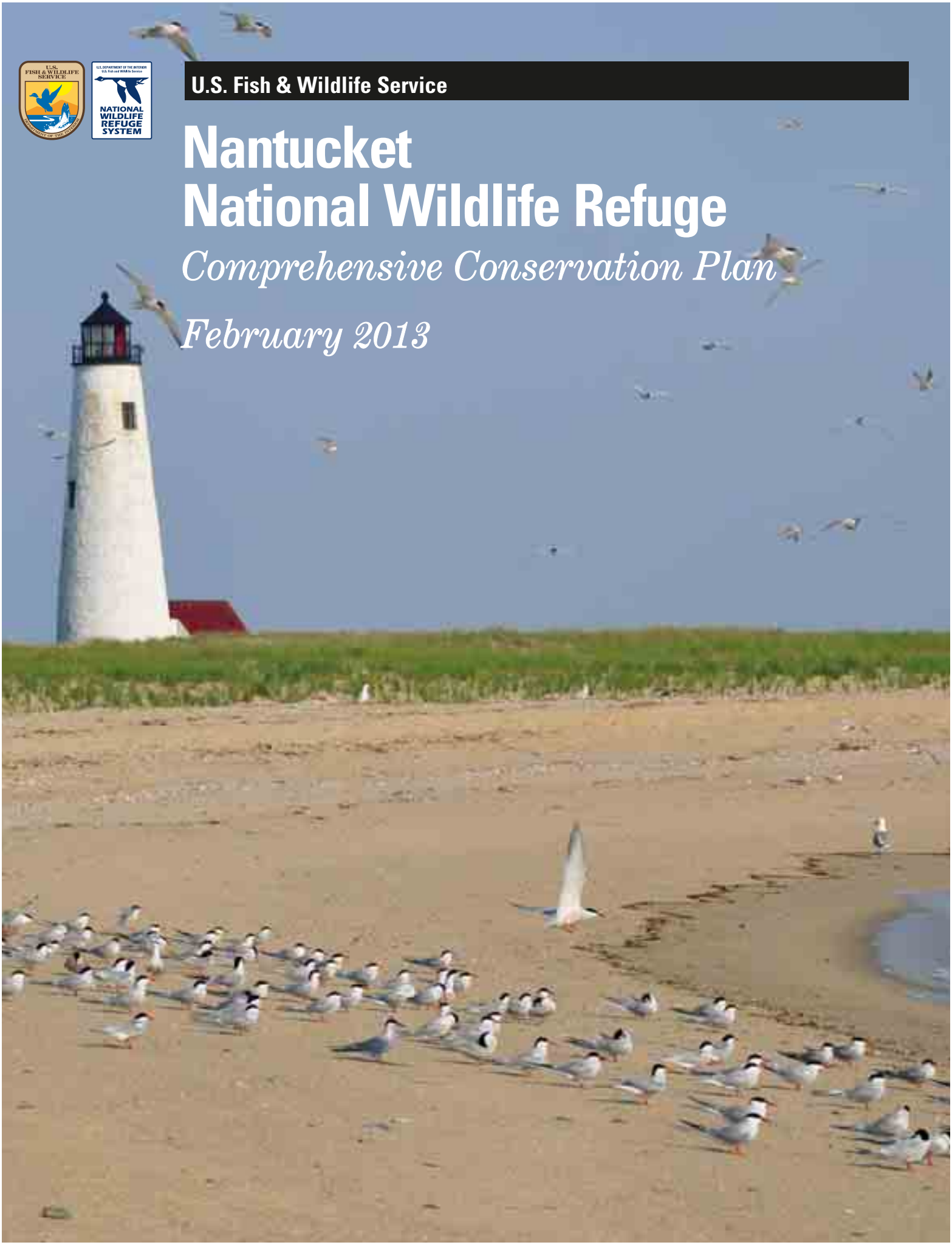
U.S. Fish & Wildlife Service

Nantucket National Wildlife Refuge

Comprehensive Conservation Plan

February 2013



Front cover:

Terns staging with the Great Point Lighthouse as a backdrop
Amanda Boyd/USFWS

Back cover:

Terns at Great Point
Amanda Boyd/USFWS



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 86 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

