	X									
Sedge wren	X		X			S1B/ S1S2N	M	2C	III	X									
Sharp-shinned hawk	X							4											
Short-eared owl	X					S1B/ S2N		2C		X									
Snow bunting	X																		
Song sparrow	X		X																
Summer tanager	X																		
Swainson's warbler	X					S2B		1B	II									2	
Swamp sparrow	X					S1B/ S4S5N													
Tree swallow	X		X																
Tufted titmouse	X																		
Turkey vulture	X		X																
Veery	X																		
Vesper sparrow	X							4											
Whip-poor-will	X						H	1A	IV	X									22
White-breasted nuthatch	X																		
White-crowned sparrow	X																		
White-eyed vireo	X																		
White-throated sparrow	X																		
Willow flycatcher	X						H		IV										
Winter wren	X					S2B/ S4N			II										
Wood thrush	X						HH	1A	IV	X									X
Worm-eating warbler	X						H	1A	IV	X								2	X
Yellow warbler	X		X						IV										
Yellow-bellied sapsucker	X					S1B/ S4N			I										

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	ACJV Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
Yellow-billed cuckoo	X							2A	IV										
Yellow-breasted chat			X						IV										
Yellow-rumped warbler	X																		
Yellow-throated vireo	X						H	1A	IV										
Yellow-throated warbler	X																		
WATERBIRDS																			
American bittern			X			S1B/ S2N	M	4	II	X				4	H H			2	
American coot	X					S1B/ S2N									L				
American white pelican	X											M							
Black rail	X	X				S2B/ S2N	HH	1B	I	X				2	H H			2	
Black-crowned night-heron	X					S3B/ S4N	M	4	III			M		3	H H				
Bonaparte's gull	X											M			M				
Brown pelican	X	X	X			S2B/ S3B		4				M			M				
Caspian tern	X					S1B/ S2N						L			L				
Cattle egret														1					
Clapper rail	X	X	X				H	1A	IV					1	H				14
Common loon	X		X											2	H H				26
Common moorhen	X					S1B/ S1N		4							H				
Common tern	X	X	X			S3B	M	4	III			L		4	H H				20, 26
Double-crested cormorant	X		X			S2B/ S4S5N						N R		1	L				
Forster's tern	X		X			S3B/ S3N	H	2B	IV			M		1	H				
Franklin's gull	X											M							
Glossy ibis	X	X	X			S2B/ S1N	H		III			L		2	H H				
Great black-backed gull	X		X									N R		1	L				
Great blue heron	X		X			S3B/ S5N		4				N R		1	H				
Great cormorant	X											M		1	H				

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	ACJV Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
Great egret	X	X	X			S2S3B/ S3N		4						1	M				
Green heron	X		X						IV			L			M				
Herring gull	X		X									L			H				
Laughing gull	X		X											2	H				
Least bittern	X	X				S3B/ S3N	M	4	III	X				3	H H				X
Lesser Black-backed gull	X											M			L				
Little blue heron	X		X			S2B/ S3N	M	4	II			H		1	H H				
Little gull	X											H			M				
Northern gannet	X						H							2	M				
Pied-billed grebe	X					S1S2B/ S3N		4		X					H H				
Red-throated loon	X						HH			X				4	H H				
Ring-billed gull	X														L				
Snowy egret			X			S2B/ S3N	M	4		X				3	H H				14
Sora	X					S1B/ S2N	M								H				
Tricolored heron	X		X			S2B/ S3N	M	4	III			H			H H				
Virginia rail	X		X			S2B/ S3N		2A	IV						M				
White ibis	X					S1B						M			L				
Wood stork	X											H							
Yellow rail	X								IV					1	H				
Yellow-crowned night-heron	X		X			S2S3B/ S3N	M		III			M		1	H				
SHOREBIRDS																			
American avocet	X						M				3								
American oystercatcher	X	X	X			S3B/ S3N	HH	1B	II	X	5							2	
American woodcock	X						HH	1A	IV		5								22
Black skimmer	X	X	X			S2B/ S1N	M	2B	II	X		H		1	H H			2	20
Black-bellied plover	X						H		IV		3	N R							
Black-legged kittiwake	X													1	L				

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	ACJV Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
Black-necked stilt	X		X			S1B													
Common snipe	X						M				3								
Dunlin	X		X				H		IV		3								
Greater yellowlegs	X	X	X				H				4								
Gull-billed tern	X				T	S2B	HH	4	I	X		H		1	H H				
Hudsonian godwit	X						H		IV	X	4								
Killdeer	X						M				2								
Least sandpiper	X						M				3								
Least tern	X	X	X				H	4	II	X		H		3	H H				20
Lesser yellowlegs	X	X	X				M				2								
Long-billed dowitcher	X		X								2								
Marbled godwit	X						H		IV	X	4								
Parasitic jaeger	X											L			L				
Piping plover	X	X		T	T	S2B/ S1N	HH	1A	I		5							1	20
Pomarine jaeger	X											L			L				
Purple sandpiper	X						H		IV	X	2								
Red knot	X	X		C		S2N	HH		IV	X	5								20
Royal tern	X		X			S2B	M		II			M		1	H				
Ruddy turnstone	X						HH				4								
Sanderling	X	X					HH				4								20
Sandwich tern	X		X			S1B	HH	4				N R			L				
Semipalmated sandpiper	X	X	X				H			X	4								20
Short-billed dowitcher	X	X	X				H		IV	X	3								
Sooty tern	X											M							
Spotted sandpiper	X					S2B	M				3								
Upland sandpiper	X				T	S1B	M	2C	I	X	4								X
Western sandpiper	X						M				2								
Whimbrel	X		X				HH		IV	X	5								
Willet	X	X	X				H	2B			4								14

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	ACJV Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
Wilson's phalarope											4								
Wilson's plover	X				E	S1B		1B	I	X	4								
WATERFOWL																			
American black duck	X	X	X				HH	1A	II				H					2	14, 20
American wigeon	X		X				M						M L						
Atlantic brant	X	X	X						III				H						
Black scoter	X		X				H						M L						26
Blue-winged teal	X		X			S1B/ S2N							M H						
Bufflehead	X	X	X				H						M H						26
Canada goose	X		X										H H						
Canvasback	X	X	X				H						M H						26
Common eider							H						H						26
Common goldeneye	X		X				M						M L						
Common merganser	X		X			S1B/ S4N							L						X
Eurasian wigeon	X						M												
Gadwall	X		X			S2B/ S4N	M						M L						
Greater scaup	X		X				H		IV				H						
Green-winged teal	X		X				M						M L						
Harlequin duck	X						M						M L						
Hooded merganser	X		X				M						H						
Horned grebe	X						H		IV				4 H H						
Lesser scaup	X		X				H												
Long-tailed duck							H						M L						26
Mallard	X		X				H						H						
Northern pintail	X	X					M						M						X
Northern shoveler	X						M						M L						

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	A-CJV Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
Oldsquaw	X		X																
Red-breasted merganser	X		X				M						H						26
Redhead	X		X						III				M L						
Red-necked grebe	X													1	H				
Ring-necked duck	X		X										M L						X
Ruddy duck			X				M						M H						
Scaup (species not specified)			X																
Snow goose	X		X																
Surf scoter	X		X				H						M H						26
Tundra swan	X		X				H						H						
White-winged scoter	X		X				H						M H						26
Wood duck	X						M						H						X
MAMMALS																			
Atlantic bottlenose dolphin		X																	
Cotton mouse						S3			IV										
Eastern red bat																			X
Harbor seal		X	X																
Hoary bat						SUB/ S3N													
Marsh rabbit		X				S3			IV										
Northern river otter		X				S4													
Pungo white-footed mouse						S1			III										
Silver-haired bat		X				SUB/ S4N													
Southeastern myotis									IV										
Southern bog lemming						S3			IV										
REPTILES																			
Atlantic hawksbill				E	E	SA													
Canebrake rattlesnake					E	S1			II										
Common rainbow snake						S3			IV										

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	AJV Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
Common ribbon snake									IV										
Eastern box turtle									III										X
Eastern hog-nosed snake									IV										X
Eastern painted turtle																			X
Eastern slender glass lizard									IV										
Green sea turtle				T	T	SAB/ SZN													
Kemp's ridley sea turtle				E	E	S1N													
Leatherback sea turtle				E	E	SZN													
Loggerhead sea turtle		X	X	T	T	S1B/ S1N			I										26
Northern diamond-backed terrapin		X	X			S4			II										14, 26
Northern scarlet snake									IV										
Spotted turtle					CC				III										
Yellow-bellied slider									IV										
AMPHIBIANS																			
Barking treefrog					T	S1			II									2	
Eastern mud salamander									IV										
Eastern spadefoot									IV										
Eastern tiger salamander					E	S1			II									2	
Greater siren						S3			IV										
Mabee's salamander					T	S1S2			II									2	
Marbled salamander																			X
Southern chorus frog						S3			IV										
FISH																			
American eel		X							IV							X	X		X
American shad		X							IV							X	X		X
Atlantic sturgeon		X		E		S2			II							X	X	1	
Hickory shad		X														X	X		
Striped bass		X	X													X	X		

Common Name	Refuge Purpose	Potential Priority Refuge ROCs ¹	Refuge Occurrence ²	Federal T&E ³	Virginia T&E ⁴	Virginia NHP ⁵	BCR 30 ⁶	PIF 44 ⁷	Virginia 2005 Wildlife Action Plan ⁸	USFWS Birds of Conservation Concern ⁹	North Atlantic Shorebird Plan ¹⁰	North American Waterbird Plan ¹¹	AJV Waterfowl Conservation Need ¹²	MANEM Waterbird Focal Species ¹³	MANEM Waterbird Conservation Plan ¹⁴	Federal Trust Fish ¹⁵	USFWS Priority Fisheries ¹⁶	TNC Chesapeake Bay Lowlands Ecoregional Plan ¹⁷	Mid Atlantic LCC ¹⁸
TERRESTRIAL INVERTEBRATES																			
Aaron's skipper butterfly		X				S3													
Black dash butterfly						S1S3			IV										
Marl pennant		X				S1													
Northeastern beach tiger beetle	X	X	X	T	T	S2			II									1	
MARINE INVERTEBRATES																			
Blue crab		X																	
Horseshoe crab		X	X													X			X
Oyster		X	X																
VEGETATION																			
Sensitive joint-vetch				T	T													1	

III. Prioritizing ROCs

The potential ROC table (A.2) contains a large number of species with a broad array of habitat needs. The refuge prioritized these species and their associated habitats while concurrently developing a reasonable range of habitat management alternatives to support these species.

To guide us in prioritizing this list, we considered the following concepts:

- Achieving refuge purposes and managing for trust resources, as well as biological diversity, integrity, and environmental health, can be addressed through the habitat requirements of ROCs, or species that may represent guilds that are highly associated with important attributes or conditions within habitat types. The use of ROCs is particularly valuable when addressing USFWS trust resources such as migratory birds.
- The BCR plans are increasing their effectiveness at ranking and prioritizing those migratory birds most in need of management of conservation focus. Although all species that make it to a ranked BCR priority list are in need of conservation attention, we considered ROCs that were ranked High or Moderate in Continental

concern with a High to Moderate BCR Responsibility. See www.abcbirds.org/nabci for BCR rules used to rank birds.

- Priority species selected that were not birds were identified as ROCs due to range-wide concern over their population status or because they are currently under review for inclusion on the federal Endangered or Threatened Species list. Fish species were reviewed using information available from the limited number plans for fish species and consulting local State and Federal fisheries experts on the capacity of the refuge to support or contribute to particular fish species.
- Habitat conditions on or surrounding the refuge may limit the refuge's capability to support or manage for a potential species of concern. The following site-specific factors were evaluated:
 - ❖ Patch size requirements
 - ❖ Habitat connectivity
 - ❖ Incompatibility surrounding land uses
 - ❖ Environmental conditions: soils, hydrology, disturbance patterns, contaminants, predation, invasive species
 - ❖ Specific life history needs
- The likelihood that a potential species of concern would have a positive reaction to management strategies.
- The ability to rely on natural processes to maintain habitat conditions within a natural range of variability suitable to the ROCs.
- The ability to use adaptive management (flexibility and responsiveness of the refuge and the habitats) in the face of changing environmental conditions (e.g., climate change).
- Consultation with State and Federal taxonomic and natural resource experts.

To select the final priority resources for the preferred habitat management alternative (alternative B), we used a decision support matrix process, with scores associated with each of the criteria described above and developed from information in Paveglio and Taylor (2010). Each category had a possible range of scores (10, 7, 5, 3, or 1, with 10 being the best), and each species was given a score under each criteria. The separate scores were then added to obtain a total score for each species, so that each potential priority resource of concern had a score that could be compared against other potential resources. The exercise of scoring each potential resource against set criteria allowed us to systematically evaluate each resource and provide a relatively quantitative and transparent analysis to support the final selection of priority resources.

a. Priority Habitat Types

Refuge management is most often focused on restoring, managing, or maintaining habitats or certain habitat conditions to benefit a suite of priority species or a suite

of plants and animals associated with a particular habitat. Plum Tree Island NWR identified priority habitats on the refuge based on information compiled in Section I (e.g., site capability, historic condition, current vegetation, conservation needs of wildlife associates). The designation of Priority I and Priority II habitats was used instead of an alternative classification such as high, moderate, or low priorities because all habitats are important to the refuge. The designation of a habitat into the Priority I category helps refuge management focus efforts when funding and resources are limited. As part of this process, we identified any limiting factors that affect the refuge's ability to maintain these habitats (see table A.3).

Table A.3 Priority I and II Habitats on Plum Tree Island NWR under Alternative B

Habitat Type	Reason for Ranking	Limiting Factors/Threats
Priority I		
Salt Marsh	Largest contiguous salt marsh in the lower Chesapeake Bay. Provides important overwintering and breeding habitat for migratory waterfowl and breeding habitat for waterbirds and priority species. <i>Priority Refuge ROC: American black duck, clapper rail, saltmarsh sparrow</i>	Erosion or displacement of soils from normal wave and wind action and increased effects during tropical storms. Sea level rise would also alter salinity gradients and effect species composition or coverage.
Maritime Shrubland and Dune	Provides nesting habitat for species of conservation concern. Limited distribution of habitat within the region. Intact dunes protect salt marsh habitat integrity. <i>Priority Refuge ROC: northern diamond back terrapin</i>	Sea level rise as a result of climate change can increase saltwater inundation and change the plant community composition to more wetland plant species.
Sandy Beach and Mudflat	Provides foraging and nesting habitat for conservation species with limited distributions and narrow habitat requirements. <i>Priority Refuge ROC: black skimmer, northeastern beach tiger beetle</i>	Sea level rise as a result of climate change could transition mudflat habitat from intertidal to completely submerged. Large storm events with high wave activity have the potential to shift or remove flats. For sandy beaches, increasing high tides and large storm events that produce strong winds and wave action can displace this habitat dramatically or completely remove it.
Priority II		
Estuarine and Marine Coastal	Does not require active management to maintain present condition. <i>Priority Refuge ROC: blue crab</i>	Sea level rise as a result of climate change would make this area deeper.
Submerged Aquatic Vegetation	Outside the management authority or jurisdiction of the refuge. Would require partnering with other agencies to a greater extent than Priority I habitats. <i>Priority Refuge ROC: bufflehead</i>	Sea level rise can change low tide lines and water depths on current grass beds, which would reduce light penetration to the beds. Beds are also vulnerable to disturbance from strong wave action of tropical storms and pollution from oil spills or coastal run-off.

b. Priority Refuge ROCs

Based on the habitat types identified on the refuge as described in table A.3, we then developed a table of the priority refuge ROCs with their associated habitat

types (table A.4) for the preferred habitat management alternative, alternative B. This table also described the habitat structured required by each priority species and identifies other species that would benefit from the same or similar habitat conditions.

Table A.4 Priority Refuge ROCs for Plum Tree Island NWR under Alternative B

Priority Refuge ROCs	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
American Black Duck	Salt Marsh	Uses a variety of marsh habitats for both breeding and during migration (Longcore et al. 2000).	Overwintering	black rail, brown pelican, glossy ibis, great egret, greater yellowlegs, least bittern, lesser yellowlegs, northern harrier, northern pintail, seaside sparrow, willet, Aaron's skipper butterfly, dragonfly spp., marl pennant, marsh rabbit, northern river otter, silver-haired bat
Clapper Rail		Favors emergent vegetation and scattered shrubs within 15 meters of open water and habitat that is equal to or greater than 25 percent of total wetland area within 15 meters of a shoreline (Lewis and Garrison 1983, Rush et al. 2012).	Breeding, foraging	
Saltmarsh Sparrow		Prefers smooth cordgrass, saltmeadow grass, and blackgrass bordered by cattails and marsh elder (Greenlaw and Rising 1994). Nests on ground under mat of grasses or several centimeters above wet ground in dense clump of grass (Byrd and Johnston 1991).	Breeding, foraging	
Blue Crab	Estuarine and Marine Coastal	Uses saline/tidal embayments bordered by salt marsh of varying depths depending on gender and lifecycle stage. (Ramach et al. 2009)	Foraging	American eel, American shad, Atlantic bottlenose dolphin, Atlantic sturgeon, harbor seal, hickory shad, horseshoe crab, striped bass, oyster, brown pelican
Bufflehead	Submerged Aquatic Vegetation	Uses shallow waters in secluded coves, harbors, estuaries, or along beaches; avoids open coastlines (Gauthier 1993).	Overwintering	Atlantic brant, canvasback, loggerhead sea turtle
Northern Diamondback Terrapin	Maritime Shrubland and Dune	Nests occur on the flat, sparsely vegetated, on gently sloped sandy areas on the beach, approximately 0.5-1.0 meters above the high tide mark (Burger and Montevecchi 1975; Roosenburg 1994). Upon emergence from the nest, turtles seek out the nearest vegetation, regardless of dune slope, thereby minimizing risks posed by diurnal predators (Berger 1976).	Year-round, breeding	eastern towhee, prairie warbler, savannah sparrow, dragonfly spp.
Black Skimmer	Sandy Beach and Mudflat	Nests primarily on coastal sandy beaches and estuary islands using wrack and drift of salt marshes (Hammerson 1987).	Nesting, foraging	American oystercatcher, common tern, least tern, semipalmated sandpiper, short-billed dowitcher, piping plover, red knot, sanderling, horseshoe crab
Northeastern Beach Tiger Beetle		Uses medium to medium coarse sand along the mid to high tide zone (USFWS 2011).	Year-round, breeding, foraging	

IV. Adaptive Management

The priority ROCs and their respective habitat attributes were used to develop specific habitat objectives for the preferred alternative. Refuge habitat management objectives must be achievable. Many factors, such as lack of resources, existing habitat conditions, species response to habitat manipulations, climatic changes, contaminants or invasive species, may reduce or eliminate the ability of the refuge to achieve objectives.

Although these limiting factors were considered during the development of refuge objectives, conditions may and are likely to change over the next 15 years and beyond.

The refuge will use adaptive management to respond to changing conditions that impair our ability to measure and achieve the habitat objectives. This requires that we establish and maintain a monitoring program to ensure that we can detect and respond to changing conditions.

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Appendix B



Cyrus Brame/USFWS

No trespassing signage on PTI Range FUDS

Findings of Appropriateness and Compatibility Determinations

This appendix reflects our evaluation of what uses to allow or not allow under the Service-preferred alternative B of the draft Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA). Table B.1 lists other uses that the refuge does not have existing completed findings of appropriateness (FOAs) and compatibility determinations (CDs) for and indicates our proposal for those uses under alternative B. Following this table, we provide the full FOAs and CDs for all of these uses under alternative B.

Table B.1 Uses Addressed in Plum Tree Island NWR CCP and EA under Alternative B

Use	Proposed Finding or Determination	Page
Recreational Beach Activities Not in Support of Priority Public Uses	Not appropriate	B-2
Commercially Guided Tours for Wildlife Observation, Photography, Environmental Education, and Interpretation	Not appropriate	B-4
	Compatible with stipulations	B-7
Research Conducted by Non-Service Personnel	Appropriate specialized use	B-25
	Compatible with stipulations	B-28
Waterfowl Hunting	Appropriate priority public use Compatible with stipulations	B-46
Wildlife Observation, Photography, Environmental Education, and Interpretation	Appropriate priority public use Compatible with stipulations	B-59

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Plum Tree Island National Wildlife Refuge

Use: Recreational Beach Activities Not in Support of Priority Public Uses

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.

FWS Form 3-2319
02/06

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Plum Tree Island National Wildlife Refuge

Use: Recreational Beach Activities Not in Support of Priority Public Uses

NARRATIVE:

In accordance with the 2006 U.S. Fish and Wildlife Service (Service) Appropriate Use Policy (603 FW 1), the Refuge Manager must first determine if the use is appropriate prior to allowing any non-priority public use on the refuge. Recreational beach activities are not identified as a priority public uses of the National Wildlife Refuge System (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 (Improvement Act; Public Law 105–57). These uses are considered general public uses that are not wildlife-dependent recreational uses. The Service policy on Appropriate Refuge Uses (603 FW 1) states, “General public uses that are not wildlife dependent recreational uses (as defined by the Improvement Act) and do not contribute to the fulfillment of refuge purposes or goals or objectives as described in current refuge management plans are the lowest priorities for Refuge Managers to consider. These uses are likely to divert refuge management resources from priority general public uses or away from our responsibilities to protect and manage fish, wildlife, and plants, and their habitats. Therefore, both law and policy have a general presumption against allowing such uses within the Refuge System.”

This finding covers recreational, non-wildlife dependent beach activities at Plum Tree Island National Wildlife Refuge (NWR). Beach sporting activities (e.g., Frisbee®, volleyball, surfing, skim boarding) kite flying, fires, fireworks, grilling, use of shade tents or other canopies, camping, and sunbathing, are examples of recreational beach activities that are not wildlife dependent and not necessary to support quality wildlife dependent recreational uses. These activities could potentially disturb wildlife and vegetation, increase beach erosion, result in sanitation issues, and affect the quality of the experience of those visitors engaged in wildlife-dependent recreation given the limited area of the refuge open to visitors.

Resources needed to monitor and manage these activities to ensure wildlife and habitat are not disturbed would divert existing and future resources from accomplishing priority refuge tasks and supporting priority, wildlife dependent public uses. The lack of staff and financial resources to manage these activities, the potential conflicts they would cause with other users, and the impact on refuge plant and wildlife resources make these inappropriate uses for Plum Tree Island NWR.

The refuge is a leave-no-trace, carry-in/carry-out facility. Intentional or unintentional deposition of food waste on the refuge would likely be eaten by refuge wildlife. This could result in an increase of gulls or mammals who can also act as mammalian predators on bird eggs and unfledged chicks. All food containers, bottles, and other waste and refuse must be taken out. Littering, dumping, and abandoning property are prohibited by Federal regulation at 50 CFR 27.93–94.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Plum Tree Island National Wildlife Refuge
 Use: Commercially Guided Tours for Wildlife Observation, Photography, Environmental Education, and Interpretation

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.

FWS Form 3-2319
02/06

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Plum Tree Island National Wildlife Refuge

Use: Commercially Guided Tours for Wildlife Observation, Photography, Environmental Education, and Interpretation

NARRATIVE:

The use of commercially guided tours for wildlife observation, photography, environmental education, and interpretation is not identified as a priority public use of the National Wildlife Refuge System (Refuge System) under the Refuge System Administration Act of 1966 (16 U.S.C. 668dd–668ee), as amended by the Refuge System Improvement Act of 1997 (Public Law 105–57). This use is considered a specialized use of a refuge, specifically an economic use (603 FW 1). However, commercial uses of a refuge may be appropriate if they are a refuge management economic activity (see 50 CFR 25.12), if they directly support a priority general public use (i.e., fishing, hunting, wildlife observation, photography, environmental education, and interpretation), or if they are specifically authorized by statute. In accordance with the 2006 U.S. Fish and Wildlife Service (Service) Appropriate Use Policy (603 FW 1), the Refuge Manager must first determine if the use is appropriate prior to allowing any non-priority public use on the refuge.

The use of commercially guided tours for wildlife observation, photography, environmental education, and interpretation is a refuge management economic activity, meaning it is a management activity on a national wildlife refuge that results in generation of a commodity which is or can be sold for income or revenue or traded for goods or services (50 CFR 25.12). This commercial use has been found to be an appropriate public use of Plum Tree Island National Wildlife Refuge (NWR) for the following reasons.