Nantucket National Wildlife Refuge

Comprehensive Conservation Plan

February 2013

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Nantucket National Wildlife Refuge

Comprehensive Conservation Plan

February 2013

Vision Statement

Nantucket National Wildlife Refuge (NWR), though diminutive in size, is an important part of a larger area aptly named Great Point. It has great value to the wildlife that uses its beaches, from coastal birds including piping plovers and terns, to mammals including gray seals. Situated at the tip of a peninsula, it is surrounded by a diverse assemblage of coastal, intertidal, wetland, and marine habitat, attracting a great diversity of fauna. It will continue to be managed as a special place for breeding, wintering, and migratory wildlife.

We will continue to provide opportunities for quality, compatible, wildlife-dependent experiences for the public. Nantucket NWR is recognized internationally as a premier fishing location, and the presence of its lighthouse provides the public with a destination that offers cultural perspective and panoramic views. Through strong partnerships, we will promote ecologically responsible use of the property, and continue to promote public awareness about the intrinsic value of dynamic coastal ecosystems.

U.S. Fish & Wildlife Service

Nantucket National Wildlife Refuge

Comprehensive Conservation Plan

February 2013

Summary

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

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

Location: Nantucket National Wildlife Refuge
Nantucket, MA

Administrative Headquarters: Eastern Massachusetts National Wildlife Refuge Complex
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This Comprehensive Conservation Plan (CCP) for the 21-acre Nantucket National Wildlife Refuge is the culmination of a planning effort that included participation from the Massachusetts Division of Fish and Wildlife, the Wampanoag Tribe of Gay Head (Aquinnah), the Mashpee Wampanoag Tribe, and local partners. This CCP establishes 15-year management goals and objectives for wildlife and habitats, public use, and administration of this important refuge.

Under this plan, we emphasize landscape-level conservation of coastal dune and beach habitat for sea and land birds of high conservation concern, including those listed as Federal or State endangered or threatened. An increased Service presence on the refuge, along with working more closely with our partners, will further advance conservation and result in more consistent and cooperative management on the peninsula. We will collaborate with others on research, inventory, and monitoring programs to ensure management is effective in achieving our goals and objectives. Pursuit of a 2,036-acre refuge expansion, acquiring high resource value lands in fee or easement from willing sellers, will also contribute significantly to protecting and conserving Federal trust resources on the island. Finally, we will work with our partners to protect resources while also providing quality, wildlife-dependent, recreational opportunities, including fishing, wildlife observation and photography, and environmental education and interpretation.

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Chapter 1



Karen Terwilliger/TCI

Great Point Lighthouse

The Purpose of, and Need for, Action

- Introduction
- The Purpose of, and Need for, the Proposed Action
- The Service and the Refuge System: Policies and Mandates Guiding our Planning
- Conservation Plans and Initiatives Guiding our Planning
- Refuge Establishing Purposes and Land Acquisition History
- Refuge Administration
- Refuge Operational Plans ("Stepdown" Plans)
- Refuge Vision Statement
- Refuge Goals

Introduction

The U.S. Fish and Wildlife Service (Service, we, our) acquired the land for the Nantucket National Wildlife Refuge (Nantucket NWR, refuge) in 1973 under the "Act Authorizing the Transfer of Certain Real Property for Wildlife or Other Purposes" from the U.S. Coast Guard (Coast Guard). Part of a larger sand spit known locally as "Great Point," the refuge consists of an approximately 21-acre parcel of land at the tip of the spit that is accessible through the adjacent 1,117-acre Coskata-Coatue Wildlife Refuge to the south. The Coskata-Coatue Wildlife Refuge is owned by The Trustees of Reservations (TTOR) which is a Massachusetts-based, non-governmental organization. The 498-acre Coatue Refuge owned by the Nantucket Conservation Foundation completes the protection of the more than 1,600-acre Coskata-Coatue Peninsula and its 20 miles of ocean, sound, and harbor coastline. The Coast Guard currently maintains management of a 1-acre inholding on Nantucket NWR that contains the Great Point Lighthouse. Nantucket NWR is one of eight refuges that comprise the Eastern Massachusetts NWR Complex (refuge complex), which is headquartered in Sudbury, Massachusetts. The refuge currently has no permanent staff or facilities on Nantucket Island.