Commercial tour guides provide the public with high-quality, safe, educational, and unique recreational opportunities. These visitor services are a valuable benefit to a segment of the American public that is not comfortable with or, for other reasons, chooses not to participate in unguided tours on the refuge. In addition, commercially guided tours will help increase public understanding of the Refuge System.

Commercially guided wildlife observation, photography, environmental education, and interpretation are not identified as priority public uses of the Refuge System and are guided by the following laws, regulations, and policies:

- 16 U.S.C. 668dd, 50 CFR 27.97, Private Operations: Soliciting business or conducting a commercial enterprise on any national wildlife refuge is prohibited except as may be authorized by special permit.
- 16 U.S.C. 668dd, 50 CFR 27.86, Begging: Begging on any national wildlife refuge is prohibited. Soliciting of funds for the support or assistance of any cause or organization is also prohibited unless properly authorized.
- 16 U.S.C. 668dd, 50 CFR 29.1 Allowing Economic Uses on National Wildlife Refuges: We may only authorize public or private economic use of the natural resources of any refuge, in

accordance with 16 U.S.C. 715s, where we determine that the use contributes to the achievement of the national wildlife refuge purposes or the Refuge System mission.

■ 5 RM 17, Commercial & Economic Uses on National Wildlife Refuges.

Commercially guided tours conducted on watercraft for fishing, birding, and sight-seeing are available in the refuge vicinity; however, no commercial tours are currently approved to drop anchor on the refuge, beach a watercraft on the refuge, or allow clients to disembark on to the refuge. Allowing commercially guided wildlife observation, photography, environmental education, and interpretation tours is a new public use on the refuge.

Allowing commercially guided wildlife observation, photography, environmental education, and interpretation tours will not materially interfere with or detract from the mission of the Refuge System or purposes for which Plum Tree Island NWR was established. In addition, this activity will fulfill one or more purposes of the refuge or the Refuge System mission.

COMPATIBILITY DETERMINATION

USE:

Commercially Guided Tours for Wildlife Observation, Photography, Environmental Education, and Interpretation

REFUGE NAME:

Plum Tree Island National Wildlife Refuge

ESTABLISHMENT DATE:

April 24, 1972

ESTABLISHING AND ACQUISITION AUTHORITIES:

Plum Tree Island National Wildlife Refuge (NWR, refuge) was established under authority of the Migratory Bird Conservation Act (MBCA; 16 U.S.C. 715d), the Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4) and 16 U.S.C. 742f(b)(1)), and the General Services Administration (GSA) Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes (16 U.S.C. 667b).

PURPOSES FOR WHICH ESTABLISHED:

The purposes for which Plum Tree Island NWR was established are:

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (MBCA, 16 U.S.C. 715d);

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” (Fish and Wildlife Act of 1956, 16 U.S.C. 742f(a)(4));

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

“... particular value in carrying out the national migratory bird management program.” (GSA Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes, 16 U.S.C. 667b).

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

The mission of the National Wildlife Refuge System (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 Administration Act of 1966 [16 U.S.C. 668dd–668ee], as amended by the National Wildlife Refuge

System Improvement Act of 1997 [Improvement Act][Public Law 105–57]).

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority public use?

This use is any fee-based service providing recreational, educational, or interpretive enjoyment of refuge lands and waters to the visiting public such as transportation, interpretation, educational materials, and programs. The services must aim to enhance the refuge visitor’s knowledge and enjoyment of the key natural resources and the mission of Plum Tree Island NWR and the U.S. Fish and Wildlife Service (Service), or other uses otherwise determined appropriate and compatible with the purposes for refuge establishment.

The refuge will authorize commercially guided wildlife observation, photography, environmental education, and interpretation tours within the refuge and will regulate such use through the implementation of a commercial wildlife guide management program, including issuance of special use permits (SUPs) with conditions. Commercial means that clients pay a fee for the program and the intent of the permittee is to generate profit. Commercially guided tours provide recreational opportunities for the paying public who desire a successful, quality experience, but who may lack the necessary equipment, skills, or knowledge to observe wildlife or otherwise experience the refuge. Guiding includes outfitting operations that may not provide a paid or unpaid staff person to accompany clients on the tour.

Commercially guided tours conducted on watercraft for fishing, birding, and sight-seeing are available in the refuge vicinity; however, no commercial tours are currently approved to drop anchor on the refuge, beach a watercraft on the refuge, or allow clients to disembark on to the refuge. Allowing commercially guided tours for wildlife observation, photography, environmental education, and interpretation is a new public use on the refuge. Although not one of the six priority public uses of national wildlife refuges, commercially guided tours are proposed in the draft Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for Plum Tree Island NWR because this use does support several wildlife-dependent priority uses at this refuge.

No-fee and not-for-profit wildlife observation, photography, environmental education, and interpretation tours conducted by non-profit groups, schools, colleges, and other agencies are covered under the general wildlife observation, photography, environmental education, and interpretation compatibility determination.

(b) Where would the use be conducted?

The use would occur in refuge waters (e.g., above mean low water) and at one designated public use area on refuge lands (map 3.4 in the draft CCP and EA). Specifically, we would designate a landing area on Cow Island for kayaks and canoes and provide access to a viewing platform. The area is located at the northwest corner of Cow Island and bounded by the confluence of the Poquoson River and Bennett Creek to the north and west, and maritime shrubland and dune habitat to the south and east. The shallow waters and flat beach at this site make getting in and out of kayaks and canoes easy. These waterways and natural landform features also serve as natural boundaries to the designated public use area and would be complemented by informational signage as needed.

Currently, one of the refuge’s waterfowl hunt blinds (blind #2) is located at this site. The existing

waterfowl hunt blind would be transformed to serve as a wildlife observation platform for approximately 9 months of the year (early February through late October) and waterfowl hunt blind for approximately 3 months of the year (late October through late January). Where possible, interpretive media to support non-commercial and commercially guided wildlife observation, photography, environmental education, and interpretation opportunities on the refuge would be developed and installed on the wildlife observation platform/waterfowl hunt blind.

All other areas on Plum Tree Island NWR would remain closed to public access for commercial activities. All commercially guided tour activities will be restricted from access to sensitive areas prone to disturbance (e.g., sensitive vegetation areas) or degradation (e.g., soil compaction), and will be conducted in a manner that minimizes impacts to nesting birds or other breeding, feeding, or resting wildlife.

None of the commercial services would originate or terminate on the refuge. All commercial services, tours, guides, and outfitters transporting visitors to the designated landing site on Cow Island would originate from one or more off-refuge locations such as Whitehouse Cove Marina, Owens Marina, York Haven Marina, Poquoson Yacht Club, or the Messick Road and Rens Road public boat launches. Commercially guided tour providers would seek pre-approval from boat launching facilities, as necessary. Fees may apply at certain locations.

(c) When would the use be conducted?

As recommended in our draft CCP and EA, commercially guided wildlife observation, photography, environmental education, and interpretation may occur in the designated public use area between early February and late October, from sunrise to sunset. No commercially guided tours will be permitted to occur during the refuge's waterfowl hunting season, which begins in the late fall and continues through the winter (typically late October through late January). When needed, additional time-of-year restrictions will be imposed on a case-by-case basis to ensure compliance with purposes for which the refuge was established and to prevent conflicts with refuge management activities.

Pre-approved SUPs will be required for commercially guided tours once public use facilities have been constructed to support refuge visitation. Commercially guided wildlife observation, photography, environmental education, and interpretation tours will be offered as outlined in an annual tour schedule that is approved by the Refuge Manager or his designee.

Commercial tours would occur on up to 4 days per week during 9 months of the year (early February through late October). Each commercial guide company may propose to offer tours on 1 day per week, with a maximum of three tours per day. Commercially guided tours may occur at any time of day between sunrise and sunset and for a duration determined by the commercial guide. The commercial use program will be evaluated by the Refuge Manager on an annual basis. To ensure that refuge resources and public safety are protected, the Refuge Manager may modify these conditions as needed.

(d) How would the use be conducted?

In our draft CCP and EA, we propose to construct infrastructure to support refuge visitation participating in non-commercial wildlife observation, photography, environmental education, or interpretation at a designated public use area on Cow Island. The refuge's designated public use location is only accessible by boat.

Guided tours typically consist of an individual or group including a guide visiting the refuge's designated public use area to learn about plant and wildlife species, natural processes and wetlands, and cultural history such as the Captain John Smith's voyages. Commercial guides may provide intensive, individual guidance to refuge visitors most often engaged in wildlife observation and photography, as the refuge is a prime birding location.

The total number of commercial guides and clients interested in touring the refuge is not known. Until further information becomes available, the Refuge Manager will annually permit guides to schedule up to 1 tour day per week between early February and late October, allowing a maximum of three tours per tour day and 15 people per tour. Commercial tours would be offered on up to 2 days per week of the 39-week season, for a total maximum of 234 tours annually.

Administration of commercially guided tours will be conducted in accordance with commercial guide use stipulations developed to ensure consistency throughout the refuge; provide a safe, quality experience; protect resources; and to ensure compliance with pertinent Refuge System regulations and policies. The guide use stipulations will address all aspects of the guided wildlife observation program including the number of permits to be issued, guide qualifications, permit cost, and selection methods. Since allowing commercially guided tours on the refuge is a new use for Plum Tree Island NWR, refuge administrators reserve the right to alter the stipulations as needed. Each commercial guide company will be subject to a 1-year probationary period, during which refuge administrators will closely monitor and evaluate commercial guide services to determine if the permit would be renewed. The Refuge Manager would determine whether to issue a 1-year permit or multi-year permit, modify the \$100 permit application fee, and require that a portion of each commercial service provider's revenues be shared with the refuge to recover program administration costs.

Non-motorized and motorized boats enter waters around the refuge from a variety of access points, including but not limited to: Whitehouse Cove Marina, Owens Marina, York Haven Marina, Poquoson Yacht Club, or the Messick Road and Rens Road public boat launches. Non-motorized and motorized boaters are encouraged to be familiar with daily tidal levels and fluctuations, as access may be limited by shallow water and the draft depth of the watercraft. Commercial guide companies are encouraged to familiarize guides and visitors with daily tidal levels and fluctuations.

In addition to published 50 CFR regulations and State regulations, additional restrictions have been placed on public use of lands and waters surrounding the refuge to protect human health and safety. However, Cow Island is not located within any of these restricted areas: the U.S. Air Force permanent danger zone (33 CFR 334.340), U.S. Army Corps of Engineers temporary danger zone (designated under the authorities of 33 U.S.C. 1 and 33 U.S.C. 3), or Virginia Marine Resources Commission restricted area (4 VAC 20-1065).

(e) Why is the use being proposed?

The Improvement Act identifies these four uses as priority public uses that, if compatible, are to receive enhanced consideration over other general public uses. Offering all four of these priority public uses at Plum Tree Island NWR will facilitate public enjoyment of and advocacy for the refuge, the Refuge System, and the Service mission. In the draft CCP and EA, we propose to open the refuge to wildlife observation, photography, environmental education, and interpretation. Offering these four uses through commercially permitted operations will further facilitate and enhance the refuge's ability to provide quality wildlife observation, photography, environmental education, and interpretation.

Commercially guided tours will provide additional opportunities for visitors to observe and learn about wildlife and wild lands in both structured and unstructured environments, and observe wildlife in their natural habitats. These four priority uses provide visitors with opportunities to enjoy refuge resources and gain a better understanding and appreciation of fish and wildlife, wild lands ecology, the relationships of plant and animal populations in an ecosystem, and wildlife management. Commercially guided tours will enhance public understanding of natural resource management programs and ecological concepts, enable the public to better understand the problems facing native wildlife and wild lands resources, help visitors better understand how they affect wildlife and other natural resources, and demonstrate the Service's role in conservation and restoration.

Photographers will gain opportunities to photograph wildlife in its natural habitat. These opportunities will increase the publicity and advocacy of Service programs. Photography provides wholesome, safe, outdoor recreation in a scenic setting, and entices those who come strictly for recreational enjoyment to participate in the educational facets of our public use program and become advocates for the refuge and the Service.

Visitors need a way to access these priority uses. By allowing commercial guides and outfitters to facilitate visitors transportation needs to designated areas of the refuge, we are providing access to these important priority public uses to a new audience of the public with minimal impacts to sensitive wildlife and habitat.

AVAILABILITY OF RESOURCES:

The financial and staff resources necessary to provide and administer these uses at their current levels are now available. We expect the existing financial resources to continue in the future, subject to availability of appropriated funds. Recommendations detailed in the final CCP and Visitor Services step-down plan would identify strategies for implementation.

Current annual administrative costs associated with the existing refuge-supported operations for wildlife observation, photography, environmental education, and interpretation programming are small due to the limited scope of use. The largest short-term costs would be associated with new construction and sign installation. These capital costs are described in appendix D of the draft CCP and EA.

Staff time associated with administration and regulatory enforcement of commercially guided tours is related to assessing the need for maintaining the wildlife viewing platform/waterfowl hunt blind, maintaining sign-posting, informing commercial tour providers about refuge uses, conducting visitor use surveys, analyzing visitor use patterns, monitoring the effects of public uses on refuge resources and visitors, and providing information to the public about the use.

Funding for visitor improvements comes from a variety of sources including general management capability funds, visitor facility enhancement projects, grant funds, contributions, and special project funds. We will complete and maintain projects and facilities as funds become available, and use volunteers and partners to help in construction and maintenance when appropriate.

Once a visitor services plan is completed and support infrastructure erected, long-term costs of administering the commercially guided wildlife observation, photography, environmental education and interpretive program will be easier to assess. After a 1-year probationary period,

the Refuge Manager may modify the \$100 permit application fee and require that a portion of each commercial service provider’s revenues be shared with the refuge to recover program administration costs.

Staff costs are incurred to review each request, coordinate with the outside entity, and process a SUP. Compliance with the terms of the Permit is within the regular duties of the Complex’s Law Enforcement Officer. Staff costs are also incurred to maintain refuge facilities to support the use. Anticipated costs are as follows (table B.2).

Table B.2 Anticipated Annual Administrative Costs Associated with Commercially Guided Wildlife Observation, Photography, Environmental Education, and Interpretation

Activities	Resource	Annual Duration	Rate ¹	Cost
Program review and oversight, review requests	Refuge Manager	4 hours	\$61/hour	\$ 244
	Deputy Refuge Manager (GS-12)	8 hours	\$43/hour	\$ 344
Review requests, coordinate with permittee, messaging, orientation, process SUP, issue SUP	Wildlife Refuge Specialist (GS-11)	16 hours	\$38/hour	\$ 608
Review request, assess site	Wildlife Biologist (GS-11)	8 hours	\$38/hour	\$ 304
Conducts patrols, coordinates with Federal and State conservation officers, defines hunt conditions	Federal Wildlife Officer (GL-09)	32 hours	\$39/hour	\$1,248
Fuel and equipment				\$ 500
Facility maintenance				\$ 200
TOTAL				\$3,367

Note: Some actions and resulting costs also support other approved public uses (i.e., hunting, wildlife observation, photography, environmental education, and interpretation).

¹In 2014 dollars, full performance salary.

ANTICIPATED IMPACTS OF THE USE:

The public use program on the refuge is affected by Service policy to ensure that the biological integrity, diversity, and environmental health (BIDEH) of the Refuge System are maintained for the benefit of present and future generations of Americans. The Service policy on BIDEH (601 FW 3) provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on national wildlife refuges and associated ecosystems. As a result, the final CCP may also include new objectives to protect non-avian wildlife and their habitats, including state and federally listed species (e.g., northeastern beach tiger beetle). All refuge-specific goals, objectives, and strategies will be developed within the context of the refuge’s establishing purpose, anticipated effects of climate change, and using the strategic habitat conservation approach.

In an effort to consider and protect the broad spectrum of fish, wildlife, and habitats present at Plum Tree Island NWR, adverse impacts to the refuge’s BIDEH will be avoided or minimized when implementing public use programs by establishing stipulations that control the use context, intensity, and duration.

Air Quality

Interpretation of the refuge’s habitats would provide a negligible, indirect, long-term beneficial impact on refuge air quality. At the designated public use area, interpretation programs

explaining the important role that salt marsh vegetation plays in air and water purification, storm abatement, flood control, and nutrient cycling have the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Increased fuel-burning equipment use by refuge visitors, refuge staff, and law enforcement officers would result in negligible to minor, direct, short- and long-term adverse impacts on local air quality. Transformation of the existing waterfowl hunt blind (#2) on Cow Island would require the use of motorized boats to transport equipment and materials for the new structure, resulting in negligible, short-term impacts to local air quality. In the long-term, the increased participation in the refuge's waterfowl hunt and designation of one public use area on Cow Island would result in an increase in vehicular traffic to parking lots located adjacent to the refuge and motorized boat traffic on the waters surrounding the refuge. We would promote use of non-motorized boats and visiting the refuge with commercial tour service providers because they could accommodate up to 15 refuge visitors per trip. Increased visitation and public access infrastructure would require an increased staff presence for maintenance and law enforcement activities; one or two additional vehicles would travel to Poquoson from refuge offices in either Warsaw or Charles City, Virginia to park in lots adjacent to the refuge a minimum of once a month.

Water Quality

Interpretation of the refuge's habitats would provide a negligible, indirect, long-term beneficial impact on refuge water resources. At the designated public use area, interpretation programs explaining the important role that salt marsh vegetation plays in air and water purification, storm abatement, flood control, and nutrient cycling have the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on water quality. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. Construction activities would include motorized boat landing on the shore, staging materials, installing posts, and constructing the structure. Construction activities would be completed in less than a month. We would illustrate and promote conservation principles by incorporating ecologically sensitive design concepts, using sustainable construction materials, and employing best management practices. The footprint of the wildlife observation platform and waterfowl hunt blind would be sufficient to support up to 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. This increased access would result in increased soil destabilization and erosion, as well as damage to native plants. We would use signage to clearly delineate the bounds of the designated public use area, and we would monitor conditions at the designated public use area. Regularly conducting quantitative shoreline surveys would allow us to determine if additional management actions are necessary to protect water quality.

Soils

Interpretation of the refuge's habitats would provide a negligible, indirect, long-term beneficial impact on refuge soils. At the designated public use area, interpretation programs explaining the important role that salt marsh soils plays in air and water purification, storm abatement, flood control, and nutrient cycling have the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on soils. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. Construction activities would include motorized boat landing on the shore, staging materials, installing posts, and constructing the structure. Construction activities would be completed in less than a month. We would illustrate and promote conservation principles by incorporating ecologically sensitive design concepts, using sustainable construction materials, and employing best management practices. The footprint of the wildlife observation platform and waterfowl hunt blind would be sufficient to support up to 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. This increased use would result in increased soil destabilization and erosion, as well as damage to native plants. We would use signage to clearly delineate the bounds of the designated public use area, and we would monitor soil conditions at the designated public use area. Regularly conducting quantitative shoreline surveys would allow us to determine if additional management actions are necessary to protect soils.

Vegetation

Interpretation of the refuge's habitats would provide a negligible, indirect, long-term impact on refuge vegetation. At the designated public use area, interpretation programs explaining the important role that salt marsh vegetation plays in air and water purification, storm abatement, flood control, and nutrient cycling have the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on refuge vegetation. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. Construction activities would include motorized boat landing on the shore, staging materials, installing posts, and constructing the structure. Construction activities would be completed in less than a month. We would illustrate and promote conservation principles by incorporating ecologically sensitive design concepts, using sustainable construction materials, and employing best management practices. The footprint of the wildlife observation platform and waterfowl hunt blind would be sufficient to support up to 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as

recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. This increased use would result in increased soil destabilization and erosion, as well as damage to native plants. We would use signage to clearly delineate the bounds of the designated public use area, and we would monitor vegetation condition at the designated public use area. Regularly conducting quantitative shoreline surveys would allow us to determine if additional management actions are necessary to protect vegetation.

Birds

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to bird populations. Observing birds and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on birds. Since the refuge is only open to limited waterfowl hunting, birds on the refuge experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. The time of year when access occurs can greatly impact birds that have historically used closed areas for foraging, nesting, or roosting (ACJV 2008). To minimize disturbance of birds in adjacent areas, we would clearly mark the boundaries of the designated public use area. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities.

Fisheries

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to fish populations. Observing fish and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on fishery species. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In an effort to avoid or minimize the potential for expanded long-term adverse impacts to fishery species and their habitats, we would monitor conditions at the kayak and canoe landing area and the viewing platform.

Mammals

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to mammal populations. Observing mammals and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on mammals. Since the refuge is only open to limited waterfowl hunting, mammals on the refuge currently experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. Human disturbance would potentially cause mammals to flee (Knight and Cole 1991). Females with young are more likely to flee from disturbance than those without young (Hammit and Cole 1998). To minimize disturbance of mammals in adjacent areas, we would clearly mark the boundaries of the designated public use area. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities.

Reptiles

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to reptile populations. Observing reptile and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on reptiles. Since the refuge is only open to limited waterfowl hunting, reptiles on the refuge currently experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. Human disturbance would potentially cause reptiles to flee. Because reptiles are relatively small and can easily be captured, losing species to collectors is a possibility and threat to viable populations. The time of year when access occurs can greatly impact reptiles that have historically used the area. Reptiles are more active in the warmer months, and we anticipate public use would also be highest during the warmer months. To minimize disturbance of reptiles in adjacent areas, we would clearly mark the boundaries of the designated public use area. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities.

Invertebrates

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to invertebrate populations. Observing invertebrates and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on invertebrates. Since the refuge is only open to limited waterfowl hunting, mammals on the refuge currently experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. This increase in boat traffic along the north side of Cow Island has strong potential to directly impact the submerged aquatic vegetation that occurs in the highest density class (<http://web.vims.edu/bio/sav/index.html>; accessed January 2016) as well as shallow sand and mud flats that have been documented as important to the blue crab production in adjoining salt marshes (http://www.vims.edu/people/seitz_rd/pubs/lipcius_et_al_crab_Seagr_2005.pdf; accessed January 2016). Degradation of this habitat would have minor indirect impacts on the crab population of Plum Tree Island NWR because we are limiting public use to a kayak and canoe landing area and wildlife viewing platform.

Human disturbance would only minimally impact invertebrates because of their ability to flee. The time of year when access occurs can greatly impact invertebrates that have historically used the area. Invertebrates are more active in the warmer months, and we anticipate public use would also be highest during the warmer months. It is critically important that we not adversely affect habitats occupied by the federally threatened tiger beetle. During the summer of 2014, refuge staff conducted a site visit to the waterfowl hunting blind location #2 on Cow Island, where we propose to open to wildlife observation, photography, environmental education, and interpretation by non-commercial and commercial service providers. Although the proposed landing and viewing site is a sandy beach spit, refuge staff determined that there is no northeastern beach tiger beetle population at this site and no population in close proximity that would likely re-establish here (Mowbray and Brame 2014 personal communications). Our Ecological Services Office staff confirmed our findings and recommended periodic monitoring at this location to assess beetle use of the area (Drummond 2014 personal communication). Use of the designated public use area would be modified if necessary to protect the northeastern beach tiger beetle.

Public Access and Use

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually, at a designated public use area on Cow Island would have minor to moderate, direct, local, long-term benefits to those who want to engage in these activities on the refuge. Since refuge establishment, the public has expressed interest in being able to safely visit the refuge to enjoy the beauty of its scenery, observe the diversity of wildlife and habitats, and be enveloped in the relaxing atmosphere of boating on the Chesapeake Bay.

Overall, the increased public awareness and promotion of public use programs allowed on the

refuge, specifically hunting, would provide a negligible, direct, local benefit to the interested public. When we expand visitor use public uses, more people would become aware that low levels of visitation (up to 15 people at any one time) have been deemed to be compatible with the habitat and wildlife management objectives for this refuge.

Potential for conflict exists primarily between commercial and non-commercial wildlife observation, photography, environmental education, and interpretation visitors at the designated public use area. The kayak and canoe landing area and viewing platform can reasonably accommodate up to 15 individuals to enjoy a quality wildlife observation experience. To minimize the potential for conflict, we prepared compatible use stipulations for these commercial and non-commercial public uses, and we expect that participants will comply with the stipulations.

Cultural Resources

Refuge visitors may inadvertently or even intentionally damage or disturb known or undiscovered cultural artifacts or historic properties. We would continue our vigilance in looking for this problem, use law enforcement where necessary, and continue our outreach and education efforts with local Virginia Indian Tribes and the National Park Service.

Socioeconomics

Opening the refuge to non-commercial and commercial wildlife observation, photography, environmental education, and interpretation programs on Cow Island would have minor to moderate, indirect, long-term impacts on the local economy. Although the City of Poquoson has realized an increase in recreation expenditures since 1996, total expenditures were 11 percent below the average level of expenditures incurred by other Virginia localities (City of Poquoson 2008). Opening the refuge to these new uses is consistent with the City's Comprehensive Management Plan (2008), which states that "Poquoson's waterways are an asset and should be protected, maintained and accessible for both commercial and recreational uses." Economic benefit would be gained by any local businesses providing guided wildlife observation, photography, environmental education, and interpretation tour services or businesses that rent or sell items in support of those services (e.g., watercraft, fuel, snacks, bird guides).

PUBLIC REVIEW AND COMMENT:

As part of the CCP process for Plum Tree Island NWR, this compatibility determination will undergo a public review and comment period of 60 days following the release of the draft CCP and EA.

DETERMINATION (CHECK ONE BELOW):

- Use is not compatible
- Use is compatible, with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Stipulations to ensure compatibility are detailed in "Stipulations for Commercially Guided Tours for Wildlife Observation, Photography, Environmental Education, and Interpretation on Plum Tree Island National Wildlife Refuge" (see attachment).

JUSTIFICATION:

Wildlife observation, photography, environmental education, and interpretation are all priority public uses and are to receive enhanced consideration on refuges, according to the Improvement Act. Providing increased wildlife-dependent recreational opportunities at Plum Tree Island NWR by allowing commercially guided tours promotes visitor appreciation and support for the refuge, Refuge Systems, and the Service; engages communities in local habitat conservation efforts and climate change concerns in the Chesapeake Bay; and instills a sense of ownership and stewardship ethic in refuge visitors.

Commercially guided wildlife observation, photography, environmental education, and interpretation, as described above, will not detract or materially interfere with the purposes of the refuge or the mission of the Refuge System because:

- 1) Existing Federal and State agency oversight and regulation of affected species and habitat is sufficient to ensure healthy populations. Disturbance to fish and wildlife will be local, short- and long-term, and not adversely impact overall populations for the refuge.
- 2) Qualifying standards for commercial operators will help ensure that the public is guided by competent individuals.
- 3) Restricting the number of tour days per year and number of tours per day will reduce conflicts between competing guide services, and conflicts between guided operations and other refuge users. Regulating and limiting the number of commercial operators as stated in the refuge commercial guide program stipulations will provide a safe, quality experience to an expanded audience of individuals who want to enjoy the resources of the refuge. It will also increase opportunities for those who wish to observe wildlife and experience the scenic and wild nature of the refuge, but may lack the required equipment, knowledge, or expertise.
- 4) Establishing and enforcing commercial guide operating requirements, will minimize conflicts with other refuge users within the designated public use area.
- 5) Administrative (application) and SUP fees will help offset costs to administer and provide oversight to this use.

This activity will not materially interfere with or detract from the mission of the Refuge System or purposes for which the refuge was established. In addition, this activity will fulfill one or more purposes of the refuge and the Refuge System.

SIGNATURE:

Refuge Manager: _____
(Signature) (Date)

CONCURRENCE:

Regional Chief: _____
(Signature) (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE:

LITERATURE CITED:

Atlantic Coast Joint Venture (ACJV). 2008. New England/Mid-Atlantic Coast Bird Conservation Region (BCR) 30 Implementation Plan. Accessed November 2014 at:
http://www.acjv.org/BCR_30/BCR30_June_23_2008_final.pdf.

City of Poquoson. 2008. City of Poquoson, Virginia Comprehensive Plan 2008–2028. 340 pp. Accessed January 2013 at:
http://www.ci.poquoson.va.us/city_departments/planning_department.

Hammit, W.E. and D.N. Cole. 1998. *Wildlife Recreation: Ecology and Management* (2nd edition). New York: John Wiley & Sons. 361p.

Knight, R.L. and D.N. Cole. 1991. Effects of recreational activity on wildlife in wildlands. *Transactions of the 56th North American Wildlife and Natural Resources Conference* pp. 238–247.

Miller, S.G., R.L. Knight, and C.K. Miller. 2001. Wildlife responses to pedestrians and dogs. *Wildlife Society Bulletin* 29(1):124–132.

ATTACHMENT:

Stipulations for Commercially Guided Tours for Wildlife Observation, Photography, Environmental Education, and Interpretation on Plum Tree Island NWR

ATTACHMENT

Stipulations for Commercially Guided Tours for Wildlife Observation, Photography, Environmental Education, and Interpretation on Plum Tree Island NWR

To minimize the potential for adverse impacts on refuge lands and resources, commercially guided tour providers will comply with the following stipulations. Refuge administrators and law enforcement will monitor permit holders for compliance with the following conditions imposed to minimize adverse impacts on refuge lands and resources. Failure to comply will result in permit revocation.

- 1) Parties interested in providing commercially guided wildlife observation, photography, environmental education, and interpretation tours at the refuge will complete a commercial activities SUP application.
- 2) An annual, non-refundable administrative fee of \$100 will be charged to each commercial guide tour applicant. This administrative fee is comparable to fees issued by other refuges in the Northeast Region. This fee is based on refuge staff salaries for reviewing one permit request, coordinating with one permittee, and issuing one SUP. After a 1-year probationary period, the Refuge Manager may modify the \$100 permit application fee and require that 5 percent of each commercial service provider's revenues be shared with the refuge to recover program administration costs. With each permit renewal or new permit issuance, this percentage of revenue received by the refuge will be evaluated to determine if revenue payments to the refuge cover administrative costs and will be adjusted accordingly.
- 3) In years 1 and 2 of this new commercial services program, the refuge may permit up to two commercial service providers to provide tours between early February and late October, for a maximum total of 234 tours offered during the 39-week season annually. In subsequent years, the refuge may permit up to four commercial service providers to provide a maximum total of 234 tours annually; however, the number of tours would remain capped at 234 annually.
- 4) Each commercial guide is allowed to conduct a maximum number of three tours on 1 day per week, any time between sunrise and sunset. Each commercial guide will submit a proposed tour schedule and a description of programs to the Refuge Manager or his designee no less than 60 days in advance of the proposed tour season start date. Modifications to the proposed schedule may be necessary to minimize the potential for conflict among commercial guides and refuge operations. An annual tour schedule will be approved by the Refuge Manager or designee prior to issuing a SUP to initiate the commercially guided tours. The permittee and refuge staff will coordinate closely to promote and advertise the tour schedule(s).
- 5) Each commercial guide will be issued a permit for a 1-year probation period. Upon successful completion of the probationary period, the Refuge Manager will determine whether a 1-year or multi-year permit will be issued for subsequent years. Permits will be issued for the commercial tour season, starting in early February and ending in late October.
- 6) Each guided tour will be restricted to a maximum of 15 patrons to ensure a quality wildlife-dependent recreational opportunity on the refuge.
- 7) Permitted commercially guided tours will land only at the refuge designated public use area on Cow Island.

- 8) Permitted tours will include an interpretive or educational program approved by refuge staff. The program will provide such details as the mission of the Refuge System, the purposes for establishing the refuge, and highlights of refuge resources and refuge management.
- 9) Qualified individuals conduct guided tours. Qualified individuals are defined as:
 - a. Each commercial guide leading motorized boat tours must comply with State boater safety education requirements, representative to the watercraft used (www.dgif.virginia.gov/boating/education/requirement).
 - b. Each non-motorized tour guide (via paddle board, kayak, or canoe) should demonstrate proficiency and knowledge of conducting such tours in a safe and effective manner. Certification by the American Canoeing Association (<http://www.americancanoe.org>) or similar certification would fulfill this requirement.
 - c. Possess a current vessel operator license issued by the U.S. Coast Guard (USCG), as applicable. Minimum license shall be Operator Uninspected Passenger Vessel. The license shall be valid for the area of operations and type(s) of vessel operated. This license applies to guides transporting patrons by water.
 - d. Possess a current cardiopulmonary resuscitation (CPR) and First Aid training certificate issued by a recognized national organization. The permittee must provide a copy of the appropriate documentation of current Red Cross First Aid and CPR certification for all guides.
 - e. Provide proof of insurance, including minimum coverage for general liability and comprehensive for all operations.

The permittee agrees to hold the U.S. Government harmless from liability for any accident or injury to their clients or employees resulting from the activities the permit authorizes. The permittee must provide adequate, appropriate liability insurance: a Certificate of Insurance with adequate Comprehensive General Liability coverage, the minimum amount of liability being \$300,000 per occurrence. The insurance certificate must name the U.S. Fish and Wildlife Service as additional insured, specify that the service or activity the permit authorizes is covered by the policy, and provide a telephone number for verification.
 - f. Each commercial tour guide should demonstrate proficiency and knowledge of conducting effective interpretive tours. Certification as a “Certified Interpretive Guide” through the National Association for Interpretation (<http://www.interpnet.com>), similar certification, or training transcript certified by the Refuge Manager would fulfill this requirement.
 - g. Otherwise required by State law.
- 10) Permittee must comply with the conditions previously mentioned and to all other conditions of the SUP, including but not limited to the following to ensure compatibility:
 - a. The permittee will not advertise on refuge property or distribute leaflets at existing or future refuge facilities, except as authorized in the SUP.

- b. All SUPs will expire on or before November 1, regardless of the date of issue.
- c. The permittee is responsible for accurate record keeping. The permittee shall provide the Refuge Manager with an interim report by July 31 and a final report by December 31 of each year. The following information will be detailed in the reports:
 - Fee schedule for the year (charge per patron)
 - Total number of tours performed on the refuge
 - Total number of patrons
 - Date, time, and duration of each tour
 - Boat launching location for each trip
 - Individual names and description of duties for all additional staff who assist with a trip on the refuge
- d. A copy of a valid SUP must be available for inspection on request by any law enforcement officer or refuge staff member, whenever an activity authorized by the permit is occurring. Storing the permit in the watercraft is acceptable; however, all guides must be knowledgeable about the permit and its conditions.
- e. Violation of any special conditions of the permit or of any Federal, State, local, or refuge regulations may result in a Notice of Violation being issued or the revocation or cancellation of the permit without written or verbal warning. In that case, the permit holder will receive immediate notification by phone with follow-up notification by mail. The permit holders are responsible for the actions of their employees, agents, others working under their SUP, and their clients.
- f. Regardless of the reason for the revocation or cancellation of a permit, no refund will be made to the permit holder.
- g. The refuge will not automatically reissue permits upon expiration of a previously issued permit, commercial guide companies must apply for a new permit no less than 60 days in advance of the proposed tour season start date
- h. Permit holders will provide all participants with relevant refuge information, including the regulations and conditions of the permit. The refuge will supply information to the permit holder on request.
- i. Permittees may be assisted by any number of individuals. These assistants must be named/authorized on the permit issued and possess any of the applicable State and USCG licenses for duties conducted. These assistants must also attend the required annual orientation by the refuge.
- j. All boats must carry standard USCG-approved safety equipment.
- k. Tours must begin and end during daylight hours only.
- l. Groups will police their routes for litter, vandalism, and other site concerns. Report any problems to the refuge office.

- m. All vessels used in guide operations shall be marked with a guide identifier as required by the refuge.
 - n. Speed restrictions (no wake zones) would be established to be protective of refuge resources and protection of human health and safety.
- 11) The refuge is a leave-no-trace, carry-in/carry-out facility. All food containers, bottles, and other waste and refuse must be taken out.
- 12) If refuge regulations or SUP conditions are violated, the Refuge Manager will revoke the commercial tour company's permit for the remainder of the year and the renewal request in the following year will be denied.

(Note: Some stipulations may not apply to outfitters, such as equipment rental companies that do not accompany clients on tours to the refuge. Deviations will be noted in individual permits.)

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Plum Tree Island National Wildlife Refuge

Use: Research by Non-Service Personnel

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

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

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

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes No

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

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

Not Appropriate

Appropriate

Refuge Manager: _____

Date: _____

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.

FWS Form 3-2319
02/06

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Plum Tree Island National Wildlife Refuge

Use: Research by Non-Service Personnel

NARRATIVE:

In accordance with the 2006 U.S. Fish and Wildlife Service (Service) Appropriate Use Policy (603 FW 1), the Refuge Manager must first determine if the use is appropriate prior to allowing any non-priority public use on the refuge. Research conducted by non-Service personnel is not identified as a priority public use of the National Wildlife Refuge System (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. However, research by non-Service personnel is often conducted by colleges and universities; Federal, State, and local agencies; nongovernmental organizations; and qualified members of the general public. Research on Plum Tree Island National Wildlife Refuge (NWR, the refuge) would further our basic understanding of the refuge’s biological and cultural resources, and to inform our management decisions that affect those resources. In many cases, research by non-Service personnel ensures the perception of unbiased and objective information gathering, which can be important when using the research to develop management recommendations for politically sensitive issues. Additionally, universities and other Federal and State partners can often access equipment and facilities unavailable to refuge staff for analysis of data or biological samples.

Research conducted by non-Service personnel would also help the refuge to better achieve the goals of the Comprehensive Conservation Plan (CCP) because the data would help evaluate objectives and strategies identified in the plan.

The Service would encourage and prioritize research and management studies on refuge lands that would improve and strengthen natural resource management decisions. The Refuge Manager would particularly encourage research supporting approved refuge goals and objectives that clearly improves land management decisions related to Federal trust resources, helps evaluate or demonstrate state-of-the art techniques, and/or helps address or adapt refuge lands to climate and land use change impacts.

Refuge staff would also consider research for other purposes that may not be directly related to refuge-specific goals and objectives, but contribute to the broader enhancement, protection, use, preservation, and management of cultural resources and native populations of fish, wildlife, and plants, and their natural diversity within the Northeast region or Atlantic flyway. All research proposals must also comply with the Service’s compatibility policy.

Evaluating and accepting or rejecting study proposals, as well as conditioning the special use permits (SUPs) appropriately, would minimize the impacts of, and maximize the value of, such research. If a research project occurs during the refuge’s hunting season, special precautions would be required and enforced to ensure the researchers’ health and safety. If conducted according to refuge-specific stipulations set forth in an approved compatibility determination and in a project-specific SUP, this use would not affect the Service’s ability to protect, conserve and manage wildlife and their habitats, nor would it impair existing wildlife-dependent recreational uses or reduce the potential to provide quality, compatible, wildlife-dependent recreation uses into

the future.

Therefore, research has been found appropriate because it is beneficial to the refuge's natural and cultural resources, and is consistent with the goals and objectives of the CCP.

COMPATIBILITY DETERMINATION

USE:

Research by Non-Service Personnel

REFUGE NAME:

Plum Tree Island National Wildlife Refuge

ESTABLISHMENT DATE:

April 24, 1972

ESTABLISHING AND ACQUISITION AUTHORITIES:

Plum Tree Island National Wildlife Refuge (NWR, refuge) was established under authority of the Migratory Bird Conservation Act (MBCA; 16 U.S.C. 715d), the Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4) and 16 U.S.C. 742f(b)(1)), and the General Services Administration (GSA) Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes (16 U.S.C. 667b).

PURPOSES FOR WHICH ESTABLISHED:

The purposes for which Plum Tree Island NWR was established are:

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (MBCA, 16 U.S.C. 715d);

“...for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” (Fish and Wildlife Act of 1956, 16 U.S.C. 742f(a)(4));

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

“... particular value in carrying out the national migratory bird management program.” (GSA Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes, 16 U.S.C. 667b).

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

The mission of the National Wildlife Refuge System (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 Administration Act of 1966 [16 U.S.C. 668dd–668ee], as amended by the National Wildlife Refuge System Improvement Act of 1997 [Improvement Act][Public Law 105–57]).

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority public use?

This determination covers low impact research projects; namely, those projects with methods that only have a minimal potential to adversely affect cultural resources and native wildlife and plants.

This is not an all-inclusive list, but examples of the types of research that would be allowed include: mist-netting for banding or tagging birds, point count surveys, fish and amphibian tagging, electrofishing, radio-telemetry tracking, use of cameras and recorders, use of live or other passive traps, or non-destructive searches of nests, dens, or burrows.

Research activities allowed under this determination would not result in long-term, negative alterations to species' behavior (e.g., result in wildlife leaving previously occupied areas for long periods; modifying their habitat use; or, causing nest or young abandonment). No project would degrade wildlife habitat, including vegetation, soils, and water. Research associated activities that would not be allowed include, but are not limited to, those that would result in soil compaction or erosion, degrade water quality, remove or destroy vegetation, involve off-road vehicle use, collect and remove animals or whole native plants, cause public health or safety concerns, or result in conflicts with other compatible refuge uses.

Refuge support of research directly related to refuge goals and objectives may take the form of funding, in-kind services such as housing or use of other facilities, vehicles, boats, or equipment, direct staff assistance with the project in the form of data collection, provision of historical records, conducting of management treatments, or other assistance as appropriate.

Research conducted by non-U.S. Fish and Wildlife Service (Service) personnel is not a priority public use of the Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd–668ee), and the Improvement Act of 1997 (Public Law 105–57).

(b) Where would the use be conducted?

This use will be allowed on all refuge lands, including lands that may be acquired in the future pursuant to the final comprehensive conservation plan (CCP). The location of the research will vary depending on the individual research project that is proposed. An individual 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 research location will be limited to those areas of the refuge that are absolutely necessary to conduct the research project. The refuge may limit areas available to research as necessary to ensure the protection of Federal trust resources, or to reduce conflict with other compatible refuge uses. The methods and routes of access to study locations will be identified by refuge staff.

(c) When would the use be conducted?

The timing of the research may depend entirely on the individual research project that is being conducted. Scientific research will be allowed to occur on the refuge throughout the year. An individual research project could be short-term in design, requiring only one or two visits over the course of a few days, or be a multiple year study that may require regular visits to the study site. The timing of each individual research project will be limited to the minimum required to complete the project. If a research project occurs during the refuge's hunting season, special precautions will be required and enforced to ensure public health and safety. The Refuge Manager would approve the timing (e.g., project length, seasonality, time of day) of the research prior to the start

of the project to minimize impacts to wildlife and habitats, ensure safety, and reduce conflicts with other compatible refuge uses.

(d) How would the use be conducted?

Research activities will depend entirely on the individual research project that is conducted. The objectives, methods, and approach of each research project will be carefully scrutinized by the Refuge Manager before it will be allowed on the refuge. Only low impact research activities, such as those listed under section (a) above, are covered under this determination.

Research projects must have a Service-approved study plan and protocol. A detailed research proposal that follows the refuge's study proposal guidelines (see attachment I) is required from parties interested in conducting research on the refuge. Each research proposal request will be considered, and if determined appropriate and compatible, will be issued a SUP by the Refuge Manager that includes the stipulations in this determination. The Refuge Manager will use sound professional judgment and ensure that the request will have no considerable negative impacts to natural or cultural resources, or impact visitors, and does not violate refuge regulations. Before initiating a research project that involves federally listed endangered or threatened species, an interagency Section 7 consultation process should be completed.

If approved, multi-year research projects will be reviewed annually to ensure that they are meeting their intended design purposes, that reporting and communicating with refuge staff is occurring, and that projects continue to be consistent with the mission of the Refuge System and purposes for which the refuge was established.

If the Refuge Manager decides to deny, modify, or halt a specific research project, the Refuge Manager will explain the rationale and conclusions supporting their decision in writing. The denial or modification to an existing study will generally be based on evidence that the details of a particular research project may:

- Negatively affect native fish, wildlife, and habitats or cultural, archaeological, or historical resources.
- Detract from fulfilling the refuge's purposes or conflict with refuge goals and objectives.
- Raise public health or safety concerns.
- Conflict with other compatible refuge uses.
- Not be manageable within the refuge's available staff or budget time.
- Deviate from the approved study proposal such that impacts to refuge resources are more severe or extensive than originally anticipate.

(e) Why is this use being proposed?

Quality scientific research, including inventory and monitoring projects, are an integral part of refuge operations and management. Thorough research provides critical information for establishing baseline information on refuge resources and evaluating management effects on wildlife and habitat. Research results will help inform, strengthen, and improve future refuge management decisions, as well as inform management decisions on other ownerships with Federal trust resources in the Chesapeake Bay Watershed and possibly elsewhere in the Northeast

Region. For example, past projects on the refuge have studied federally listed species, such as northeastern beech tiger beetle, or other topics of conservation concern, such salt marsh integrity. Research projects may also include evaluating habitat management treatments and the associated wildlife community response, as well as, measures of impacts from public uses on refuge lands.

The Refuge Manager would particularly encourage research supporting approved refuge goals and objectives that clearly improves land management decisions related to Federal trust resources, helps evaluate or demonstrate state-of-the-art techniques, and/or helps address or adapt to climate and land use change impacts.

AVAILABILITY OF RESOURCES:

The resources necessary to provide and administer this use are available within current and anticipated refuge budgets. The bulk of the cost for research is incurred in staff time to review research proposals, coordinate with researchers, and write SUPs. In some cases, a research project may only require 1 day of staff time to write a SUP. In other cases, a research project may take many weeks, as the refuge staff must coordinate with students and advisors and accompany researcher’s onsite visits. These responsibilities are accounted for in budget and staffing plans.

We estimate below the annual costs associated with the administration of this use (table B.3).

Table B.3 Current Annual Administrative Costs Associated with Research by Non-Service Personnel

Activities	Resource	Annual Duration	Rate¹	Cost
Proposal review, coordination, and SUP preparation	Refuge Manager (GS-13)	4 hours	\$61/hour	\$ 244
	Deputy Refuge Manager (GS-12)	4 hours	\$43/hour	\$ 172
	Wildlife Biologist (GS-11)	40 hours	\$38/hour	\$1,520
	Wildlife Refuge Specialist (GS-11)	8 hours	\$38/hour	\$ 304
Field assistance, evaluating resource impacts	Wildlife Refuge Specialist (GS-11)	10 hours	\$38/hour	\$ 380
	Wildlife Biologist (GS-11)	120 hours	\$38/hour	\$4,560
Use of facilities		40 days	\$5/day	\$ 200
Use of equipment	Vehicle or watercraft	4 days	\$20/day	\$ 80
TOTAL				\$7,460

Note: Some actions and resulting costs also support approved public uses (i.e., hunt program).

¹ In 2014 dollars, full performance salary.

ANTICIPATED IMPACTS OF THE USE:

The Service encourages quality research to further the understanding of natural resources. Research by non-Service personnel contributes to the availability of the best available scientific information to support refuge management decisions.

Disturbance to wildlife, vegetation, water, soils, or cultural resources could occur while researchers are accessing study sites on vehicles or by foot, or while they are engaged in their project. The presence of researchers could also indirectly disturb wildlife. Potential impacts include:

- Trampling, damage, and killing of vegetation from walking off trail (Kuss 1986, Roovers et al. 2004, Hammitt and Cole 1998).
- Soil compaction, soil erosion, and changes in hydrology from hiking on and off trail (Kuss 1986, Roovers et al. 2004).

Disturbance to wildlife that causes shifts in habitat use, abandonment of habitat, increased energy demands on affected wildlife, changes in nesting and reproductive success, and singing behavior (Knight and Cole 1991, Miller et al. 1998, Shulz and Stock 1993, Gill et al. 1996, Arrese 1987, Gill et al. 2001).

Overall, we expect that these impacts would be negligible because of the low number of researchers and because, under this determination, only low impact projects would be allowed. As indicated under (a) above, low impact projects are those that would only minimally impact cultural resources or native wildlife and plants, and would not result in long-term, negative alterations to species' behavior, or their habitat, including vegetation, soils, and water. Research would only be conducted in approved locations and at approved times of day and times of season to minimize impacts to sensitive habitats and wildlife.

Animals may be temporarily disturbed during direct or remote observation, telemetry, capture (e.g., mist-netting), or banding. In very rare cases, direct injury or mortality could result as an unintended result of research activities. Mist-netting and banding, which are common research methods, can cause stress, especially when birds are captured, banded, and weighed. In very rare cases, birds have been injured or killed during mist netting, or killed when predators reach the netted birds before researchers. In a study of mist-netting and banding at 22 bird banding stations in the U.S. and Canada, Spotswood et al. (2012) found that the average rate of injury was very low (0.59 percent; mostly from damage to the wings, stress, cuts, or breaks) and the average rate of mortality was also very low (0.23 percent; mostly from stress and predation). Overall, they found that the likelihood of injury differed among species (e.g., heavier birds were more prone to incidents) and some species were more vulnerable to certain types of injuries. To minimize the potential for injuries, researchers should be properly trained (Fair et al. 2010, Spotswood et al. 2012) and look for signs of stress (e.g., lethargy, panting, raising feathers, closing eyes), wing strain, tangling, and predation (Spotswood et al. 2012). Impacts can also be minimized by considering the species to be captured, mesh size of net, time of day, time of year, weather, the number of birds that need to be captured, and the level of predation (Fair et al. 2010).