In Massachusetts, most public and private property extends to the normal low water line, but no farther than 1,650 feet from the high water line. Therefore, when we refer to Service management responsibility for Nantucket NWR, or describe refuge shoreline management actions, we generally mean those areas above the normal low water line. The refuge encompasses its entire approved acquisition boundary (map 1-1).

Nantucket NWR is primarily a barrier beach system at the northern-most point of the Coskata-Coatue Peninsula on the eastern side of Nantucket Island (map 1-1). It is at this point that two longshore currents meet, running north, creating a riptide that extends offshore. Nantucket Island, "the land far at sea," is located about 25 miles south of Cape Cod in Nantucket Sound (map 1-2). Two smaller islands, Tuckernuck and Muskeget, lying just to the west of Nantucket, are also within the political boundary of the town of Nantucket. Bound by Nantucket Sound to the north and the Atlantic Ocean to the south, Nantucket Island is heavily influenced by maritime processes. Wind and wave energy, especially during storms, can alter the size and shape of the land due to sand movements. The location of the refuge on Great Point creates ever-changing coastlines and habitats through the natural processes of erosion and deposition of sand.

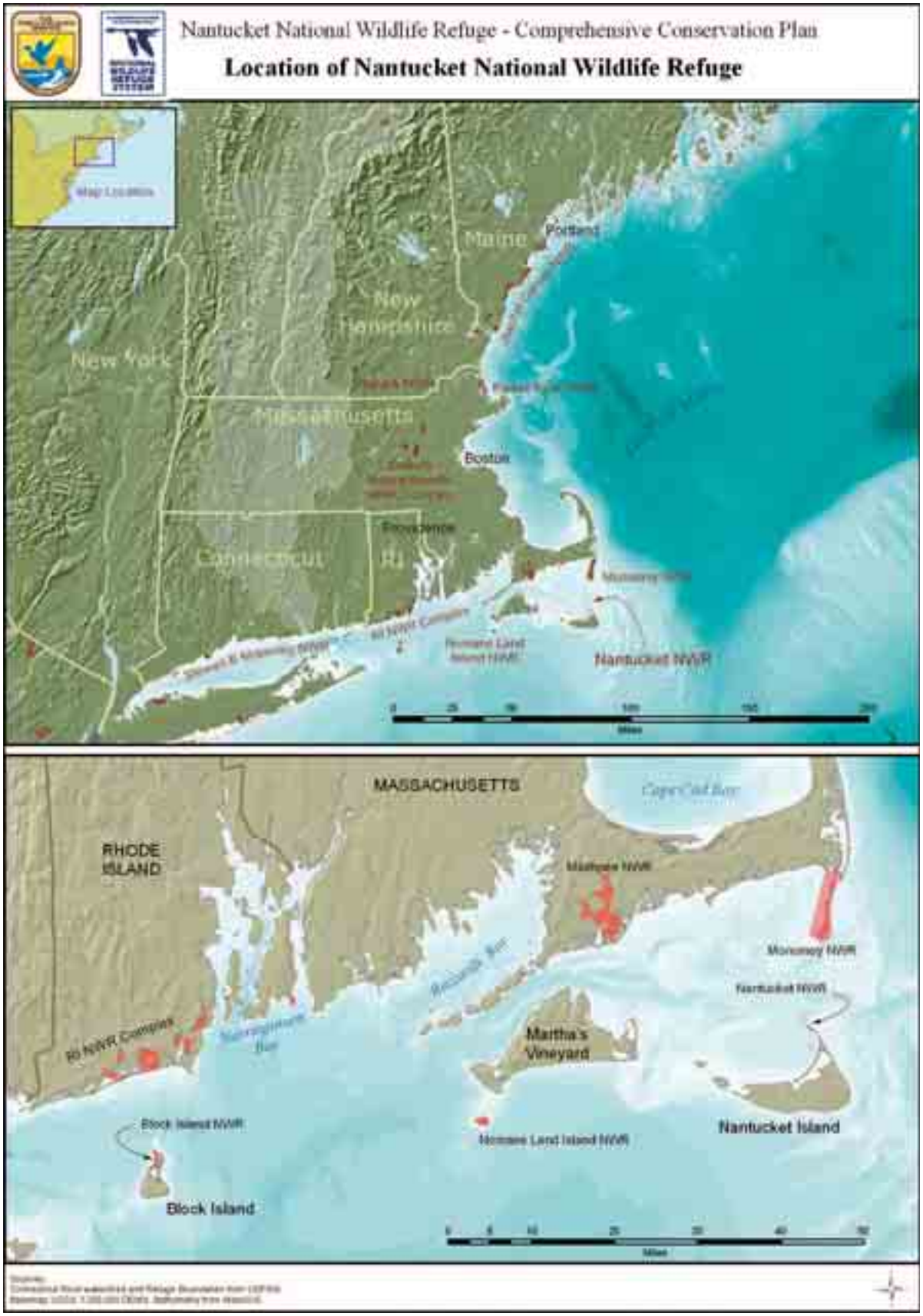
This Comprehensive Conservation Plan (CCP) for the refuge was prepared pursuant to the National Wildlife Refuge System Administrative Act of 1996, as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 6688dd et seq.; Refuge Improvement Act). An environmental assessment (EA), required by the National Environmental Policy Act of 1969 (NEPA), was prepared with the draft CCP.