Barron et al. (2010) found that transmitters attached for research can also negatively impact bird species by affecting their behavior and ecology. The greatest impacts from transmitters were increased energy expenditure and decreased the likelihood of nesting. They also found that the method of transmitter attachment had an impact on the likelihood of injury or mortality, with anchored and implanted transmitters having the highest mortality due to the need for anesthesia. Collar and harness transmitters also had high mortality rates because they could cause birds to become entangled in vegetation. To minimize these risks, researchers can avoid anchored/implanted transmitters and use adjustable harnesses and collars with weak links that allow the device to detach if it becomes trapped in vegetation (Barron et al. 2010).

The U.S. Department of Agriculture's Animal Welfare Information Center maintains a website with resources to help minimize stress, injury, and mortality of wildlife in field studies at: <https://awic.nal.usda.gov/research-animals/wildlife-field-studies>. Recommendations relevant to

refuge research projects would be followed. Included on this site are links to the following guidelines to help researchers limit their impacts on wildlife:

- The Ornithological Council’s “Guideline to the Use of Wild Birds in Research” (Fair et al. 2010).
- The American Society of Mammologists, “Guidelines of the American Society of Mammologists for the Use of Wildlife Mammals in Research” (2011).
- American Fisheries Society, “Guidelines for the Use of Fishes Research” (2004).
- American Society of Ichthyologists and Herpetologists, “Guidelines for Use of Live Amphibians and Reptiles in Field Research” (2006).

Researchers may also inadvertently damage plants (e.g., via trampling or equipment use) during the research project. To minimize impacts, the SUP will outline how researchers are allowed to access their study sites and use equipment to minimize the potential for impacts to refuge vegetation, soils, and water. We would not allow the collection and removal, or permanent damage, of any native plants under this determination.

Overall, allowing well-designed, properly reviewed, low impact research to be conducted by non-Service personnel is likely to have very little negative impact on refuge wildlife populations and habitats. We anticipate research will only have negligible to minor impacts to refuge wildlife and habitats because it will only be carried out after the refuge approves a detailed project proposal and issues a SUP including the stipulations in this determination to ensure compatibility. These stipulations are designed to help ensure each project minimizes impacts to refuge cultural resources, wildlife, vegetation, soils, and water. We also anticipate only minimal impacts because Service staff will supervise this activity, and it will be conducted in accordance with refuge regulations. In the event of persistent disturbance to habitats or wildlife, the activity will be further restricted or discontinued. If the research project is conducted with professionalism and integrity, potential minor adverse impacts are likely to be outweighed by the body of knowledge contributed to our understanding of refuge resources and our management effects on those resources, as well as the opportunity to inform, strengthen, and improve future refuge management decisions.

PUBLIC REVIEW AND COMMENT:

As part of the CCP process for Plum Tree Island NWR, this compatibility determination will undergo a public review and comment period of 60 days following the release of the draft CCP and environmental assessment.

DETERMINATION (CHECK ONE BELOW):

- Use is not compatible
- Use is compatible, with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

- Only low impact projects are covered under this determination. Low impact projects, as indicated under (a) above, are those that would only have a minimal potential to impact cultural resources and native wildlife and plants. No project should result in long-term negative alterations to species' behavior (e.g., result in wildlife leaving previously occupied areas for a long term; modifying their habitat use within their range; or, causing nest or young abandonment). No project should degrade wildlife habitat, including vegetation, soils, and water. Nest, dens, and burrows must not be harmed. No research activities should result in soil compaction or erosion, degrade water quality, remove or destroy vegetation, involve off-road vehicle use, or result in collection and removal of animals or whole native plants.
- Research would only be conducted in Service-approved locations, using approved modes of access, and conducted only after the timing, season, duration, numbers of researchers, and areas open and closed is approved. Sensitive wildlife habitat areas will be avoided unless sufficient protection, approved by the Service, is implemented to limit the area and/or resources potentially impacted by the proposed research.
- If a research project occurs during the refuge's hunting season, special precautions will be required and enforced to ensure public health and safety, and otherwise reduce conflicts with other compatible refuge uses.
- The Service will require modifications to research activities, including temporarily closing areas, or changing methods, when warranted, to avoid harm to sensitive wildlife and habitat when unforeseen impacts arise.
- All researchers will be required to submit a detailed research proposal following the refuge's study proposal guidelines (see attachment I) and Service policy (4 RM 6). The refuge must be given at least 45 days to review proposals before initiation of research. Proposals will include obligations for regular progress reports and a final summary document including all findings.
- The criteria for evaluating a research proposal, outlined in the "Description of Use" section (a) above, will be used when determining whether a proposed study will be approved on the refuge. Projects would be denied if they:
 - Negatively impact native fish, wildlife, and habitats or cultural, archaeological, or historical resources.
 - Detract from fulfilling the refuge's purposes or conflicts with refuge goals and objectives.
 - Cause public health or safety concerns.
 - Conflicts with other compatible refuge uses.
 - Are not manageable within the refuge's available staff or budget time.
- Proposals will be prioritized and approved based on need, benefit to refuge resources, and the level of refuge funding required. Service experts, State agencies, or academic experts may be asked to review and comment on proposals.
- If proposal is approved, a SUP will be issued. The SUP will contain this determination's

stipulations as well as project-specific terms and conditions that the researcher(s) must follow relative to the activities planned (e.g., location, duration, seasonality, use of biotic specimens). For example, if biotic specimens are to be collected, the following language will be included in the SUP (USFWS 2005):

You may use specimens collected under this permit, any components of any specimens (including natural organisms, enzymes, genetic material or seeds), and research results derived from collected specimens for scientific or educational purposes only, and not for commercial purposes unless you have entered into a Cooperative Research and Development Agreement (CRADA) with us. We prohibit the sale of collected research specimens or other transfers to third parties. Breach of any of the terms of this permit will be grounds for revocation of this permit and denial of future permits. Furthermore, if you sell or otherwise transfer collected specimens, any components thereof, or any products or any research results developed from such specimens or their components without a CRADA, you will pay us a royalty rate of 20 percent of gross revenue from such sales. In addition to such royalty, we may seek other damages and injunctive relief against you.

- Researchers must comply with all state and Federal laws and follow all refuge rules and regulations. All necessary State and Federal permits must be obtained before starting research on the refuge (e.g., permits for capturing and banding birds). Any research involving federally listed species may require Section 7 consultation under the Endangered Species Act. Any research involving ground disturbance may require historic preservation consultation with the Regional Historic Preservation Officer and/or State Historic Preservation Officer.
- Researchers will mark any survey routes, plots, and points in as visually unobtrusive a manner as practical. No permanent markers or infrastructure can be left on the refuge.
- Researchers will use every precaution and not conduct activities that would cause damage to refuge property or present hazards or significant annoyances to other refuge visitors. Any damage should be reported immediately to the Refuge Manager.
- Researchers must not litter, or start or use open fires on refuge lands.
- All research staff handling wildlife must be properly trained to minimize the potential for impacts to individual wildlife prior to initiating the project. In addition, a review of the U.S. Department of Agriculture’s Animal Welfare Information Center website must be documented by the researcher with identification of practices that will be followed to help further minimize stress, injury, and mortality of wildlife. The website is reached at: <https://awic.nal.usda.gov/research-animals/wildlife-field-studies>.
- Researchers may not use any chemicals (e.g., herbicides to treat invasive plants) or hazardous materials without prior written consent of Refuge Manager (e.g., the type of chemical, timing of use, and rate of application). All activities will be consistent with Service policy and an approved refuge Pesticide Use Plan.
- Researchers will be required to take steps to ensure that invasive species and pathogens are not inadvertently introduced or transferred to the refuge and surrounding lands (e.g., cleaning equipment).
- Refuge staff will monitor research activities for potential impacts to the refuge. The Refuge

Manager may determine that previously approved research and SUP be modified or terminated due to observed impacts that are more severe or extensive than originally anticipated. The Refuge Manager will also have the ability to cancel a SUP if the researcher is not in compliance with the stated conditions.

- Researchers must have the SUP in their possession when engaged in research activities and will present it to refuge officials and State and Federal law enforcement agents upon their request.
- Researchers will submit a final report to the refuge upon completion of their work. For long-term studies, interim progress reports may also be required. The refuge also expects that research findings will be published in peer-reviewed publications. The contribution of the refuge and the Service should be acknowledged in any publications. The SUP will identify a schedule for annual progress reports and the submission of a final report or scientific paper.

JUSTIFICATION:

The Service encourages quality scientific research because it provides critical baseline information on Federal trust and other refuge resources and helps evaluate the management effects on those resources. Research results will help inform, strengthen, and improve future refuge management decisions, as well as inform management decisions on other ownerships in the Chesapeake Bay Watershed and possibly elsewhere in the Northeast Region. Given the stipulations above, and given that only low impact research projects would be conducted under this determination, we do not anticipate this activity will have greater than minor impact on refuge resources. If they occur, impacts would be confined in area, duration, and magnitude, with no long-term consequences predicted. Therefore, research conducted by non-Service personnel on Plum Tree Island NWR will not materially interfere with or detract from the mission of the Refuge System or the purposes for which the refuge was established.

SIGNATURE:

Refuge Manager: _____
(Signature) (Date)

CONCURRENCE:

Regional Chief: _____
(Signature) (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE:

LITERATURE CITED:

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ATTACHMENT I

Plum Tree Island National Wildlife Refuge Research Proposal Guidelines

A study proposal is a justification and description of the work to be done, and includes cost and time requirements. Proposals must be specific enough to serve as “blueprints” for the investigative efforts. Step-by-step plans for the actual investigations must be spelled out in advance, with the level of detail commensurate with the cost and scope of the project and the needs of management. Please submit proposals electronically as a Microsoft Word document or hardcopy to the Refuge Manager.

The following list provides a general outline of first order headings/sections for study proposals.

- Cover Page.
- Table of Contents (for longer proposals).
- Abstract.
- Statement of Issue.
- Literature Summary.
- Objectives/Hypotheses.
- Study Area.
- Methods and Procedures.
- Quality Assurance/Quality Control.
- Specimen Collections.
- Deliverables.
- Special Requirements, Concerns, Necessary Permits.
- Literature Cited.
- Peer Review.
- Budget.
- Personnel and Qualifications.

Cover Page

The cover page must contain the following information:

- Title of Proposal.
- Current Date.

- Investigator(s): name, title, organizational affiliation, address, telephone and fax numbers and e-mail address of all investigators or cooperators.
- Proposed starting date.
- Estimated completion date.
- Total Funding Support Requested from the U.S. Fish and Wildlife Service.
- Signatures of Principal Investigator(s) and other appropriate institutional officials.

Abstract

The abstract should contain a short summary description of the proposed study, including reference to major points in the Statement of Issue, Objectives, and Methods and Procedures sections.

Statement of Issue

Provide a clear, precise summary of the problem to be addressed and the need for its solution. This section should include statements of the importance, justification, relevance, timeliness, generality, and contribution of the study. Describe how any products will be used, including any anticipated commercial use. What is the estimated probability of success of accomplishing the objective(s) within the proposed timeframe?

Literature Summary

This section should include a thorough but concise literature review of current and past research that pertains to the proposed research, especially any pertinent research conducted within the lower Chesapeake Bay, and specifically, on refuge units. A discussion of relevant legislation, policies, and refuge planning and management history, goals, and objectives should also be included.

Objectives/Hypotheses

A very specific indication of the proposed outcomes of the project should be stated as objectives or hypotheses to be tested. Project objectives should be measurable. Provide a brief summary of what information will be provided at the end of the study and how it will be used in relation to the problem. These statements should flow logically from the statement of issue and directly address the management problem.

Establish data quality objectives in terms of precision, accuracy, representativeness, completeness, and comparability as a means of describing how good the data need to be to meet the project's objectives.

Study Area

Provide a detailed description of the geographic area(s) to be studied and include a clear map delineating the proposed study area(s) and showing specific locations where work will occur.

Methods and Procedures

This section should describe as precisely as possible how the objectives will be met or how the hypotheses will be tested. Include detailed descriptions and justifications of the field and laboratory methodology, protocols, and instrumentation. Explain how each variable to be measured directly addresses the research objective/hypothesis. Describe the experimental design,

population, sample size, and sampling approach (including procedures for sub-sampling). Summarize the statistical and other data analysis procedures to be used. List the response variables and tentative independent variables or covariates. Describe the experimental unit(s) for statistical analysis. Also include a detailed project time schedule that includes initiation, fieldwork, analysis, reporting, and completion dates.

Quality Assurance/Quality Control

Adequate quality assurance/quality control (QA/QC) procedures help insure that data and results are: credible and not an artifact of sampling or recording errors; of known quality; able to stand up to external scientific scrutiny; and accompanied by detailed method documentation. Describe the procedures to be used to insure that data meet defined standards of quality and program requirements, errors are controlled in the field, laboratory, and office, and data are properly handled, documented, and archived. Describe the various steps (e.g., personnel training, calibration of equipment, data verification and validation) that will be used to identify and eliminate errors introduced during data collection (including observer bias), handling, and computer entry. Identify the percentage of data that will be checked at each step.

Specimen Collections

Clearly describe the kind (species), numbers, sizes, and locations of animals, plants, rocks, minerals, or other natural objects to be sampled, captured, or collected. Identify the reasons for collecting, the intended use of all the specimens to be collected, and the proposed disposition of collected specimens. For those specimens to be permanently retained as voucher specimens, identify the parties responsible for cataloging, preservation, and storage and the proposed repository.

Deliverables

The proposal must indicate the number and specific format of hard and/or electronic media copies to be submitted for each deliverable. The number and format will reflect the needs of the refuge and the Refuge manager. Indicate how many months after the project is initiated (or the actual anticipated date) that each deliverable will be submitted. Deliverables are to be submitted or presented to the Refuge Manager.

Deliverables that are required are as follows:

Reports and Publications

Describe what reports will be prepared and the timing of reports. Types of reports required in fulfillment of natural and social science study contracts or agreements include:

- (1) Progress report(s) (usually quarterly, semiannually, or annually): may be required
- (2) Draft final and final report(s): always required

A final report must be submitted in addition to a thesis or dissertation (if applicable) and all other identified deliverables. Final and draft final reports should follow refuge guidelines (see attachment II).

In addition, investigators are encouraged to publish the findings of their investigations in refereed professional, scientific publications and present findings at conferences and symposia. The Refuge manager appreciates opportunities to review manuscripts in advance of publication.

Data Files

Provide descriptions of any spatial (Geographic Information Systems (GIS) and non-spatial data files that will be generated and submitted as part of the research. Non-spatial data must be entered onto Windows CD ROMs in Access or Excel. Spatial data, which includes GPS (Global Position System)-generated files, must be in a format compatible with the refuge's GIS system (ArcGIS 8 or 9, ArcView 3.3, or e00 format). All GIS data must be in UTM 19, NAD 83.

Metadata

For all non-spatial and spatial data sets or information products, documentation of information (metadata) describing the extent of data coverage and scale, the history of where, when, and why the data were collected, who collected the data, the methods used to collect, process, or modify/transform the data, and a complete data dictionary must also be provided as final deliverables. Spatial metadata must conform to Service and Federal Geographic Data Committee (FDGC) metadata standards.

Oral Presentations

Three types of oral briefings should be included: pre-study, annual, and closeout.

These briefings will be presented to refuge staff and other appropriate individuals and cooperators. In addition, investigators should conduct periodic informal briefings with refuge staff throughout the study whenever an opportunity arises. During each refuge visit, researchers should provide verbal updates on project progress. Frequent dialogue between researchers and refuge staff is an essential element of a successful research project.

Specimens and Associated Project Documentation

A report on collection activities, specimen disposition, and the data derived from collections, must be submitted to the refuge following refuge guidelines.

Other:

Researchers must provide the Refuge Manager with all of the following:

1. Copies of field notes/notebooks/datasheets.
2. Copies of raw data (in digital format), including GIS data, as well as analyzed data.
3. Copies of all photos, slides (digital photos preferred), videos, and films.
4. Copies of any reports, theses, dissertations, publications or other material (such as news articles) resulting from studies conducted on refuge.
5. Detailed protocols used in study.
6. Aerial photographs.
7. Maps.
8. Interpretive brochures and exhibits.
9. Training sessions (where appropriate).
10. Survey forms.

11. Value-added software, software developed, and models.

Additional deliverables may be required of specific studies.

Special Requirements, Permits, and Concerns

Provide information on the following topics where applicable. Attach copies of any supporting documentation that will facilitate processing of your application.

Refuge Assistance

Describe any refuge assistance needed to complete the proposed study, such as use of equipment or facilities or assistance from refuge staff. It is important that all equipment, facilities, services, and logistical assistance expected to be provided by the Service be specifically identified in this section so all parties are in clear agreement before the study begins.

Ground Disturbance

Describe the type, location, area, depth, number, and distribution of expected ground-disturbing activities, such as soil pits, cores, or stakes. Describe plans for site restoration of significantly affected areas.

Proposals that entail ground disturbance may require an archeological survey and special clearance prior to approval of the study. You can help reduce the extra time that may be required to process such a proposal by including identification of each ground disturbance area on a U.S. Geological Survey 7.5-minute topographic map.

Site Marking and/or Animal Marking

Identify the type, amount, color, size, and placement of any flagging, tags, or other markers needed for site or individual resource (e.g., trees) identification and location. Identify the length of time it is needed and who will be responsible for removing it. Identify the type, color, placement of any tags placed on animals (see SUP for requirements on marking and handling of animals).

Access to Study Sites

Describe the proposed method and frequency of travel to and within the study site(s). Explain any need to enter restricted areas. Describe duration, location, and number of participants, and approximate dates of site visits.

Use of Mechanized and Other Equipment

Describe any vehicles, boats, field equipment, markers, or supply caches by type, number, and location. You should explain the need to use these materials and if or how long they are to be left in the field.

Safety

Describe any known potentially hazardous activities, such as electro-fishing, scuba diving, whitewater boating, aircraft use, wilderness travel, wildlife capture or handling, wildlife or immobilization.

Chemical Use

Identify chemicals and hazardous materials that you propose using within the refuge.

Indicate the purpose, method of application, and amount to be used. Describe plans for storage, transfer, and disposal of these materials and describe steps to remediate accidental releases into

the environment. Attach copies of Material Safety Data Sheets.

Animal Welfare

If the study involves vertebrate animals, describe your protocol for any capture, holding, marking, tagging, tissue sampling, or other handling of these animals (including the training and qualifications of personnel relevant to animal handling and care). If your institutional animal welfare committee has reviewed your proposal, please include a photocopy of their recommendations. Describe alternatives considered, and outline procedures to be used to alleviate pain or distress. Include contingency plans to be implemented in the event of accidental injury to or death of the animal. Include state and Federal permits. Where appropriate, coordinate with and inform state natural resource agencies.

Literature Cited

List all reports and publications cited in the proposal.

Peer Review

Provide the names, titles, addresses, and telephone numbers of individuals with subject-area expertise who have reviewed the research proposal. If the reviewers are associated with the investigator's research institution or if the proposal was not reviewed, please provide the names, titles, addresses, and telephone numbers of three to five potential subject-area reviewers who are not associated with the investigator's institution. These individuals will be asked to provide reviews of the proposal, progress reports, and the draft final report.

Budget

The budget must reflect both funding and assistance that will be requested from the Service and the cooperator's contributions on an identified periodic (usually annual) basis.

Personnel Costs

Identify salary charges for principal investigator(s), research assistant(s), technician(s), clerical support, and others. Indicate period of involvement (hours or months) and pay rate charged for services. Be sure to include adequate time for data analysis and report writing and editing.

Fringe Benefits

Itemize fringe benefit rates and costs.

Travel

Provide separate estimates for fieldwork and meetings. Indicate number of trips, destinations, estimated miles of travel, mileage rate, air fares, days on travel, and daily lodging and meals charges. Vehicle mileage rate cannot exceed standard government mileage rates. Charges for lodging and meals are not to exceed the maximum daily rates set for the locality by the Federal Government.

Equipment

Itemize all equipment to be purchased or rented and provide a brief justification for each item costing more than \$1,000. Be sure to include any computer-related costs. For proposals funded under Service agreement or contract, the refuge reserves the right to transfer the title of purchased equipment with unit cost of \$1,000 or more to the Federal Government following completion of the study. These items should be included as deliverables.

Supplies and Materials

Purchases and rentals under \$1,000 should be itemized as much as is reasonable.

Subcontract or Consultant Charges

All such work must be supported by a subcontractor's proposal also in accordance with these guidelines.

Specimen Collections

Identify funding requirements for the cataloging, preservation, storage, and analyses of any collected specimens that will be permanently retained.

Printing and Copying

Include costs for preparing and printing the required number of copies of progress reports, the draft final report, and the final report. In general, a minimum of two (2) copies of progress reports (usually due quarterly, semiannually, or as specified in agreement), the draft final report, and the final report are required.

Indirect Charges

Identify the indirect cost (overhead) rate and charges and the budget items to which the rate is applicable.

Cooperator's Contributions

Show any contributing share of direct or indirect costs, facilities, and equipment by the cooperating research institution.

Outside Funding

List any outside funding sources and amounts.

Personnel and Qualifications

List the personnel who will work on the project and indicate their qualifications, experience, and pertinent publications. Identify the responsibilities of each individual and the amount of time each will devote. A full vita or resume for each principal investigator and any consultants should be included here.

ATTACHMENT II. INTERIM FINAL REPORT GUIDELINES

Draft final and final reports should follow Journal of Wildlife Management format and should include the following sections:

- Title Page
- Abstract
- Introduction/ Problem statement
- Study Area
- Methods (including statistical analyses)
- Results
- Discussion
- Management Implications
- Management Recommendations
- Literature Cited

COMPATIBILITY DETERMINATION

USE:

Waterfowl Hunting

REFUGE NAME:

Plum Tree Island National Wildlife Refuge

ESTABLISHMENT DATE:

April 24, 1972

ESTABLISHING AND ACQUISITION AUTHORITIES:

Plum Tree Island National Wildlife Refuge (NWR, refuge) was established under authority of the Migratory Bird Conservation Act (MBCA; 16 U.S.C. 715d), the Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4) and 16 U.S.C. 742f(b)(1)), and the General Services Administration (GSA) Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes (16 U.S.C. 667b).

PURPOSES FOR WHICH ESTABLISHED:

The purposes for which Plum Tree Island NWR was established are:

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (MBCA, 16 U.S.C. 715d);

“...for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” (Fish and Wildlife Act of 1956, 16 U.S.C. 742f(a)(4));

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

“... particular value in carrying out the national migratory bird management program.” (GSA Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes, 16 U.S.C. 667b).

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

The mission of the National Wildlife Refuge System (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 Administration Act of 1966 [16 U.S.C. 668dd–668ee], as amended by the National Wildlife Refuge System Improvement Act of 1997 [Improvement Act][Public Law 105–57]).

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority public use?

The use is the public hunting of waterfowl on the refuge. The species covered by this determination are waterfowl (ducks), sea duck, coot, mergansers, light (snow) geese, Atlantic Brant, and Canada geese. For purposes of this discussion, they are collectively referred to herein as “waterfowl.” The Improvement Act identified hunting as one of the six, priority, wildlife-dependent recreational uses to be facilitated in the Refuge System. The Improvement Act encourages the U.S. Fish and Wildlife Service (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?

Hunting will occur at six designated locations on the Cow Island tract, a 211-acre tract within the 3,502-acre refuge (map 3.4 in the draft Comprehensive Conservation Plan [CCP] and Environmental Assessment [EA]). As new properties are acquired, they will be evaluated for inclusion in the refuge hunt program.

(c) When would the use be conducted?

Hunting opportunities are offered on a limited season, permit-only basis. The refuge is currently open to the hunting of waterfowl on specific days during the last two segments of the State’s season. The use would be conducted in designated areas of the refuge in accordance with Federal, State, and County regulations and seasons (<http://www.dgif.virginia.gov/hunting>; accessed June 2012).

In accordance with the State’s hunting regulations, legal hunting hours are one half-hour before sunrise to one half-hour after sunset. Permitted hunters may enter the refuge no more than one hour before legal hunting time and depart no later than one half-hour after legal hunting time.

(d) How would the use be conducted?

Hunting would take place within the regulatory framework established by Virginia Department of Game and Inland Fisheries (VDGIF) and the Service. The Refuge Manager may, upon annual review of the hunting program and in coordination with VDGIF, impose further restrictions on hunting. Hunting at the refuge is more restrictive than the Commonwealth of Virginia. The refuge coordinates with the VDGIF annually to maintain regulations and programs that are consistent with the State’s management programs. Hunting restrictions may be imposed if hunting conflicts with other priority refuge programs, endangers refuge resources, or public safety. Specific hunt details will be outlined in the annual hunt program.

Hunt Administration

The Service established a Memorandum of Agreement (MOA #50130–11–K006) with VDGIF to administer a quota hunt at the refuge for the 2006 through 2011 waterfowl hunt seasons. This 5-year was renewed for the 2011 through 2016 seasons and is expected to be renewed in the future as appropriate. The agreement covers processing hunter applications, making equitable and random selections of hunters to participate in the hunt, notifying all applicants about the selection outcome, and providing applicant contact information to the Service. There is currently a processing fee to each applicant as reimbursement for services provided; this fee may be modified in the future. Currently, the refuge does not charge a permit fee for hunting.

Refuge waterfowl hunts are advertised on the refuge and VDGIF Web sites (currently found at

http://www.fws.gov/refuge/Plum_Tree_Island and <http://www.dgif.virginia.gov/hunting/quotahunts>, respectively; accessed August 2013), as well as in the annual “Hunting & Trapping in Virginia” regulations digest, published by VDGIF. Participation instructions are included in these announcements. Pre-season or Sunday scouting of the shoreline and blind locations is encouraged; however, access to the island itself is strictly prohibited for scouting. Offshore visual assessments are encouraged in order to help interested parties determine if they want to submit an application to hunt on the refuge.

Hunters wishing to participate in the refuge’s hunt apply through the State’s quota hunt lottery system. Hunters may apply by mail, telephone, or through the VDGIF’s Web site (<http://vaquotahunts.com>). Each selected hunter may be accompanied by two guest hunters, who must acquire a refuge permit to participate in the hunt. Each hunter must complete a “Refuge-specific Hunting Permit Conditions” form, which details requirements of the hunt as identified in 50 CFR 32.66.

Once a refuge hunting permit is obtained from the VDGIF contractor, hunters provide their own means of transporting themselves and gear to one of the six designated blinds at Cow Island. Arrival time can occur an hour prior to sunrise and any time after. Departure time is to occur no later than 30 minutes after the end of legal shooting time.

Hunters must access refuge lands from designated access points. Hunters participating in our waterfowl program are permitted to hunt from one of the six designated hunting locations. The stationary blinds are safely positioned beyond the 500-yard requirement of other refuge blinds and those of adjacent riparian rights owners. We are continually working with the VDGIF to create a public waterfowl hunting program at the refuge that will provide fair, equal, and high quality opportunities for the public.

On any given hunt day, two of our six hunt blinds are inaccessible depending on the wind direction, strength, and tide cycles. Waterfowl hunt participants are offered their choice of the remaining four hunt blinds.

Prohibited activities include, but are not limited to:

- Jump-shooting by foot or boat.
- Having more than one boat or more than one hunting party at a designated hunt location.
- Having more than three people per hunting party, due to blind size and safety considerations.
- Introducing or cutting vegetation for the purposes of concealment in refuge blinds, or any other purpose.
- Use or possession of alcohol.
- Creating fires.

Harvest Limits and Reporting Requirements

Hunters are solely responsible for the retrieval and transport of harvested waterfowl back to their vehicle. The refuge permits hunting within State guidelines in compliance with a hunt program that we may adjust each year to enhance safety and sound wildlife management.

(e) Why is the use being proposed?

The Improvement Act identifies hunting a priority public use that, if compatible, is to receive enhanced consideration over other general public uses. We recognize hunting as a healthy, traditional outdoor past time and an important cultural activity in this area of Virginia. Hunting promotes public understanding and appreciation of natural resources and their management on all lands and waters in the Refuge System.

Hunting is a tool managers use to maintain wildlife populations at an acceptable level. Based on Federal recommendations, the VDGIF establishes State hunting seasons and bag limits to meet population objectives and to offer people the opportunity to experience a traditional outdoor recreational activity. Game species population objectives are determined by a number of factors (such as prior year(s) harvest totals, available habitat, and landowner tolerances), and each year the seasons and bag limits are designed to remove the harvestable surplus without long-term negative impacts to the population. The ability to effectively manage game species populations depends in large part on the availability of land with quality habitat. Providing hunting opportunities on the refuge will aid the Commonwealth and the Service in meeting its management objectives and preserve a wildlife-dependent priority public use long associated with this land.

The Service intends to continue the tradition of wildlife-related recreation on the refuge by allowing hunting in compliance with State and refuge-specific regulations. By allowing this use to continue, hunters can experience this traditional recreational activity, aid the refuge and State in maintaining acceptable game species population levels, gain a better appreciation of the refuge's high quality wildlife habitats, and become better informed about the refuge and the Refuge System.

The Service encourages the development of hunting programs on national wildlife refuges when they are compatible with the refuge's legal purposes, biologically sound, affordable, properly coordinated with other refuge programs, and meet the Service description of a quality hunt. "Quality hunts" are defined as those which are planned, supervised, conducted, and evaluated to promote positive hunting values and ethics such as fair chase and sportsmanship. The Service strives to provide hunting opportunities on refuges which are superior to those available on other public or private lands, and to provide participants with reasonable harvest opportunities, uncrowded conditions, fewer conflicts among hunters, relatively undisturbed wildlife, and limited interference from, or dependence on, mechanized aspects of the sport (605 FW 2).

The refuge opened to public waterfowl hunting for the 1999–2000 season (64 FR 43834; codified at 50 CFR 32.67). Proposed changes to the refuge-specific regulation revisions have been published in the *Federal Register* and Title 50 in the Code of Federal Regulations annually since that time. We prepared a compatibility determination and environmental assessment in 2007 (USFWS 2007). The compatibility determination emphasizes that the objectives for the hunt were to encourage the use of refuge lands for wildlife-dependent public recreation as outlined in various laws, regulations, and Service guidance policies governing the Refuge System, while continuing to provide resting and feeding habitat for wintering waterfowl and other migratory birds.

AVAILABILITY OF RESOURCES:

The financial and staff resources necessary to provide and administer these uses at their current levels are now available. We expect the existing financial resources to continue in the future,

subject to availability of appropriated funds.

The Refuge Recreation Act requires that funds are available for the development, operation, and maintenance of the permitted forms of recreation. The preseason application fee and refuge hunting permit fee are the minimal amounts needed to offset the cost of facilitating the preseason drawings and manage the hunts. Permit fees may need to be adjusted (increased or decreased) and will be evaluated annually.

Current annual administrative costs associated with the existing refuge-supported operations for the waterfowl hunt program are detailed in table B.4. The preseason application portion of the hunt program is administered by VDGIF contractor and is a cost savings to the refuge. No funds are garnered from the refuge hunt permit as there is no fee for the permit. In the 2013–2014 season, the VDGIF contractor received 119 preseason applications, at a cost of \$7.50 for each applicant.

Table B.4 Current Annual Administrative Costs Associated with Public Waterfowl Hunting

Activities	Resource	Annual Duration	Rate¹	Cost
Program review and oversight, approves hunt conditions, submits updated CFR regulations	Refuge Manager (GS-13)	1 hour	\$61/hour	\$ 61
	Deputy Refuge Manager (GS-12)	1 hour	\$43/hour	\$ 43
Site preparation, scheduling, collaborates with VDGIF and contractor, responds to public inquiries, promotes use, administers and defines hunt conditions, authors hunt plan	Wildlife Refuge Specialist (GS-11)	20 hours	\$38/hour	\$ 760
Monitors harvest data, collaborates with VDGIF, defines hunt conditions, assesses waterfowl populations	Wildlife Biologist (GS-11)	5 hours	\$38/hour	\$ 190
Conducts patrols, coordinates with Federal and State conservation officers, defines hunt conditions	Federal Wildlife Officer (GL-09)	16 hours	\$39/hour	\$ 624
Waterfowl blind construction materials, signage, and boat fuel				\$ 200
TOTAL				\$1,764

¹In 2014 dollars, full performance salary.

ANTICIPATED IMPACTS OF THE USE:

Hunting can result in positive or negative impacts to the wildlife resource. A positive effect of allowing visitors’ access to the refuge will be the provision of additional wildlife-dependent recreational opportunities and a better appreciation and more complete understanding of the wildlife and habitats associated with the Chesapeake Bay ecosystems. This can translate into more widespread and stronger support for the refuge, the Refuge System, and the Service.

The use would be conducted at six designated locations on the 211-acre Cow Island tract of the 3,502-acre refuge. In the 2014/2015 season, only 50 visits occurred on the refuge for migratory bird hunting. Thus, our determination considers these factors in our overall analysis. The following is a discussion of refuge-specific impacts, which is supported by a compilation of baseline information relative to the featured topic.

Air Quality

Emissions from motorized boats used by refuge staff to prepare and maintain waterfowl hunt blinds, as well as by waterfowl hunt participants, would result in direct, negligible, short-term impacts on local air quality. Any adverse air quality effects from the refuge's waterfowl hunt activities would be more than offset by the benefits of maintaining the refuge in natural vegetation. The hunting program would not violate Environmental Protection Agency (EPA) standards and would comply with the Clean Air Act.

Water Quality

The refuge's waterfowl hunt would result in negligible, direct, short-term adverse impacts on local water resources. Refuge waterfowl hunt participants and staff maintaining the waterfowl hunt blinds would access Cow Island by motor boat. Motor boats have a wide variety of physical, chemical, and biological impacts on water resources, including resuspension of sediments, introduction of hydrocarbon compounds into the water column and sediments, and damage to aquatic organisms (Mosisch and Arthington 1998). We would minimize impacts on local water quality by limiting public access to the refuge waterfowl hunt blinds on Cow Island and to the dates of the waterfowl hunt. The hunting program would not violate Federal or State standards for contributing pollutants to water sources and would comply with the Clean Water Act.

Non-toxic shot is required for all waterfowl hunting. Public outreach and education on littering and proper waste disposal will lessen potential for adverse impacts on local water quality.

Soils

The refuge's waterfowl hunt would have negligible, direct, short-term, local impacts on refuge soils. Coastal soils develop under dynamic conditions and are vulnerable to disruption by human activities (Gedan et al. 2009). Boating to the waterfowl hunt blinds would create boat wakes that could destabilize loose soils and damage native plants (Mosisch and Arthington 1998) resulting in increased loss of refuge soils from erosion. Foot traffic on the shore of Cow Island would cause soil compaction and impacts to dune vegetation, which is vulnerable to trampling (Liddle and Greig-Smith 1975). We would minimize impacts by limiting the number of public hunt days to no more than 30 annually, designating specific hunt locations, and limiting the number of boats and hunters at each hunt location.

Vegetation

The refuge's waterfowl hunt would result in negligible, direct, short-term impacts on vegetation near each of the hunt blinds on Cow Island. Compaction of soils and trampling of vegetation may result from hunt participants accessing the refuge's hunt blinds, anchoring boats, or retrieving waterfowl. To avoid or minimize the potential for adverse impacts on refuge vegetation, we would limit waterfowl hunting to no more than 30 days within the State's waterfowl hunt season (late October through late January) and allow the use of one retrieval dog per hunting party. Vegetation is dormant through most of this hunting season, thereby limiting the potential for permanent loss or damage to vegetation.

Birds

The refuge's waterfowl hunt would continue to result in a negligible, direct, short-term impact on waterfowl species that are permitted to be hunted. The harvesting of wildlife on refuges is carefully regulated to ensure equilibrium between population levels and wildlife habitat. Prior to opening to waterfowl hunting for the 1999/2000 season, the Service's Office of Migratory Birds determined that sufficient populations of waterfowl existed to permit hunting at Plum Tree Island

NWR (USFWS 1999).

The resident Canada goose population increased significantly during the 1980s and early 1990s. The population peaked at over 260,000 geese in the mid- to late-1990s in Virginia and has been steadily reduced by specific management programs since that time. The current population estimate is 158,267 (+/- 28 percent) in Virginia and over 1 million in the Atlantic Flyway. For migrant Canada geese, the breeding population estimate for 2012 (190,340) is similar to the past 3-year average (189,317)

(http://www.dgif.virginia.gov/hunting/va_game_wildlife/waterfowlfactsheets.pdf).

Liberal duck seasons (60 days, 6-bird bag limit) and resident goose seasons have resulted in higher waterfowl harvests in Virginia during the past 10 years. Harvest has averaged approximately 150,000 ducks and 60,000 geese from 2000 to 2011, compared to 114,770 ducks and 25,000 geese during the 1990s (figures B.1 and B.2). The long season length and liberal bags offer greater opportunity and a greater cumulative harvest over the course of the season.

Waterfowl hunter numbers in Virginia have been generally stable since the late 1990s, and Federal Duck Stamp sales have averaged 23,390 in Virginia (for 5-year period, 2006 to 2010). Since 1999, the Harvest Information Program (HIP) has been used to estimate hunter effort and harvest. The average number of duck and goose hunters over the past 3 years, as measured by HIP, was 13,618 and 12,360 respectively.

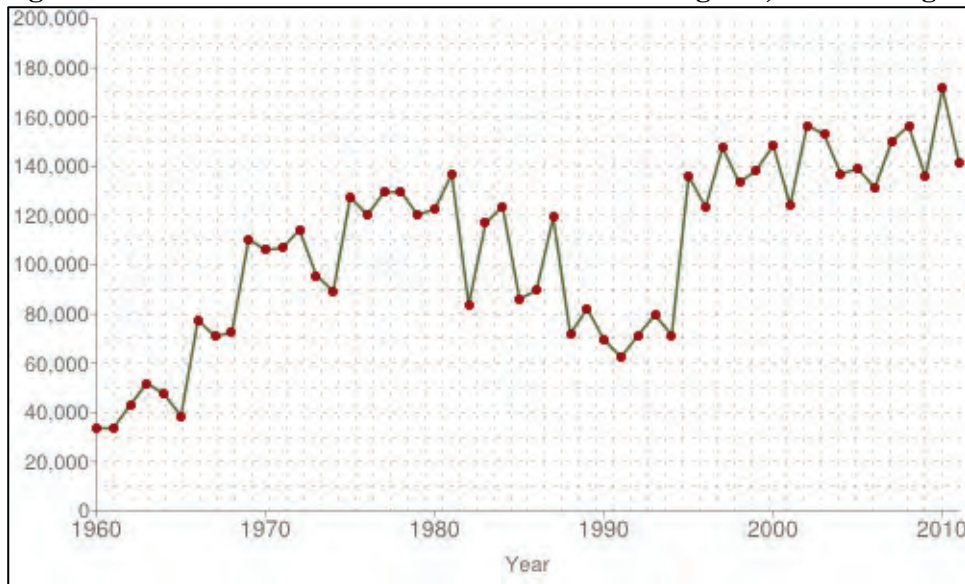
Data collected from Plum Tree Island NWR waterfowl hunt participants during the 2009 to 2012 seasons indicates approximately 1.25 ducks or geese per hunter use day (USFWS 2012); the national seasonal harvest average is 2.3 ducks or geese per hunter use day. Since hunt participation during that time period was only approximately 24 percent, this means that one hunter participates on each day of the refuge waterfowl hunt and only harvests one duck or goose on each of those days; approximately 24 ducks or geese are harvested by refuge waterfowl hunt participants annually. Additional details are provided in table B.5.

Potential contributing factors to low participation rates include: unfamiliarity with the hunt unit, due to distance from residence (over 60 percent of selectees reside more than 60 miles away from the refuge); dates selected are not convenient with selectees availability; lack of incentive to participate in a “no permit fee” hunt; weather was non-conducive; and hunter health and boat issues. Possible reasons for low duck/geese harvest ratio include less than prime wetland habitat, weather factors, and inexperience of the hunter.

Given the exceptionally low numbers of waterfowl harvested from the refuge in respect to the total statewide harvest and waterfowl population, no cumulative impacts to local, regional, or statewide populations of ducks or geese are anticipated from hunting on the refuge.

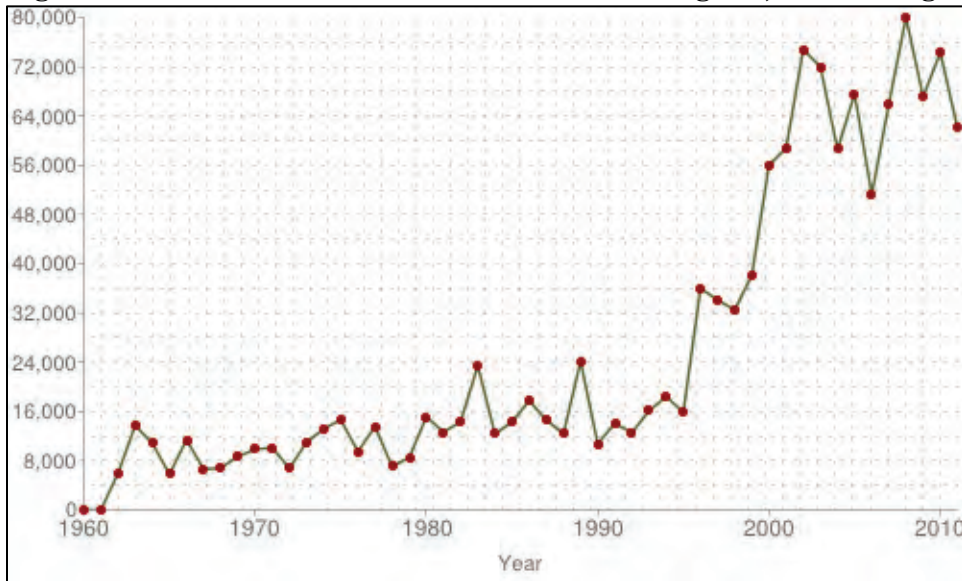
The hunt program would have minor, direct, short-term impacts on non-target birds because hunting season occurs outside of the breeding and migratory seasons for shorebirds and waterbirds. Impacts would be minimized by enforcement of State and Federal regulations, including the use of non-toxic shot for waterfowl hunting (4VAC15-260-140 and 50 CFR 20.21, respectively), and refuge-specific regulations that limit the number of public hunt days, hunt

Figure B.1 Total Number of Ducks Harvested in Virginia, 1960 through 2010



(<http://www.flyways.us/regulations-and-harvest/harvest-trends>)

Figure B.2 Total Number of Geese Harvested in Virginia, 1960 through 2010



(<http://www.flyways.us/regulations-and-harvest/harvest-trends>)

Table B.5 Self-reported Waterfowl Harvest for Plum Tree Island NWR, 2009 through 2012

Season	Total Harvest Reported	Species Harvested
2009/2010	26 birds	bufflehead, Canada goose, merganser, scoter, gadwall, ruddy duck, pintail
2010/2011	18 birds	bufflehead, mallard, gadwall, scaup, pintail
2011/2012	22 birds	bufflehead, Canada goose, merganser, mallard, gadwall, ruddy duck, coot

locations, hunting party composition, and hunting practices (50 CFR 32.66). We limit human disturbance in the majority of the refuge by only allowing waterfowl hunting to occur at six designated locations on Cow Island; up to 211 acres of the 3,502-acre refuge are subject to human disturbance on each of the up to 30 waterfowl hunting days annually. On non-hunting days, waterfowl can rest, feed, and move throughout the entire refuge without the influence of human disturbance.

Fisheries

The refuge's waterfowl hunt would result in minor, direct and indirect, short and long-term adverse impacts on fisheries. Refuge waterfowl hunt participants and staff maintaining the waterfowl hunt blinds would access Cow Island by motor boat. Motor boats have a wide variety of physical, chemical, and biological impacts on fish species and their habitats, including resuspension of sediments, introduction of hydrocarbon compounds into the water column and sediments, and damage to aquatic organisms (Mosisch and Arthington 1998). In shallow waters, human actions can negatively impact fish due to the instinctual survival response of the species. When in close proximity to humans, fish will react by fleeing and discontinue their current activity (feeding or resting). We would minimize impacts on fishery species by limiting public access to the refuge to the refuge waterfowl hunt blinds on Cow Island and to the dates of the waterfowl hunt.

Mammals

The hunt program would have minor, direct, short-term impacts on mammals. Impacts would be minimized by enforcement of State and Federal regulations, including refuge-specific regulations that limit the number of public hunt days, hunt locations, hunting party composition, and hunting practices (50 CFR 32.66). Each hunting party is allowed to have one retrieval dogs; however, retrieval dogs should be under the control of their owners and interactions with refuge mammals should be minimal (USFWS 2007). We limit human disturbance in the majority of the refuge by only allowing waterfowl hunting to occur at six designated locations on Cow Island; up to 211 acres of the 3,502-acre refuge are subject to human disturbance on each of the up to 30 waterfowl hunting days annually. On non-hunting days, mammals can rest, feed, and move throughout the entire refuge without the influence of human disturbance.

Public Use and Access

Continuing to offer limited waterfowl hunting opportunities on the refuge provides a negligible, direct, short-term benefit on the hunting community within the lower Chesapeake Bay area, particularly for individuals who are not members of private hunt clubs, do not maintain stationary or float blinds, or are new to hunting (Brame 2014 personal communication). Prior to opening Cow Island to limited waterfowl hunting, there were no publicly owned, traditional hunting lands in eastern Poquoson (USFWS 1999). Cow Island was opened to waterfowl hunting in 1999 because this use was determined to not materially detract from the refuge's purposes.

Administrative changes to our existing waterfowl hunting program would provide minor, direct, long-term benefit to the local waterfowl hunting community because a greater number of hunters would be able to participate in our hunt days. Data collected during the 2009 to 2012 season indicates that only 24 percent of lottery-selected hunters actually participate in the refuge's waterfowl hunt. If we make changes to the way we administer the hunt, we anticipate increasing hunter participation. For example, one administrative change we could make to the program would be to offer interested hunters the opportunity to hunt if the lottery-selected hunter does not report to the refuge on their specified hunt day. Making these opportunities available to local, interested waterfowl hunters would improve our hunt participation and satisfy the public's desire

for more waterfowl hunting opportunities on the refuge (Brame 2014 personal communication). A second change to our existing waterfowl hunt program would be to promote Apprentice Hunter opportunities. This means that an experienced waterfowl hunter would share their knowledge and experience with less experienced hunters. Since we allow hunting parties to be comprised of up to three hunters per hunt location, we could help waterfowl hunters of all different experience levels get to know each other and hunt together cooperatively. Additionally, we would offer one youth waterfowl hunt day annually. The additional emphasis on youth involvement would provide minor, direct, local, short-term benefits to the local waterfowl hunting community because young hunters would otherwise not have any opportunities to hunt on public lands. Youth participation in the refuge's waterfowl hunt would connect young sportsmen to the natural world.

Opening the refuge to four new public use opportunities, as well as constructing a wildlife observation platform/waterfowl hunting blind and allowing commercially guided tours, at a designated public use area on Cow Island satisfies the public's interest to participate in these activities on the refuge. Since its establishment, the public has expressed interest in being able to safely visit the refuge to enjoy the beauty of its scenery, observe the diversity of wildlife and habitats, and be enveloped in the relaxing atmosphere of boating on the Chesapeake Bay. These new public use opportunities on the Cow Island would provide a moderate, direct, long-term benefit to communities in or visiting the lower Chesapeake Bay.

Overall, the increased public awareness and promotion of public use programs allowed on the refuge, specifically hunting, would provide a negligible, direct, local benefit to the interested public. When we expand visitor use public uses, more people would become aware that low levels of visitation may be deemed to be compatible with the habitat and wildlife management objectives for this refuge.

Cultural Resources

Refuge visitors may inadvertently or even intentionally damage or disturb known or undiscovered cultural artifacts or historic properties. We would continue our vigilance in looking for this problem, use law enforcement where necessary, and continue our outreach and education efforts with local Virginia Indian Tribes and the National Park Service.

Socioeconomics

The refuge's limited waterfowl hunting opportunities provide a negligible, direct, long-term benefit to the local economy because hunt participants purchase supplies, food, and lodging in the vicinity of the refuge. A 2001 study found that hunting generates \$25 billion (all figures are in 2001 dollars) in retail sales in the U.S., \$17 billion in salaries and wages, and employs 575,000 Americans, as well as generates sales tax, state income tax, and Federal income tax revenues for government agencies (International Association of Fish and Wildlife Agencies 2002). That same study found that, on average, each hunter spends approximately \$1,900 on hunting-related expenditures.