This final CCP presents the combination of management goals, objectives, and strategies that we believe will best achieve our vision and goals for the refuge; contribute to the mission of the National Wildlife Refuge System (Refuge System); achieve the refuge purposes; fulfill legal mandates; address key issues; incorporate sound principles of fish and wildlife management, and serve the American public. This CCP will guide management decisions and actions on the refuge over the next 15 years. It will also help us communicate our priorities to the Commonwealth of Massachusetts' natural resource agencies, our conservation partners, local communities, and the public.

Map 1-1. Nantucket National Wildlife Refuge



Map 1-2. Location of Nantucket National Wildlife Refuge



Chapter 1, "The Purpose of and Need for Action," explains the purpose of, and need for, preparing a CCP, and sets the stage for four subsequent chapters and nine appendices. Specifically, it:

- Defines our planning analysis area.
- Presents the mission, policies, and mandates affecting the development of the plan.
- Identifies other conservation plans we used as references.
- Lists the purposes for which the refuge was established and its land acquisition history.
- Clarifies the vision and goals that drive refuge management.
- Describes our planning process and its compliance with NEPA regulations.
- Identifies public and partner issues or concerns that surfaced as we developed the plan.

Chapter 2, "The Planning Process," describes the planning process and its compliance with NEPA regulations, and identifies public issues or concerns that surfaced as we developed the plan.

Chapter 3, "Refuge and Resource Descriptions," describes the physical, biological, and human environments of the refuge.

Chapter 4, "Management Direction and Implementation," presents current and future management actions and their objectives and strategies for meeting refuge goals and addressing public issues.

Chapter 5, "Consultation and Coordination with Others," summarizes how we involved the public and our partners in the planning process. Public involvement is vital for the future management of this refuge and all national wildlife refuges.

Twelve appendices, a glossary with acronyms, and a bibliography (literature cited) provide additional documentation and references to support our narratives and analysis.

The Purpose of, and Need for, the Proposed Action

We developed a CCP for the refuge that, in the Service's best professional judgment, best achieves the purposes, goals, and vision of the refuge. It contributes to the Refuge System's mission, adheres to the Service's policies and other mandates, addresses identified issues of significance, and incorporates sound principles of fish and wildlife science.

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

Goal 1. Perpetuate and enhance the biological integrity and diversity of coastal habitats on and around Nantucket Island to support and enhance native wildlife and plant communities, with an emphasis on species of conservation concern.

Goal 2. Promote awareness and stewardship of our coastal natural resources by providing compatible, wildlife-dependent recreation and education opportunities on the refuge and within the local and visitor community on and around Nantucket Island.

Goal 3. Perpetuate and enhance long-term conservation and management of wildlife resources on and around Nantucket Island through partnerships and land protection with public and private landowners, Federal, State, and local entities.

The *need* for a CCP is manifold. First, the Improvement Act requires us to write CCPs for all national wildlife refuges by 2012 to help fulfill the mission of the refuge system. New policies to implement the strategic direction in the Improvement Act have 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 direction for refuge management.
- Justifying budget requests for staffing, operation, and maintenance funds.

Second, this refuge lacks a master plan with strategic management direction to guide our decisions. The environment of the refuge has changed considerably since 1973. Most notably, the population on Nantucket has nearly tripled between 1970 and 2000 (U.S. Census Bureau, *http://quickfacts.census.gov/qfd/states/25/25019.html*; accessed March 2011). The economy and patterns of land use are changing, and with it, the pressures for public use and access continue to increase. We have a better understanding about the plants and animals found on the refuge than we did in 1973. New ecosystem and species conservation plans have developed that bear directly on refuge management. We also must evaluate the need for administrative and visitor facilities, including their locations, to ensure the best customer service possible. Finally, as responsible stewards of Federal lands, conveying our vision and priorities for the refuge to our partners and the public is imperative.

The Service and the Refuge System: Policies and Mandates Guiding our Planning

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

As part of the Department of the Interior (Department), the Service administers the refuge system. The Service 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. We also enforce Federal wildlife laws and international treaties on importing and exporting wildlife, assist states with their fish and wildlife programs, and help other countries develop conservation programs.

The Service Manual, available online at: *http://www.fws.gov/policy/manuals* (accessed March 2011), contains the standing and continuing directives on implementing our authorities, responsibilities, and activities. The 600 series of the Service Manual addresses land use management and sections 601 to 609 specifically address management of national wildlife refuges. We publish special directives that affect the rights of citizens or the authorities of other agencies separately in the Code of Federal Regulations (CFR); the Service Manual does not duplicate them (see 50 CFR 1–99 at: *http://www.gpoaccess.gov/cfr/index.html;* accessed March 2011).

Herring gull on refuge sign



Amanda Boyd/USFWS

The National Wildlife Refuge System and its Mission and Policies

The refuge system, of which Nantucket NWR is a part, is the world's largest collection of lands and waters set aside specifically for the conservation of wildlife and the protection of ecosystems. More than 560 national wildlife refuges encompass more than 150 million acres of lands and waters in all 50 States and several island territories. Each year, more than 40 million visitors hunt, fish, observe and photograph wildlife, or participate in environmental education and interpretation on refuges.

In 1997, President Clinton signed into law the National Wildlife Refuge System Improvement Act (Public Law 105–57). 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. It also states that the refuge system must focus on wildlife conservation and 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.*
>
> *—National Wildlife Refuge System Improvement Act*

The Refuge Manual contains policy governing the operation and management of the refuge system that the Service Manual does not cover, including technical information on implementing refuge polices and guidelines on enforcing laws. You can review that manual at the refuge complex headquarters. These are a few noteworthy policies instrumental in developing this CCP.

You may view them on the Web site *http://www.fws.gov/policy/manuals/part.cfm?series=600&seriestitle=LAND%20USE%20AND%20MANAGEMENT%20SERIES* (accessed March 2011).

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 (U.S.).
- Provide and enhance opportunities to participate in compatible, wildlife-dependent recreation.
- Help to foster public understanding and appreciation of the diversity of fish, wildlife, and plants and their habitats.

This policy also establishes management priorities for the refuge system.

- Conserve fish, wildlife, and plants and their habitats.
- Facilitate compatible, wildlife-dependent, recreational uses.
- Consider other appropriate and compatible uses.

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 we will manage all refuges in accordance with an approved CCP that, when implemented, will help:

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

This planning policy provides step-by-step directions and identifies the minimum requirements for developing all CCPs including reviewing any existing special designation areas such as wilderness and wild and scenic rivers, specifically addressing the potential for any new special designations, conducting a wilderness review, and incorporating a summary of that review into each CCP (602 FW 3).

Policy on the 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 (when the refuge is open to public use). 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 involves the taking of fish and/or wildlife under State regulations.

4. The use has been found to be appropriate after concluding a specified findings process using 10 specific criteria included in the policy.

You may view this policy on the Web site *http://www.fws.gov/policy/603fw1.html* (accessed March 2011).