The 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation found that in Virginia, hunters 16 years and older spent \$877 million, of which nearly \$300 million was related to trip expenses; the remainder was for equipment and other expenses. On average, hunters were found to spend \$2,000 a year on hunting, or an average of \$30 per day (USDOI et al. 2013).

PUBLIC REVIEW AND COMMENT:

As part of the CCP process for Plum Tree Island NWR, this compatibility determination will undergo a public review and comment period of 60 days following the release of the draft CCP and EA.

DETERMINATION (CHECK ONE BELOW):

- Use is not compatible
- Use is compatible, with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Stipulations to ensure compatibility are:

- Hunters must abide by all applicable Federal, State, and refuge-specific regulations. Refuge-specific regulations are published annually in the *Federal Register*, 50 CFR, and on a form that hunters must sign prior to being issued a hunt permit.
- We allow hunting of migratory waterfowl on designated areas of the refuge in accordance with State regulations.
- We require hunters to possess and carry a current refuge hunting permit along with their State hunting license and state and federal migratory bird stamps, while hunting migratory game birds on the refuge.
- We require migratory game bird hunters to obtain a permit through a lottery administered by the VDGIF. We mail permits to successful applicants.
- We prohibit jump-shooting by foot or boat. All hunting must take place from a blind as determined by the hunting permit.
- We allow only one boat and hunting party at each of the hunting locations. Each hunting party is comprised of up to three hunters due to blind size and safety considerations.
- An adult age 21 or older, possessing and carrying a valid hunting license and refuge hunting permit, must accompany and directly control youth hunters ages 12 to 17. Unless participating in a designated youth waterfowl hunting opportunity, we prohibit persons younger than age 12 to hunt on the refuge.

JUSTIFICATION:

Hunting is a priority public use and is to receive enhanced consideration on refuges, according to the Improvement Act. Providing increased wildlife-dependent recreational opportunities at Plum Tree Island NWR promotes visitor appreciation and support for the refuge, Refuge System, and Service; engages communities in local habitat conservation efforts in the Chesapeake Bay; and instills a sense of ownership and stewardship ethic in refuge visitors.

Hunting, as described above, will not detract from the purpose and intent of the refuge.

Stipulations described will ensure proper control over the use and provide management flexibility should detrimental impact develop. Allowing this use furthers the mission of the Refuge System and Service by expanding opportunities for wildlife dependent uses when compatible and consistent with sound fish and wildlife management. We have determined that hunting will not materially interfere with, or detract from, the fulfillment of the Refuge System mission or the purposes for which the refuge was established.

SIGNATURE:

Refuge Manager: _____
(Signature) (Date)

CONCURRENCE:

Regional Chief: _____
(Signature) (Date)

MANDATORY 15 YEAR RE-EVALUATION DATE: _____

LITERATURE CITED:

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Tree Island National Wildlife Refuge, Poquoson, Virginia, Data Collected from the 2009–2012 Seasons.

United States Public Law 105–57. 105th Congress, 1st session. October 9, 1997. National Wildlife Refuge System Improvement Act of 1997.

COMPATIBILITY DETERMINATION

USE:

Wildlife Observation, Photography, Environmental Education, and Interpretation

REFUGE NAME:

Plum Tree Island National Wildlife Refuge

ESTABLISHMENT DATE:

April 24, 1972

ESTABLISHING AND ACQUISITION AUTHORITIES:

Plum Tree Island National Wildlife Refuge (NWR, refuge) was established under authority of the Migratory Bird Conservation Act (MBCA; 16 U.S.C. 715d), the Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4) and 16 U.S.C. 742f(b)(1)), and the General Services Administration (GSA) Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes (16 U.S.C. 667b).

PURPOSES FOR WHICH ESTABLISHED:

The purposes for which Plum Tree Island NWR was established are:

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (MBCA, 16 U.S.C. 715d);

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” (Fish and Wildlife Act of 1956, 16 U.S.C. 742f(a)(4));

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

“... particular value in carrying out the national migratory bird management program.” (GSA Transfer Authority—An act authorizing the transfer of certain real property for wildlife, or other purposes, 16 U.S.C. 667b).

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

The mission of the National Wildlife Refuge System (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 Administration Act of 1966 [16 U.S.C. 668dd–668ee], as amended by the National Wildlife Refuge System Improvement Act of 1997 [Improvement Act][Public Law 105–57]).

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority public use?

The uses are wildlife observation, photography, environmental education, and interpretation. The Improvement Act identified these uses as four of the six, priority, wildlife-dependent recreational uses to be facilitated in the Refuge System. The Improvement Act encourages the U.S. Fish and Wildlife Service (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?

The use would occur at one designated public use area on refuge lands (map 3.4 in the draft Comprehensive Conservation Plan [CCP] and Environmental Assessment [EA]). The designated kayak and canoe landing area is a sandy beach spit, located at the northwest corner of Cow Island and bounded by the confluence of the Poquoson River and Bennett Creek to the north and west, and maritime shrubland and dune habitat to the south and east. The shallow waters and flat beach at this site make getting in and out of kayaks and canoes easy. These waterways and natural landform features also serve as natural boundaries to the designated public use area and would be complemented by informational signage as needed.

Currently, one of the refuge's waterfowl hunt blinds (blind #2) is located at this site. The existing waterfowl hunt blind would be transformed to serve as a wildlife observation platform for approximately 9 months of the year (early February through late October) and waterfowl hunt blind for approximately 3 months of the year (late October through late January). Where possible, interpretive media to support non-commercial and commercially guided wildlife observation, photography, environmental education, and interpretation opportunities on the refuge would be developed and installed on the wildlife observation platform/waterfowl hunt blind.

No activities will be allowed in areas that may adversely impact any federally threatened or endangered species. The known presence of a threatened or endangered species will preclude any new use of an area until the Refuge Manager determines otherwise.

All other areas on Plum Tree Island NWR would remain closed to public access.

(c) When would the use be conducted?

As recommended in our draft CCP and EA, these four public uses may occur in the designated public use area between early February and late October, from sunrise to sunset. Preapproved special use permits (SUPs) will not be required for non-commercially guided individuals or visitors in groups of 10 or less for these 4 uses once public use facilities have been constructed, improved, or enhanced to support increased refuge visitation. SUPs are required for groups of 10 or more people. When needed, additional time-of-year restrictions will be imposed to ensure compliance with purposes for which the refuge was established.

Refuge- and partner-sponsored public use programs will be scheduled on a case-by-case basis.

(d) How would the use be conducted?

The refuge's designated public use area is only accessible by boat.

In our draft CCP and EA, we propose that:

- Once infrastructure to support increased refuge visitation is constructed, improved, or

enhanced, visitors in groups of 10 or less will not be required to obtain a general SUP in advance of participating in wildlife observation, photography, environmental education, or interpretation within the refuge's designated public use area.

- Visitors traveling by boat may beach and anchor boats at a designated public use area on Cow Island.
- Directional and informational signage will inform visitors about where and how to conduct these uses on the refuge.

Contingent on available staffing and funding, the draft CCP and EA also calls for expanding or enhancing these four priority public uses through a variety of methods including, but not limited to, the following:

- Develop the existing partnership with the National Park Service (NPS) for natural and cultural resource interpretation and protection along the Captain John Smith Chesapeake National Historic Trail.
- Coordinate with local schools and pursue partnerships to establish regular visitation and introduce community youth to the natural resources within their city and county through environmental education and interpretive programs.

Individuals or Small Groups

Wildlife observation, photography, environmental education, and interpretive experiences occur on an individual or group basis. To accommodate other users and promote a positive wildlife observation experience, we encourage smaller group sizes (i.e., less than 10 members). The refuge will not require advanced notice to request a general SUP for individuals or groups of less than 10 members interested in using the designated public use areas for wildlife observation, photography, environmental education, or interpretation.

Large Groups

Groups larger than 10 persons must contact the refuge office no less than 5 business days prior to the date proposed for visiting the refuge so that the refuge can determine if the group can be accommodated. A general SUP may be required. The general SUP application will be mailed, emailed, or faxed to the applicant upon request. The Refuge Manager, or his designee, will evaluate the general SUP application and determine if a permit will be issued. If approved, the applicant will be sent an approved general SUP and informed that the applicant must have a copy of the permit in his/her possession while visiting the refuge. If a permit application is denied, the applicant will be informed of the basis for permit denial.

A general SUP is not required for individuals participating in refuge- or partner-sponsored programs that are advertised in local publications and on the refuge Web site (http://www.fws.gov/refuge/plum_tree_island/). Participation instructions are included in these announcements.

Participation by visitors in partner-sponsored events or programs does not require a general SUP if the partner organization has been issued a general SUP for the event or program because program sponsors request a general SUP on behalf of program participants. A general SUP may be issued to an individual; a group (e.g., birding club, Virginia Master Naturalists); or a formally recognized Service partner organization or agency (e.g., Richmond Audubon Society, NPS)

sponsoring a wildlife-dependent recreational use program.

Refuge staff and partners communicate directly with visitors in advance of sponsored programs or during their visit. Maps, brochures, and site information is provided to the participating visitor or made available by other means (e.g., trail kiosks, refuge Web site).

(e) Why is the use being proposed?

The Improvement Act identifies these four uses as priority public uses that, if compatible, are to receive enhanced consideration over other general public uses. Offering all four of these priority public uses at Plum Tree Island NWR will facilitate public enjoyment of and advocacy for the refuge, the Refuge System, and the Service mission. In the draft CCP and EA, we propose to enhance opportunity for wildlife observation, photography, environmental education, and interpretation programs.

These uses will provide opportunities for visitors to observe and learn about wildlife and wild lands in both structured and unstructured environments, and observe wildlife in their natural habitats. These four priority uses provide visitors the chance to enjoy refuge resources and gain a better understanding and appreciation of fish and wildlife, wild lands ecology, the relationships of plant and animal populations in an ecosystem, and wildlife management. These activities will help visitors better understand how they affect wildlife and other natural resources, and demonstrate the Service's role in conservation and restoration.

Photographers will gain opportunities to photograph wildlife in its natural habitat. These opportunities will increase the publicity and advocacy of Service programs. Photography provides wholesome, safe, outdoor recreation in a scenic setting, and entices those who come strictly for recreational enjoyment to participate in the educational facets of our public use program and become advocates for the refuge and the Service.

Visitors need a way to access these priority uses. By allowing visitors to access a designated area of the refuge, we are providing access to these important priority public uses with minimal impacts to sensitive wildlife and habitat.

AVAILABILITY OF RESOURCES:

The financial and staff resources necessary to provide and administer these uses at their current levels are now available. We expect the existing financial resources to continue in the future, subject to availability of appropriated funds. Recommendations detailed in the final CCP and Visitor Services step-down plan would identify strategies for implementation.

Current annual administrative costs associated with the existing refuge-supported operations for wildlife observation, photography, environmental education, and interpretation programming are small due to the limited scope of use. The largest costs would be associated with new construction and sign installation. These capital costs are described in appendix D of the draft CCP and EA.

Staff time associated with administration and regulatory enforcement of this use is related to assessing the need for maintaining kiosks, maintaining sign-posting, informing the public about new refuge uses, conducting visitor use surveys, analyzing visitor use patterns, monitoring the effects of public uses on refuge resources and visitors, and providing information to the public about the use.

Funding for visitor improvements comes from a variety of sources including general management capability funds, visitor facility enhancement projects, grant funds, contributions, and special project funds. We will complete and maintain projects and facilities as funds become available, and use volunteers and partners to help in construction and maintenance when appropriate.

Once a visitor services plan is completed and support infrastructure erected, cost for administering the wildlife observation, photography, environmental education and interpretive program will be easier to assess.

ANTICIPATED IMPACTS OF THE USE:

The public use program on the refuge is affected by Service policy to ensure that the biological integrity, diversity, and environmental health (BIDEH) of the Refuge System are maintained for the benefit of present and future generations of Americans. The Service policy on BIDEH (601 FW 3) provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on national wildlife refuges and associated ecosystems. As a result, the final CCP may also include new objectives to protect non-avian wildlife and their habitats, including state and federally listed species (e.g., northeastern beach tiger beetle). All refuge-specific goals, objectives, and strategies will be developed within the context of the refuge's establishing purpose, anticipated effects of climate change, and using the strategic habitat conservation approach.

In an effort to consider and protect the broad spectrum of fish, wildlife, and habitats present at Plum Tree Island NWR, adverse impacts to the refuge's BIDEH will be avoided or minimized when implementing public use programs by establishing stipulations that control the use context, intensity, and duration.

Air Quality

Interpretation of the refuge's habitats would provide a negligible, indirect, long-term beneficial impact on refuge air quality. At the designated public use area, interpretation programs explaining the important role that salt marsh vegetation plays in air and water purification, storm abatement, flood control, and nutrient cycling have the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Increased fuel-burning equipment use by refuge visitors, refuge staff, and law enforcement officers would result in negligible to minor, direct, short- and long-term adverse impacts on local air quality. Transformation of the existing waterfowl hunt blind (#2) on Cow Island would require the use of motorized boats to transport equipment and materials for the new structure, resulting in negligible, short-term impacts to local air quality. In the long-term, the increased participation in the refuge's waterfowl hunt and designation of one public use area on Cow Island would result in an increase in vehicular traffic to parking lots located adjacent to the refuge and motorized boat traffic on the waters surrounding the refuge. We would promote use of non-motorized boats and visiting the refuge with commercial tour service providers because they could accommodate up to 15 refuge visitors per trip. Increased visitation and public access infrastructure would require an increased staff presence for maintenance and law enforcement activities; one or two additional vehicles would travel to Poquoson from refuge offices in either Warsaw or Charles City, Virginia to park in lots adjacent to the refuge a minimum of once a month.

Water Quality

Interpretation of the refuge's habitats would provide a negligible, indirect, long-term beneficial impact on refuge water resources. At the designated public use area, interpretation programs explaining the important role that salt marsh vegetation plays in air and water purification, storm abatement, flood control, and nutrient cycling have the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on water quality. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. Construction activities would include motorized boat landing on the shore, staging materials, installing posts, and constructing the structure. Construction activities would be completed in less than a month. We would illustrate and promote conservation principles by incorporating ecologically sensitive design concepts, using sustainable construction materials, and employing best management practices. The footprint of the wildlife observation platform and waterfowl hunt blind would be sufficient to support up to 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. This increased access would result in increased soil destabilization and erosion, as well as damage to native plants. We would use signage to clearly delineate the bounds of the designated public use area, and we would monitor conditions at the designated public use area. Regularly conducting quantitative shoreline surveys would allow us to determine if additional management actions are necessary to protect water quality.

Soils

Interpretation of the refuge's habitats would provide a negligible, indirect, long-term beneficial impact on refuge soils. At the designated public use area, interpretation programs explaining the important role that salt marsh soils plays in air and water purification, storm abatement, flood control, and nutrient cycling have the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on soils. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. Construction activities would include motorized boat landing on the shore, staging materials, installing posts, and constructing the structure. Construction activities would be completed in less than a month. We would illustrate and promote conservation principles by incorporating ecologically sensitive design concepts, using sustainable construction materials, and employing best management practices. The footprint of the wildlife observation platform and waterfowl hunt blind would be sufficient to support up to 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and

commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. This increased use would result in increased soil destabilization and erosion, as well as damage to native plants. We would use signage to clearly delineate the bounds of the designated public use area, and we would monitor soil conditions at the designated public use area. Regularly conducting quantitative shoreline surveys would allow us to determine if additional management actions are necessary to protect soils.

Vegetation

Interpretation of the refuge's habitats would provide a negligible, indirect, long-term impact on refuge vegetation. At the designated public use area, interpretation programs explaining the important role that salt marsh vegetation plays in air and water purification, storm abatement, flood control, and nutrient cycling have the potential to reach the local community and beyond. These programs can develop a greater appreciation for the refuge's habitats and the plants therein, thus encouraging native vegetation conservation.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on refuge vegetation. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. Construction activities would include motorized boat landing on the shore, staging materials, installing posts, and constructing the structure. Construction activities would be completed in less than a month. We would illustrate and promote conservation principles by incorporating ecologically sensitive design concepts, using sustainable construction materials, and employing best management practices. The footprint of the wildlife observation platform and waterfowl hunt blind would be sufficient to support up to 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. This increased use would result in increased soil destabilization and erosion, as well as damage to native plants. We would use signage to clearly delineate the bounds of the designated public use area, and we would monitor vegetation condition at the designated public use area. Regularly conducting quantitative shoreline surveys would allow us to determine if additional management actions are necessary to protect vegetation.

Birds

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to bird populations. Observing birds and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Designating kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on birds. Since the refuge is only open to limited waterfowl hunting, birds on the refuge experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and

waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. The time of year when access occurs can greatly impact birds that have historically used closed areas for foraging, nesting, or roosting (ACJV 2008). To minimize disturbance of birds in adjacent areas, we would clearly mark the boundaries of the designated public use area. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities.

Fisheries

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to fish populations. Observing fish and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on fishery species. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities. In an effort to avoid or minimize the potential for expanded long-term adverse impacts to fishery species and their habitats, we would monitor conditions at this landing and viewing site.

Mammals

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to mammal populations. Observing mammals and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on mammals. Since the refuge is only open to limited waterfowl hunting, mammals on the refuge currently experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. Human disturbance would potentially cause mammals to flee (Knight and Cole 1991). Females with young are more likely to flee from disturbance than those without young (Hammit and Cole 1998). To minimize disturbance of mammals in adjacent areas, we would clearly mark the boundaries of the designated public use area. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality,

wildlife-watching opportunities.

Reptiles

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to reptile populations. Observing reptile and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on reptiles. Since the refuge is only open to limited waterfowl hunting, reptiles on the refuge currently experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. Human disturbance would potentially cause reptiles to flee. Because reptiles are relatively small and can easily be captured, losing species to collectors is a possibility and threat to viable populations. The time of year when access occurs can greatly impact reptiles that have historically used the area. Reptiles are more active in the warmer months, and we anticipate public use would also be highest during the warmer months. To minimize disturbance of reptiles in adjacent areas, we would clearly mark the boundaries of the designated public use area. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality, wildlife-watching opportunities.

Invertebrates

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually at a designated public use area on Cow Island would provide negligible, indirect, regional, long-term benefits to invertebrate populations. Observing invertebrates and their habitats first-hand enhances one's understanding of the habitat needs of wildlife, which can promote an appreciation for, and connection with, nature.

Designating a kayak and canoe landing area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on invertebrates. Since the refuge is only open to limited waterfowl hunting, mammals on the refuge currently experience the lowest level of disturbance possible. In the short term, transforming waterfowl hunt blind #2 on Cow Island to also serve as a wildlife observation platform would disturb soils, increase sedimentation, destroy plants, and temporarily displace wildlife in the immediate area for the duration of construction activities. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. This increase in boat traffic along the north side of Cow Island has strong potential to directly impact the submerged aquatic vegetation that occurs in the highest density class (<http://web.vims.edu/bio/sav/index.html>; accessed January 2016) as well as shallow sand and mud flats that have been documented as important to the blue crab production in adjoining salt marshes (http://www.vims.edu/people/seitz_rd/pubs/lipcius_et_al_crab_Seagr_2005.pdf; accessed January 2016). Degradation of this habitat would have minor indirect impacts on the crab

population of Plum Tree Island NWR because we are limiting public use to a landing and viewing site.

Human disturbance would only minimally impact invertebrates because of their ability to flee. The time of year when access occurs can greatly impact invertebrates that have historically used the area. Invertebrates are more active in the warmer months, and we anticipate public use would also be highest during the warmer months. It is critically important that we not adversely affect habitats occupied by the federally threatened tiger beetle. During the summer of 2014, refuge staff conducted a site visit to the waterfowl hunting blind location #2 on Cow Island, where we propose to open to wildlife observation, photography, environmental education, and interpretation by non-commercial and commercial service providers. Although the proposed site is a sandy beach spit, refuge staff determined that there is no northeastern beach tiger beetle population at this site and no population in close proximity that would likely re-establish here (Mowbray and Brame 2014 personal communications). Our Ecological Services Office staff confirmed our findings and recommended periodic monitoring at this location to assess beetle use of the area (Drummond 2014 personal communication). Use of the designated public use area would be modified if necessary to protect the northeastern beach tiger beetle.

Public Access and Use

Opening the refuge to four new public uses and providing up to two refuge-sponsored interpretive programs annually, at a designated public use area on Cow Island would have minor to moderate, direct, local, long-term benefits to those who want to engage in these activities on the refuge. Since refuge establishment, the public has expressed interest in being able to safely visit the refuge to enjoy the beauty of its scenery, observe the diversity of wildlife and habitats, and be enveloped in the relaxing atmosphere of boating on the Chesapeake Bay.

Overall, the increased public awareness and promotion of public use programs allowed on the refuge, specifically hunting, would provide a negligible, direct, local benefit to the interested public. When we expand visitor use public uses, more people would become aware that low levels of visitation (up to 15 people at any one time) have been deemed to be compatible with the habitat and wildlife management objectives for this refuge.

Potential for conflict exists primarily between commercial and non-commercial wildlife observation, photography, environmental education, and interpretation visitors at the designated public use area. The kayak and canoe landing area and viewing platform can reasonably accommodate up to 15 individuals to enjoy a quality wildlife observation experience. To minimize the potential for conflict, we prepared compatible use stipulations for these commercial and non-commercial public uses, and we expect that participants will comply with the stipulations.

Cultural Resources

Refuge visitors may inadvertently or even intentionally damage or disturb known or undiscovered cultural artifacts or historic properties. We would continue our vigilance in looking for this problem, use law enforcement where necessary, and continue our outreach and education efforts with local Virginia Indian Tribes and the NPS.

Socioeconomics

Opening the refuge to non-commercial and commercial wildlife observation, photography, environmental education, and interpretation programs on Cow Island would have minor to moderate, indirect, long-term impacts on the local economy. Although the City of Poquoson has

realized an increase in recreation expenditures since 1996, total expenditures were 11 percent below the average level of expenditures incurred by other Virginia localities (City of Poquoson 2008). Opening the refuge to these new uses is consistent with the City's Comprehensive Management Plan (2008), which states that "Poquoson's waterways are an asset and should be protected, maintained and accessible for both commercial and recreational uses." Economic benefit would be gained by any local businesses providing guided wildlife observation, photography, environmental education, and interpretation tour services or businesses that rent or sell items in support of those services (e.g., watercraft, fuel, snacks, bird guides).

PUBLIC REVIEW AND COMMENT:

As part of the CCP process for Plum Tree Island NWR, this compatibility determination will undergo a public review and comment period of 60 days following the release of the draft CCP and EA.

DETERMINATION (CHECK ONE BELOW):

- Use is not compatible
- Use is compatible, with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Stipulations to ensure compatibility include:

- Plum Tree Island NWR regulations will be posted and enforced. Closed areas will remain for the bulk of the property, posted, and enforced. Signs necessary for visitor information, directions, and safety will be kept current.
- Access to the refuge solely for the purpose of wildlife observation, photography, environmental education, or interpretation is only compatible at one designated public use area on Cow Island.
- To promote public safety, accommodate other users, and reduce wildlife disturbance, groups of 10 or more persons must apply for and be issued a general SUP. Visitor group sizes and visitation frequency may be limited during sensitive time periods for wildlife or in sensitive locations (i.e., wetlands).
- Refuge- or partner-sponsored events and programming may require preregistration.
- We will evaluate sites and programs as needed to assess whether objectives are being met and to prevent site degradation. If evidence of unacceptable adverse impacts appears, the location(s) of activities will be rotated with secondary sites, curtailed, or discontinued.
- Best management practices will be used to avoid introductions of non-native, invasive plant species.
- The refuge is a leave-no-trace, carry-in/carry-out facility. All food containers, bottles, and other waste and refuse must be taken out.

JUSTIFICATION:

Wildlife observation, photography, environmental education, and interpretation are all priority public uses and are to receive enhanced consideration on refuges, according to the Improvement Act. Providing increased wildlife-dependent recreational opportunities at Plum Tree Island NWR promotes visitor appreciation and support for the refuge, Refuge System, and Service mission; engages communities in local habitat conservation efforts in the Chesapeake Bay; and instills a sense of ownership and stewardship ethic in refuge visitors.

Wildlife observation, photography, environmental education, and interpretation, as described above, will not detract from the purpose and intent of the refuge. Stipulations described will ensure proper control over the use and provide management flexibility should detrimental impacts develop. Allowing this use further the missions of the Refuge System and Service by expanding opportunities for wildlife dependent uses when compatible and consistent with sound fish and wildlife management. We have determined that wildlife observation, photography, environmental education, and interpretation will not materially interfere with, or detract from, the fulfillment of the Refuge System mission or the purposes for which the refuge was established.

SIGNATURE:

Refuge Manager: _____
(Signature) (Date)

CONCURRENCE:

Regional Chief: _____
(Signature) (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE: _____

LITERATURE CITED:

Atlantic Coast Joint Venture (ACJV). 2008. New England/Mid-Atlantic Coast Bird Conservation Region (BCR) 30 Implementation Plan. Accessed November 2014 at: http://www.acjv.org/BCR_30/BCR30_June_23_2008_final.pdf.

City of Poquoson. 2008. City of Poquoson, Virginia Comprehensive Plan 2008–2028. 340 pp. Accessed January 2013 at: http://www.ci.poquoson.va.us/city_departments/planning_department.

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Knight, R.L. and D.N. Cole. 1991. Effects of recreational activity on wildlife in wildlands. Transactions of the 56th North American Wildlife and Natural Resources Conference pp. 238–247.

Miller, S.G., R.L. Knight, and C.K. Miller. 2001. Wildlife responses to pedestrians and dogs. Wildlife Society Bulletin 29(1):124–132.

Appendix C



USFWS

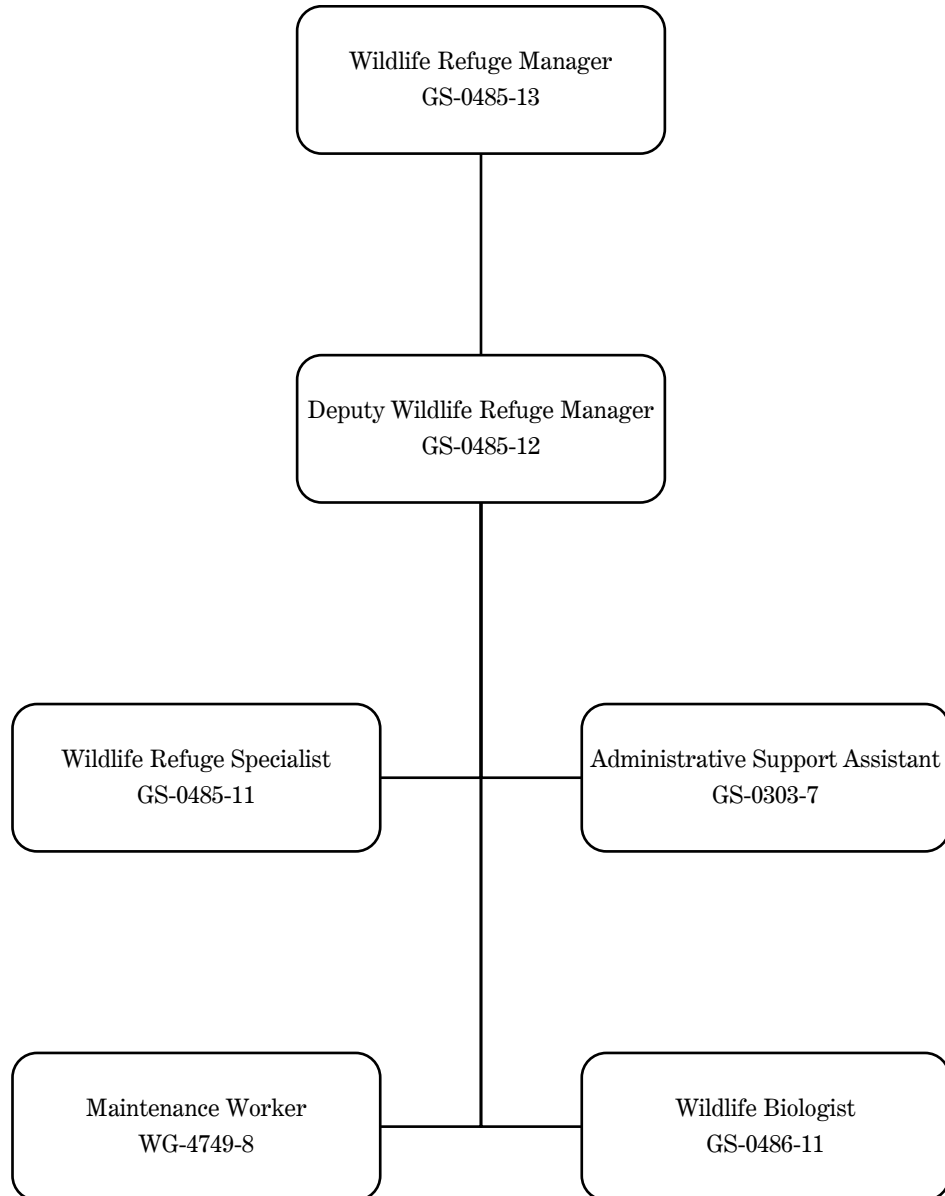
Eastern Virginia Rivers NWR Complex staff (2013)

Staffing Chart



U.S. Fish and Wildlife Service Northeast Region Eastern Virginia Rivers National Wildlife Refuge Complex (James River / Plum Tree Island / Presquile / Rappahannock River Valley)

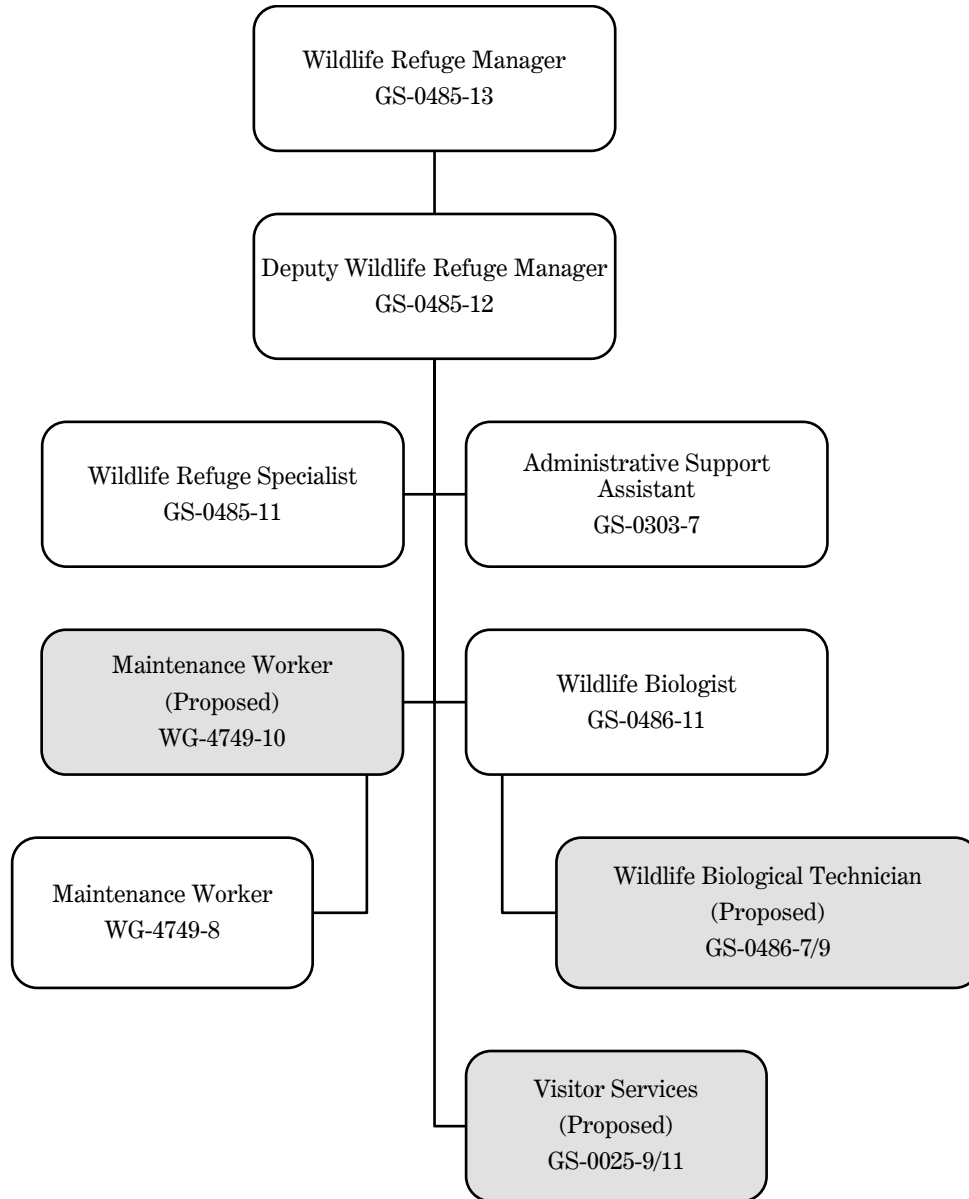
Alternative A: Current Approved Staff





U.S. Fish and Wildlife Service
Northeast Region
Eastern Virginia Rivers National Wildlife Refuge Complex
(James River / Plum Tree Island / Presquile / Rappahannock River Valley)

Alternative B: Proposed Staff



Appendix D



Jeff Brewer/USACE

USACE and refuge staff conducting shrimp and crab sampling

Refuge Operation Needs System and Service Asset Maintenance Management System Projects

Refuge Operation Needs and Service Asset Maintenance Management Systems

The Plum Tree Island National Wildlife Refuge (NWR, the refuge) 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 D.1 Existing and Proposed Projects in the RONS Database for Plum Tree Island NWR

Station Priority Rank ¹	Project Description (Staff Position Title [Pay Scale-Grade]) ²	Estimated One-time Cost	Recurring Base Cost ³	Total First Year Need	FTE ⁴
EXISTING PROJECTS COMMON TO ALL ALTERNATIVES					
1	Conduct biological inventories (Wildlife Biological Technician [GS-09])	-	\$ 42,836	\$ 42,836	0.5
2	Connect children with nature and promote the John Smith Trail (Visitor Services Specialist [GS-11])	-	\$118,458	\$118,458	1.0
Totals (as of fiscal year 2010)		-	\$161,294	\$161,294	1.5
PROPOSED PROJECTS FOR ALTERNATIVE B (SERVICE-PREFERRED)					
1	Provide enhanced nature-dependent opportunities for the visiting public (Visitor Services Specialist [GS-09/11])	-	\$ 75,376	\$ 75,376	1.0
2	Monitor and inventory biological health and impacts (Wildlife Biological Technician [GS-07/09])	-	\$ 62,297	\$ 62,297	1.0
Totals		-	\$137,673	\$137,673	2.0

¹This ranking does not necessarily represent the Eastern Virginia Rivers NWR Complex ranking. The Refuge Manager may adjust priorities based on annual funding levels and regional priorities.

²Staff positions as identified in appendix C.

³Unless otherwise noted, full performance salary in fiscal year 2014 dollars.

⁴FTE: Full-time equivalent. An FTE of 1.0 is equivalent to a full-time worker or student, while an FTE of 0.5 signals half of a full work or school load.

Table D.2 Existing and Proposed Projects in the SAMMS Database for Plum Tree Island NWR

Project Description	Estimated Cost
EXISTING PROJECTS COMMON TO ALL ALTERNATIVES	
Boundary sign replacement	\$51,300
Totals (as of fiscal year 2010)	\$51,300
PROPOSED PROJECTS FOR ALTERNATIVE B (SERVICE-PREFERRED)	
Hunt blind transformation/rehabilitation	\$40,000
Interpretive and directional signage	\$10,000
Totals	\$50,000

Appendix E



Jeff Brewer/USACE

Salt marsh

Wilderness Review

This appendix summarizes the wilderness review for the 3,502-acre Plum Tree Island National Wildlife Refuge (NWR, refuge) located in the City of Poquoson, Virginia (map E.1). The purpose of a wilderness review is to identify and recommend to Congress the lands and waters of the National Wildlife Refuge System (Refuge System) that merit inclusion into the National Wilderness Preservation System. Wilderness reviews are a required element of comprehensive conservation plans (CCPs); are conducted in accordance with the refuge planning process outlined in the U.S. Fish and Wildlife Service (Service) Manual (602 FW 1 and 3), including interagency, public, and Tribal involvement; and include compliance with the National Environmental Policy Act (NEPA).

There are three phases to the wilderness review process: (1) inventory, (2) study, and (3) recommendation. In the inventory phase, we identify lands and waters that meet the minimum criteria (described below) for wilderness. Areas meeting these criteria are called wilderness study areas (WSAs). In the study phase, we evaluate WSAs to determine if they are suitable for wilderness designation, including an assessment of whether the WSA can be effectively managed as wilderness. In the recommendation phase, we use the findings of the study to determine if we will recommend a WSA for wilderness in the final CCP. We forward a wilderness study report with recommendations on wilderness designation from the Director of the Service, through the Secretary of the Interior, and the President to Congress. Congress has the authority to make final decisions on wilderness designation. We prepare that report after our Regional Director has signed the record of decision for the final CCP.

We manage any areas recommended for designation to maintain their wilderness character in accordance with the management goals, objectives, and strategies outlined in the final CCP, until Congress makes a decision or we amend the CCP to modify or remove the wilderness proposal. If the inventory does not identify any areas that meet the WSA criteria, we document our findings in the administrative record for the CCP and end the study process. We manage non-wilderness areas following the management direction outlined in the CCP.

During the inventory phase for Plum Tree Island NWR, we determined that the minimum criteria for wilderness were not met; therefore, we did not proceed with the study or recommendation phases. The results of the inventory are presented below.

Wilderness Inventory

The wilderness inventory is a broad look at refuge lands to identify WSAs. Only those refuge lands owned in fee title are considered. WSAs must meet the minimum criteria for wilderness identified in Section 2(c) of the Wilderness Act of 1964 (Public Law 88–577), which are: size, naturalness, and opportunities for solitude or primitive recreation. Other supplemental values are evaluated, but not required. Our evaluation of the extent to which refuge lands meet the minimum wilderness criteria is discussed below.

Evaluation of the Size Criteria

To evaluate the size criteria, we review every roadless area of 5,000 contiguous acres or more, and every roadless island. “Roadless” refers to the absence of improved roads suitable and maintained for public travel by means of motorized vehicles primarily intended for highway use.

The Service has interpreted the size criteria for wilderness to be satisfied under the following situations:

- An area with over 5,000 contiguous acres. State and private lands are not included in making this acreage determination.
- A roadless island of any size. 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. We interpret a “road” to be something that is improved and maintained for legal street vehicles and for public travel.
- 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.
- An area of less than 5,000 contiguous Federal 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.

Conclusion: We have determined that Plum Tree Island NWR meets the size criteria because the refuge is a roadless island. All lands currently owned by the Federal government within the refuge’s approved acquisition boundary are separated from the mainland by permanent waterbodies (e.g., Chesapeake Bay, Poquoson River, Back River, and 4- to 20-foot wide ditch that connects Lloyd Bay with Front Cove) (map E.1).

Evaluation of Naturalness Criteria

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 man’s 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 human-caused hazards (such as the presence of unexploded ordnance from military activity and the physical impacts of refuge management facilities and activities) are also considered in evaluation of the naturalness criteria. An area may not be considered unnatural in appearance solely based on the “sights and sounds” of human impacts and activities outside the boundary of the unit. We considered the cumulative effects of these factors in conjunction with refuge size and physiographic and vegetative characteristics in the evaluation of naturalness.

Conclusion: We have determined that Plum Tree Island NWR does not meet the naturalness criteria for several reasons.

A variety of structures were constructed on the property when it was managed by the U.S. Department of Defense as the Plum Tree Island Range (PTI Range), an active military training area used from 1917 through 1959. The following PTI Range structures and materials are present on the refuge today (Shaw Environmental, Inc. 2013):

- Ruins of two observation towers (25 to 40 feet tall)
- Ruins of four concrete bunkers (144 square feet each)
- Remnants of a wooden cargo pier (800 square feet)

-
- Remnants of a wharf (1,120 square feet)
 - Boundary fence (2,800 feet)
 - Gunnery targets, some include concrete features (various shapes and sizes)
 - Bomb craters throughout the PTI Range
 - Practice bombs and rockets throughout the PTI Range and adjacent submerged lands
 - Bomb fragments throughout the PTI Range and adjacent submerged lands
 - Jet-assisted take-off (JATO) bottles PTI Range and adjacent submerged lands

Refuge staff maintains six waterfowl hunting blinds on Cow Island (map 2.3 in the draft CCP and Environmental Assessment). Annual maintenance includes repairing the structure, cleaning and installing signs, purchasing and placing stationary blind licenses issued by the Virginia Department of Game and Inland Fisheries (VDGIF), and wrapping blinds with camouflage fabric.

Additionally, new human-caused hazards are authorized to accumulate on the refuge and in surrounding waters because the U.S. Air Force (USAF) has reserved the right to use an area of the refuge and adjacent waters as an emergency jettison area and for ordnance disposal operations (28 FR 1106; codified at 33 CFR 334.340; redesignated at 50 FR 42696, Oct. 22, 1985, as amended at 62 FR 17553, Apr. 10, 1997; map E.1). Objects jettisoned by USAF aircraft may be empty or contain materials such as unused propellant. During the remedial investigations conducted in 2009, six JATO bottles were found in good condition and full of an unidentified material that was assumed to be propellant. These six JATO bottles were detonated on March 25, 2009 (Shaw Environmental, Inc. 2013).

Evaluation of Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

A WSA must provide outstanding opportunities for solitude or primitive and unconfined recreation. However, the area does not have to possess outstanding opportunities for both elements, and does not need to have outstanding opportunities on every acre. Furthermore, 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 nonmotorized, 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 opportunity “elements” are not well defined by the Wilderness Act, but in most cases they can be expected to occur together. 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. We considered these factors and their cumulative effects when evaluating the availability of outstanding opportunities for solitude or primitive recreation.

Conclusion: We have determined that Plum Tree Island NWR does not meet the criteria for providing solitude or primitive and unconfined recreation.

Solitude is not achievable throughout the refuge because it is the largest contiguous undeveloped salt marsh in the lower Chesapeake Bay. In alternative B (Service-preferred alternative) of this CCP and EA, we propose to designate one public use site on Cow Island where we would construct a visitor use facility to provide refuge visitors with a location to tie-off motorized and nonmotorized watercraft (see appendix B). The proposed facility would support up to 15 visitors at any one time. Based on observations at nearby beach sites, we anticipate that the refuge's new designated public use site would be visited by more than one person at any one, and thus the refuge would not provide solitude for visitors.

Primitive recreational opportunities are available for visitors paddling the City of Poquoson's Blueway with kayaks and canoes. The paddling route around the refuge not recommended for a beginner because it is more than 8 miles long without resting stops, the current can be very strong, and moderate to heavy wave action is typical. However, safety restrictions affect where and how these primitive recreational opportunities are conducted. Three overlay areas of restricted public use affect public uses of the lands and waters on and adjacent to the refuge (map E.1): the USAF Danger Zone, the U.S. Army Corps of Engineers (USACE) Temporary Danger Zone, and the Virginia Marine Resources Commission (VMRC) Restricted Area.

- When the USAF uses its permanent danger zone for emergency jettison and for ordnance disposal operations, no person or vessel shall enter or remain in the USAF danger zone.
- In the USACE Temporary Danger Zone, no person or vessel may conduct activities that disturb the sub-aqueous soil in the USACE Temporary Danger Zone (codified at 33 U.S.C. 1 and 33 U.S.C. 3). Prohibited activities for these areas include, but are not limited to: anchoring; clamming with rakes, shovels, or hoes; dredging; prop dredging; the intentional/unintentional beaching or grounding of vessels; or walking on the bottom.
- The VMRC Restricted Area protects the citizens of the Commonwealth from dangers associated with unexploded ordnance located on the refuge (4 VAC 20-1065). The regulation affords the Virginia Marine Police and the VDGIF the authority to enforce Virginia laws prohibiting entrance in to the restricted area. The regulation prohibits any vessel or person from entering the restricted area without the permission of the USACE or persons or agencies authorized to act on their behalf, and stipulates that commercial or private interests having a need to operate within the restricted area must contact the USACE for additional guidance before entering this area.

Evaluation of Supplemental Values

The Wilderness Act states that a wilderness area may contain ecological, geological, or other features of scientific, educational, scenic, or historical value. These values are optional, but the degree to which their presence enhances the area's suitability for wilderness designation should be considered.

Conclusion: Plum Tree Island NWR meets this criterion because the refuge contains both natural and cultural features and values that enhance its suitability for wilderness designation. All of these values are described in detail in chapter 2 of the draft CCP and EA.

Summary of Inventory Findings for Plum Tree Island NWR

Our inventory concludes that Plum Tree Island NWR does not meet the minimum criteria for a WSA and should not be recommended for further evaluation of wilderness potential. We will reevaluate this determination in 15 years with the revision of this CCP, or sooner if significant new information warrants a reevaluation.

Literature Cited

Shaw Environmental, Inc. 2013. Remedial Investigation Report for Plum Tree Island Range, Military Munitions Response Program, FUDS Project No. C03VA020201. Belcamp, Maryland. 232 pp.

Map E.1 Danger Zones and Restricted Area



Appendix F



USFWS

Dune and salt marsh on the refuge

Federal Consistency Determination

FEDERAL CONSISTENCY DETERMINATION

Draft Comprehensive Conservation Plan and Environmental Assessment

for

Plum Tree Island National Wildlife Refuge Poquoson, Virginia

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

This federal consistency determination (FCD) provides the Commonwealth of Virginia with the U.S. Fish and Wildlife Service's (the Service, we, our) Consistency Determination under the Coastal Zone Management Act Section 307(c)(1) and Title 15 Code of Federal Regulations (CFR) Part 930, Subpart C, for implementing the draft Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for Plum Tree Island National Wildlife Refuge (NWR), located in the City of Poquoson, Virginia. This CCP would guide management of Plum Tree Island NWR over the next 15 years. The information in this FCD is provided pursuant to 15 CFR 930.39. The Service seeks concurrence from the Virginia Coastal Management Program (VCP) that alternative B (the Service-preferred alternative) as detailed in the draft CCP and EA is consistent, to the maximum extent practicable, with the enforceable policies of the VCP.

To streamline the administrative requirements of the CCP development process and environmental review, the Service prepared a combined document that evaluates the potential environmental impacts from implementing a CCP. The draft CCP and EA were prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321–4347); the Council on Environmental Quality regulations for implementing NEPA (40 CFR 1500–1508); and the Department of the Interior (516 DM 8) and Service (550 FW 3) policies. The draft CCP and EA also complies with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. Refer to section 1.3 of the draft CCP and EA for additional information regarding regulatory compliance.

Background

Plum Tree Island NWR is located in the City of Poquoson, Virginia and is approximately 7 miles north of Hampton, Virginia. The regional context of the project area is defined by the interactions of the nearby metropolitan area and the lower Chesapeake Bay Estuary (maps 1.1 through 1.3 in the draft CCP and EA). The refuge encompasses 3,502 acres of salt marsh, marine shrubland and dune, sandy beaches and mudflats, and estuarine habitats in the lower Chesapeake Bay, near the mouth of the York River. The refuge is bounded by the Chesapeake Bay on all sides except the southwest. Lands immediately adjacent to the refuge are largely undeveloped, privately owned salt marsh within the city limits.

Project Description

As detailed in chapter 3 of the draft CCP and EA, alternative B (the Service-preferred alternative) emphasizes the management of specific refuge habitats to support priority refuge species whose habitat needs benefit other species of conservation concern that are found around the refuge and in the larger landscape of the lower Chesapeake Bay, such as the breeding clapper rail, saltmarsh sparrow, as well as migrating and wintering American black ducks and shorebirds.

The process we used to select priority refuge resources of concern is detailed in appendix A of the draft CCP and EA.

Over the life of the plan, we would:

- Manage and prevent the degradation of the refuge's 2,027 acres of salt marsh to include a mix of high and low salt marsh vegetation, pool, mudflat, and panne habitat that:
 - ❖ is eradicated of invasive plants,
 - ❖ is of high ecological integrity as measured by the Salt Marsh Integrity Index, and
 - ❖ sustains and provides protected habitat for breeding clapper rail and saltmarsh sparrow, as well as migrating and wintering American black ducks and shorebirds.
- Protect 102 acres of maritime shrubland and dune habitat to ensure the integrity of the adjacent salt marsh and to maintain or increase northern diamondback terrapin nests by providing open sandy areas above the high tide line for nesting.
- Protect 80 acres of sandy beaches and mudflats from human-caused disturbance and degradation to maintain an essential population of northeastern beach tiger beetles (average annual peak count of at least 300 adults), to maintain or increase the number of nesting black skimmers, and to provide foraging habitat for migrating shorebirds.
- Accommodate public waterfowl hunting opportunities on the refuge for up to 540 hunter use days during the first two segments of the waterfowl hunting season, provide 18 youth hunter days on 1 day in the fall (in accordance with the State), and investigate opportunities to establish five new hunt locations.
- Provide wildlife observation, photography, environmental education, and interpretation opportunities on the refuge for up to 6,075 visitor use days annually at one designated location on Cow Island (estimated to be 0.5-acre for this analysis).
- Provide wildlife observation, photography, environmental education, and interpretation opportunities off the refuge for a variety of events and programs.
- Maintain existing partnerships and develop new partnerships with other government, organizations, groups, and individuals to conduct research to increase baseline knowledge, monitor regional and national priority species, and evaluate ecosystem quality.
- Maintain existing partnerships and develop new partnerships with other government, organizations, groups, and individuals to promote priority public uses that promote an understanding and appreciation of the refuge and the mission of the Service.

We identified that coordination and consultation with various State agency offices responsible for enforcing the policies of the VCP is an important action to be implemented by the refuge as it implements the CCP. The following list identifies strategies that would subject to the VCP enforceable policies:

- Protect and maintain the characteristics on refuge lands that contributed to the area's special designation the Western Shore Marshes Important Bird Area, as well as its contribution to

other State natural and cultural resource area designations.

- Continue to comply with Section 106 of the NHPA through consultation with the Regional Historic Preservation Office (RHPO) and State Historic Preservation Office (SHPO) when new ground-altering activities are proposed and evaluate standing structures for National Register of Historic Places eligibility before altering.
- Continue to work with partners to promote the protection and preservation of the refuge for the benefit of wildlife through environmental education and interpretation about the natural environment and wildlife of the Chesapeake Bay.
- Implement the established partnership with the National Park Service (NPS), fulfilling the Memorandum of Understanding (MOU) in regards to the promotion of the Captain John Smith Chesapeake National Historic Trail and Chesapeake Bay Gateways and Watertrails Network, at the refuge by enhancing place-based interpretation, providing public access, and fostering conservation and restoration of natural and cultural resources related to the Chesapeake Bay through programming, outreach, and citizen involvement.
- Reduce the carbon footprint of facilities, vehicles, workforce, and operations by using energy efficient equipment, where feasible, and maintaining and constructing facilities using sustainable green building technologies (see appendix D of the draft CCP and EA).

The draft CCP and EA was developed with sufficient detail to account for the greatest potential impacts that could result from the proposed actions identified under both alternatives. However, additional NEPA analysis will be necessary for certain types of actions, even once we adopt a final CCP. Where decisions have not been made in the draft CCP and EA, but must be made later, we analyze the impacts of the possible range of alternatives in this document. During the planning process for those plans and actions, we will consult with the Virginia Department of Environmental Quality (VDEQ) to determine if additional FCDs are needed.

Examples of proposed actions that may require further analysis include:

- Improving or removing any existing facilities and construction of new facilities, including new waterfowl hunt blinds and visitor support facilities.
- Expanding the existing hunt program and adding new hunting opportunities for adults and youth.
- Removing nuisance wildlife through public hunting or trapping permits, if deemed necessary.

Effect on Resources

Implementation of the preferred alternative would affect the natural and human environments, varying in duration, context, type, and intensity. Chapter 4 and the summary table comparison of consequences (table 4.3) of the draft CCP and EA details impacts in the local, regional, and national contexts, over the short- and long-term, and identifies the intensity of beneficial and adverse impacts that would directly, indirectly, and cumulatively result from implementation of alternative B.

In summary, implementation of alternative B would affect the land or water uses or natural resources of Virginia in the following manner:

Air Quality—Minor, indirect, long-term benefits of air filtering and carbon sequestration would result from managing the refuge’s native vegetation. Negligible, direct, short-term impacts on local air quality would result from more frequent use of fuel-burning equipment and herbicide applications. None of our actions would violate U.S. Environmental Protection Agency (EPA) standards, and all actions would be undertaken to ensure compliance with the Clean Air Act (CAA).

To reduce potential adverse impacts on local air quality, we would follow guidance provided State agencies regarding refuge activities that have the potential to adversely impact air quality in the vicinity, including the minimization of vehicle idling, use of precautionary measures to restrict emissions of volatile organic compounds and oxides of nitrogen, and minimization of fugitive dust.

Water Resources—Minor to moderate, direct and indirect, long-term beneficial impacts on water resources in the refuge vicinity would result from the continued protection of soils, wetlands, and waterways within the refuge boundary. Our increased efforts to inventory and monitor salt marsh integrity would inform specific refuge management decisions that have the potential to impact water resources in the refuge vicinity. Land-disturbing activities on the refuge, such as mechanical removal of phragmites and construction of a wildlife observation platform and waterfowl hunting blind, have the potential to result in negligible to moderate, direct and indirect, short- and long-term adverse impacts on local water quality.

To reduce potential adverse impacts on local hydrology and water quality, we would employ best management practices when conducting land-disturbing activities. As needed, we would consult with State offices regarding permitting applicability and requirements to ensure compliance with applicable Federal and State laws and regulations, as well as the local ordinance for the protection of Resource Management and Protection Areas.

Soils—Minor to moderate, direct and indirect, long-term beneficial impacts on soils would result from maintaining the land cover with natural vegetation, minimizing soil disturbance to the maximum extent practicable, and allowing public use on a limited acreage and in designated areas. We would employ and maintain sediment and erosion control measures to minimize the potential for soils to migrate during land-disturbing activities. We would continue to maintain existing native vegetation and control the spread of phragmites, which would have minor, indirect, short-term adverse impacts on soils. Designating one public use area on Cow Island would result in minor, direct, short- and long-term adverse impact soils via compaction.

To reduce potential adverse impacts to soils, we would consult with State offices regarding permit applicability prior to conducting activities that have the potential to affect wetlands, disturb land, or contaminate soils.

Vegetation—Minor to moderate, direct, long-term beneficial impacts to local vegetation would result from our habitat protection efforts. We would continue to limit human-caused disturbance and control phragmites infestations in refuge habitats. We would maintain the ecological integrity of the refuge’s habitats through inventory, monitoring, and active habitat management.

Designating one public use area on Cow Island for new public use opportunities would result in minor, direct, short- and long-term impacts on refuge vegetation. We would illustrate and promote conservation principles by incorporating ecologically sensitive design concepts, using sustainable construction materials, and employing best management practices. We would use signage to clearly delineate the bounds of the designated public use area. Appropriate and compatible public uses would be conducted at designated areas in accordance with refuge-specific stipulations to ensure compatibility with the refuge's purposes (see appendix B).

Birds—Minor to moderate, direct, long-term beneficial impacts on breeding, migrating, and wintering birds along the Atlantic Flyway would result from implementation of the CCP. As the largest contiguous salt marsh habitat in the southern Chesapeake Bay, the refuge provides isolated nesting habitat for various migratory bird species. The refuge is within the Western Shores Important Bird Area because the refuge's marsh habitat supports clapper rails, seaside sparrows, marsh wrens, sedge wrens, northern harriers, prairie warblers, eastern meadowlarks and many other breeding and migrant shorebirds and waterbirds. We would continue to limit human-caused disturbance throughout the refuge to promote avian breeding, resting, and foraging.

Inventorying and monitoring priority refuge resources of concern (appendix A) would have minor, indirect, long-term benefits on all bird species that use the refuge for nesting, migration, or wintering. We would monitor the following surrogate species: clapper rails, saltmarsh sparrows, American black ducks, and nesting black skimmers. We would also monitor other breeding and migrating shorebirds and waterbirds. This information would enable biologists and managers to recognize population trends within these species and identify potential changes in management that may be needed to protect the species or the habitat on which these birds depend.

We expect negligible, indirect, short-term disturbance to breeding and migrating birds from invasive plant control, waterfowl hunt blind maintenance on Cow Island, and construction activities at waterfowl hunt blind #2 on Cow Island. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind on Cow Island as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site. The time of year when access occurs can greatly affect birds that have historically used closed areas for foraging, nesting, or roosting. To minimize disturbance of birds in adjacent areas, we would clearly mark the boundaries of the designated public use area. The designated public use area would support use by a maximum of 15 visitors at any one time to minimize disturbance to wildlife and maximize the potential for quality wildlife watching opportunities.

The refuge's waterfowl hunt would continue to result in a negligible, direct, short-term impact on waterfowl species that are permitted to be hunted. The hunt program would have minor, direct, short-term impacts on non-target birds because hunting season occurs outside of the breeding and migratory seasons for shorebirds and waterbirds. Impacts would be minimized by enforcement of State and Federal regulations, including the use of non-toxic shot for waterfowl hunting (4VAC15-260-140 and 50 CFR 20.21, respectively), and refuge-specific regulations that limit the number of public hunt days, hunt locations, hunting party composition, and hunting practices (50 CFR 32.66). We limit human disturbance in the majority of the refuge by only allowing waterfowl hunting to occur at six designated locations on Cow Island, affecting 211 acres of the 3,502-acre refuge. On

non-hunting days, waterfowl can rest, feed, and move throughout the entire refuge without the influence of human disturbance.

Fisheries—Minor, direct and indirect, long-term beneficial impacts on fisheries would result from our efforts to protect, maintain, and restore habitats for native wildlife; assessing salt marsh integrity; conducting shoreline surveys; controlling phragmites infestations; and improved interagency coordination and partnership support for fisheries monitoring and management. Minor, direct, short-term impacts on fishery species would result from construction activities at waterfowl hunt blind #2 on Cow Island. In the long term, public boating would increase along the shoreline near the wildlife observation platform and waterfowl hunt blind on Cow Island as recreational and commercially guided wildlife observation, photography, education, and interpretation tourists utilize this site.

Mammals—Negligible to minor, direct, long-term beneficial impacts to mammals would result from limiting human-caused disturbance of refuge habitats. Minor, direct, short-term adverse impacts on mammals would result from construction activities at waterfowl hunt blind #2 on Cow Island. In the long term, human-caused disturbance would potentially cause mammals to flee. We also emphasize interagency coordination to ensure that the refuge offers a quality hunting program.

Reptiles—Minor to moderate, indirect and direct, long-term beneficial impacts to reptile populations would result from limiting human-caused disturbance and controlling phragmites infestations in refuge habitats. Adverse impacts on diamondback terrapins would be minimized to the maximum extent practicable by monitoring terrapin habitat conditions and nesting activities. This information would allow refuge staff to plan and conduct phragmites control efforts with minimal impact on terrapins.

Invertebrates—Moderate, direct, long-term beneficial impacts to invertebrates would result from limiting human-caused disturbance in refuge habitats. Limiting disturbance on the dune and sandy beach habitats would have moderate, direct, short- and long-term impacts on the federally threatened northeastern beach tiger beetle population. Performing quantitative shoreline surveys would provide negligible, indirect, local, long-term benefit for invertebrates. Monitoring these changing shorelines would benefit the tiger beetle because documenting the available and changing habitat for this species would help the Service to track the species' recovery and determine if new protective areas or actions are warranted.

Public Uses and Access—Minor to moderate, direct, long-term beneficial impacts would result from improving our existing waterfowl hunt administration; offering youth waterfowl hunting opportunities; opening the refuge to commercial and noncommercial opportunities to participate in wildlife observation, photography, environmental education, and interpretation; and partnering with others to explore additional opportunities to increase public awareness and appreciation for the refuge, its purposes, and the National Wildlife Refuge System (Refuge System) mission.

The refuge will remain closed to all public uses except waterfowl hunting until transformation of the existing waterfowl hunt blind (#2) on Cow Island is completed. Once completed, we would open the refuge to noncommercial and commercial wildlife observation, photography, environmental education, and interpretation. Establishing a designated public use area for these priority public uses will enhance public access to the refuge where such uses can be

accommodated without materially detracting from the refuge purposes. Through our partnerships, our potential to achieve the goal of inspiring appreciation and stewardship of the refuge in relation to the Chesapeake Bay Estuary and the Refuge System would increase. We aim to inspire refuge stewardship by telling a more complete story of the area's natural and cultural significance.

Consistency Determination

The VCP contains the following applicable enforceable policies. For each enforceable policy, specific actions to be implemented under alternative B are described.

Fisheries Management—Administered by the Virginia Marine Resources Commission (VMRC) and Virginia Department of Game and Inland Fisheries, this program stresses the conservation and enhancement of shellfish and finfish resources and the promotion of commercial and recreational fisheries (Code of Virginia 28.2–200 through 28.2–713, 29.1–100 through 29.1–570, or 3.1–249.59 through 3.1–249.62).

We anticipate conducting additional investigation, assessment, and analysis of management alternatives to reduce adverse impacts to shellfish and finfish habitat currently resulting from refuge shoreline erosion and sediment deposition in the Chesapeake Bay in support of conservation and enhancement of shellfish and finfish resources. In an effort to limit any additional erosion of the refuge's banks, we would designate one area for visitor uses and we would construct a new facility on the refuge to support appropriate and compatible public uses (appendix B of this draft CCP and EA).

Subaqueous Lands Management—Administered by VMRC, this program establishes conditions for granting permits for encroachments in, on, or over State-owned submerged lands throughout the Commonwealth (Code of Virginia 28.2–1200 through 28.2–1213).

We anticipate conducting additional consultation with the VMRC prior to implementing actions that would affect subaqueous lands or qualify as channel-ward encroachments on tidal waterways. Actions with the potential to adversely affect subaqueous lands are the potential to construct facilities near the Chesapeake Bay to support public uses. We would consult with State agencies early in the project's planning phase to ensure consistency with the enforceable policies of the VCP. Permitting and site plan approvals would be acquired prior to implementing construction activities with the potential to adversely affect subaqueous lands.

Wetlands Management—Administered by VMRC and VDEQ, the wetlands management program preserves and protects tidal wetlands (Code of Virginia 28.2–1301 through 28.2–1320 or 62.1–44.15.5).

The protection of wetlands is of high management priority for our agency and at this refuge. We strive to avoid adverse impacts on wetlands and surface waters. However, where avoidance cannot be achieved, we strive to minimize adverse impacts by minimizing land disturbance and impervious cover.

As identified in our draft CCP and EA, we would establish a long-term monitoring program to inform management actions aimed to protect wetlands on the refuge and adjacent to the refuge. In the future, we anticipate consulting with the State for individual projects for which site-specific planning has not yet been completed. Future projects with the potential to impact

wetlands and waterways include the proposed construction of facilities near the Chesapeake Bay to support public uses. Early in the project's planning phase, we would consult with VMRC and VDEQ to identify the most appropriate best management practices to be employed to ensure the protection of wetlands and surface waters, as well as identify permitting or plan approvals required prior to project implementation.

Dunes Management—Administered by VMRC, the purpose of this program is to prevent the destruction and/or alteration of primary dunes (Code of Virginia 28.2-1400 through 28.2-1420).

As identified in our draft CCP and EA, we have a refuge management objective for dune protection. We would protect 102 acres of maritime shrubland and dune habitat to ensure the integrity of the adjacent salt marsh and to maintain or increase northern diamondback terrapin nests by providing open sandy areas above the high tide line for nesting. None of the actions to be implemented under alternative B would destroy or alter dune structure on the refuge. We would control phragmites infestations on the refuge's dunes using herbicides only if necessary.

Non-point Source Pollution Control—Administered by the Virginia Department of Conservation and Recreation (VDCR), the Virginia Erosion and Sediment Control Law and Regulations are intended to minimize non-point source pollution entering Virginia's waterways (Code of Virginia 10.1-560 et seq.).

As identified in our draft CCP and EA, we would manage invasive plant species using herbicides. We would take all appropriate steps to minimize the potential to contaminate soils or cause runoff into the river when applying herbicide, including using the minimum effective dosage, using application methods that minimize non-target effects, applying during optimal growth stage for effectiveness, applying in optimal weather conditions, and adhering to licensing requirements and other Federal, State, and local regulations. We would minimize the potential for adverse impacts to the environment and humans by using only approved herbicides, developing and following a spill plan, and using the herbicide as instructed by the manufacturer and according to pesticide use plans approved by our regional contaminants coordinator.

Hazardous materials and wastes would be stored, transported, and disposed of in accordance with applicable laws and regulations. We would consult with VDEQ regarding identification of approved solid waste and hazardous waste disposal sites, as well as opportunities to reuse and recycle non-hazardous materials.

Early in the planning phase for facility construction projects, we would consult with VDCR to identify the most appropriate best management practices to limit potential for non-point source pollution generation, as well as identify permitting or plan approvals required prior to project implementation. Actions with the potential to disturb 2,500 square feet or more of land and/or generate non-point source pollution include the maintenance of existing, or construction of new, shoreline stabilization features and water-based transportation facilities.

Point Source Pollution Control—Administered by the State Water Control Board, the National Pollutant Discharge Elimination System permit program regulates point source discharges to Virginia's waterways (Code of Virginia 62.1-44.15).

None of the actions proposed in our draft CCP and EA would generate a new point source discharge, or alter of any existing point source discharge, in to Virginia's waterways. We would consult with VDEQ regarding future maintenance or construction projects to determine which actions would be considered a new point source discharge and proceed with permitting and project approvals as needed.

Shoreline Sanitation—Administered by the Department of Health, this program regulates the installation of septic tanks to protect public health and the environment (Code of Virginia 32.1–164 through 32.1–165).

No septic systems are known to occur on the refuge currently. None of the actions proposed in our draft CCP and EA include proposal to install new septic systems on the refuge.

Air Pollution Control—Administered by the State Air Pollution Control Board, this program implements the CAA through a legally enforceable State Implementation Plan (Code of Virginia 10.1–1300 through 10.1–1320).

As identified in our draft CCP and EA, none of our actions would violate EPA standards for air quality. All actions would be undertaken to ensure compliance with the CAA. To reduce potential adverse impacts on local air quality, we would follow guidance provided the VDEQ regarding construction project design and implementation, including the minimization of vehicle idling, use of precautionary measures to restrict emissions of volatile organic compounds and oxides of nitrogen, and minimization of fugitive dust. On a project-specific basis, we would consult with State agencies regarding permit requirements for fuel-burning equipment that may be used during facility maintenance or construction activities.

Coastal Lands Management—Administered by the VDCR's Division of Stormwater Management, Local Implementation (DSM—LI) administers the coastal lands management enforceable policy of the VCP which is governed by the Chesapeake Bay Preservation Act and Chesapeake Bay Preservation Area Designation and Management Regulations (Code of Virginia 10.1–2100 through 10.1–2114, the Chesapeake Bay Preservation Area Designation and Management Regulations, or 9 VAC10–20–10 et seq.).

Since the entire refuge is located within a Chesapeake Bay Resource Protection Area (RPA), we would consult with State offices to ensure the protection of coastal lands. Actions to be undertaken within the RPA include maintenance and use of water-dependent features (e.g., transformation of the existing waterfowl hunt blind (#2) on Cow Island to also serve as a wildlife observation platform). We would also conduct resource protection activities along the shoreline (e.g., invasive plant management, documentation of archaeological resources). As needed, we would consult with VDCR regarding best management practices, minimizing land disturbance and impervious cover, and the protection of native vegetation.

Although not required for the purpose of consistency, in accordance with 15 CFR 930.39(c), we considered the advisory policies of the VCP as well.

Geographical Areas of Particular Concern—Coastal natural resource areas (e.g., wetlands; aquatic spawning, nursery, and feeding grounds, significant wildlife habitat areas, public

recreational areas, and underwater historic sites) are vital to estuarine and marine ecosystems and receive special attention from the Commonwealth because of their conservation, recreational, ecological, and aesthetic values. Coastal natural hazard areas are vulnerable to continuing and severe erosion and are susceptible to wind, tidal, and storm-related damage. Waterfront development areas are vital to the Commonwealth because of the limited number of areas suitable for waterfront activities.

The diversity of conservation, ecological, recreational, and aesthetic values associated with Plum Tree Island NWR are detailed in chapter 2 of the draft CCP and EA. As a unit of the Refuge System, the paramount purpose of this refuge is to serve as an inviolate sanctuary for migratory birds. We also support scientific research regarding the breeding of the federally endangered northeastern beach tiger at the refuge. In our draft CCP and EA, we propose to open the refuge to five priority wildlife-dependent recreational uses and one specialized use; each of these uses has been found to be appropriate and compatible with the refuge's purpose (refer to appendix B).

As discussed earlier in this FCD, we anticipate consulting with VDEQ regarding construction of any structure on the refuge in the future. We aim design and site facilities where the potential for property damage due to storms or shoreline erosion can be minimized.

Implementation of alternative B would have no direct adverse impact on commercial ports, commercial fishing piers, or community waterfronts in the refuge vicinity.

Shorefront Access Planning and Protection—The Commonwealth values maintenance of shorefront access for public recreational uses, while protecting the historic features of waterfront properties.

Implementation of alternative B would have no direct impact on Virginia's existing 25 miles of public beaches. Over the life of the plan, we may open up to 8 acres of the refuge's beach habitat for specific appropriate and compatible uses, each of which includes stipulations for compatibility with the refuge's purposes (refer to appendix B).

Implementation of alternative B would be consistent, to the maximum extent practicable, with the 2013 Virginia Outdoors Plan. We are committed to accommodate appropriate and compatible public uses on the refuge, including commercial tours for wildlife observation, photography, environmental education, and interpretation. We would increase the availability and quality of wildlife-dependent recreational uses on the refuge, as well as increase our outreach efforts through partners with shared conservation goals.

Implementation of alternative B would have direct impacts on recreational uses and values associated with the Captain John Smith Chesapeake National Historic Trail. Through our continued coordination and collaboration, we would maintain and protect recreational values associated with the refuge and the Captain John Smith Chesapeake National Historic Trail while protecting natural and cultural resources for the enjoyment of future generations.

Implementation of alternative B would have no direct impact on waterfront recreational land acquisition opportunities in the Commonwealth.

As discussed earlier in this FCD, we anticipate consulting with VDEQ regarding water-based transportation facility improvements and shoreline structures on the refuge. Refuge facilities would be designed, constructed, and maintained to provide points of water access in support of refuge operations and visitor access when conducted in accordance with the stipulations identified for public uses determined to be appropriate and compatible with the refuge's purposes (see appendix B).

As detailed in chapter 2 of the draft CCP and EA, the refuge has potential for a long history of human settlement and development. We would use a proactive approach to interagency coordination for the protection of the refuge's cultural resources. Through our partnerships, we would promote cultural resource stewardship and appreciation both on and off the refuge in educational programs and interpretive media.

Finding

Based on this information, data, and analysis, the Service finds that alternative B (the Service-preferred alternative) of the draft CCP and EA for Plum Tree Island NWR is consistent, to the maximum extent practicable, with the enforceable policies of the VCP. Although not required for the purpose of consistency, we find that alternative B is in line with the VCP advisory policies when following them will not materially interfere with, or detract from, the fulfillment of the Refuge System mission or the purposes for which the refuge was established.

Concurrence Request

Pursuant to 15 CFR 930.41, the VCP has 60 days from the receipt of this letter in which to concur with or object to this Consistency Determination, or to request an extension under 15 CFR 930.41(b). Virginia's concurrence will be presumed if its response is not received by the Service on the 60th day from receipt of this determination. The State's response should be sent to:

Andy Hofmann, Refuge Manager
Eastern Virginia Rivers NWR Complex
336 Wilna Road
Warsaw, VA 22572

The Service would implement alternative B (the preferred alternative) upon adoption of the CCP by the Northeast Regional Director of the Service. Adoption of the CCP would be documented in a Finding of No Significant Impact, if appropriate, to satisfy NEPA requirements. To complete the CCP development process, we will produce a final CCP.

Plum Tree Island National Wildlife Refuge
c/o Eastern Virginia Rivers National Wildlife Refuge Complex
336 Wilna Road
Warsaw, VA
Phone: 804/333-1470
http://www.fws.gov/refuge/Plum_Tree_Island/

Federal Relay Service
for the deaf or hard of hearing
1 800/877-8339

U.S. Fish & Wildlife Service
<http://www.fws.gov>

For Refuge Information
1 800/344-WILD

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