Policy on Compatibility
This policy (603 FW 2) complements the appropriateness policy. The refuge manager first must find a use appropriate before undertaking a compatibility review of that use. If the proposed use is not appropriate, the refuge manager will not allow it, and a compatibility determination is unnecessary. However, the refuge manager must evaluate an appropriate use further, through a compatibility determination. The direction in 603 FW 2 provides guidance on how to prepare a compatibility determination. Other guidance in that chapter is as follows:

- The Improvement Act and its regulations require an affirmative finding by the refuge manager on the compatibility of a public use before we allow it on a national wildlife refuge.

- A compatible use is one "that will not materially interfere with or detract from the fulfillment of the mission of the refuge system or the purposes of the refuge."

- The act defines six wildlife-dependent uses that are to receive enhanced consideration on refuges: "hunting, fishing, wildlife observation and photography, and environmental education and interpretation."

- The refuge manager may authorize those priority uses on a refuge when they are compatible and consistent with public safety.

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

- The refuge manager may reevaluate the compatibility of a use at any time: for example, sooner than its mandatory date, or even before we complete the CCP process, if new information reveals unacceptable impacts or incompatibility with refuge purposes (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.

You may view this policy on the Web site *http://www.fws.gov/policy/603fw2.html* (accessed March 2011).

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. You may view this policy on the Web site *http://www.fws.gov/policy/601fw3.html* (accessed March 2011).

Policy on Wilderness Stewardship
This policy (610 FW 1-3) provides guidance for managing refuge system lands designated as wilderness under the Wilderness Act of 1964 (16 U.S.C. § 1131–1136; PL 88–577). The Wilderness Act establishes a National Wilderness Preservation System (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. Our wilderness stewardship policy also provides guidance on development of wilderness stewardship plans and clarifies when prohibited uses may be necessary for wilderness preservation.

Service planning policy requires that we evaluate the potential for wilderness on refuge lands, as appropriate, during the CCP planning process (610 FW 1). Section 610 FW 4 of our Wilderness Stewardship Policy provides guidance on the wilderness review process. Sections 610 FW 1-3 provide management guidance for designated wilderness areas. You may view this policy on the Web site *http://www.fws.gov/policy/610fw1.html* (accessed March 2011).

Policy on Wildlife-dependent Public Uses
This policy (605 FW 1) presents specific guidance about wildlife-dependent recreation programs within the refuge system. We develop our wildlife-dependent recreation programs on refuges in consultation with State fish and wildlife agencies and stakeholder input based on the following specific criteria:

1. Promotes safety of participants, other visitors, and facilities.

2. Promotes compliance with applicable laws and regulations and responsible behavior.

3. Minimizes or eliminates conflict with fish and wildlife population or habitat goals or objectives in an approved plan.

4. Minimizes or eliminates conflicts with other compatible, wildlife-dependent recreation.

5. Minimizes conflicts with neighboring landowners.

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

7. Promotes resource stewardship and conservation.

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

9. Provides reliable/reasonable opportunities to experience wildlife.

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

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

You may view this policy on the Web site *http://www.fws.gov/policy/605fw1.html* (accessed March 2011).

Native American Policy
Since the inception of the United States, the U.S. Government has recognized the sovereignty of American Indian Tribes by entering into treaties with them. Moreover, the Constitution ascribes the official duties of conducting relations with the Tribes to the Federal Government, not the states (Tallbear undated), and judicial decisions have upheld this relationship over time. This government-to-government relationship provides the framework for all interactions between the U.S. Government and American Indian Tribes. The U.S. Government has also recognized the Federal trust responsibility it has to, in the most general terms, assist American Indian Tribes in protecting their rights and property (Tallbear undated). The Secretary of the Interior announced a new Tribal consultation policy on December 1, 2011. This new policy sets out detailed requirements and guidelines for Department of the Interior officials and managers to follow to ensure they are using the best practices and most innovative methods to achieve meaningful consultation with federally recognized Tribes. Any regulation, rulemaking, policy, guidance, legislative proposal, grant funding formula change or operational activity that may have a substantial and direct effect on a Tribe is subject to Tribal consultation.

In addition, the Departments of the Interior and Commerce released a Secretarial Order (#3206) regarding American Indian Tribal rights and the Endangered Species Act (ESA) that acknowledges this government-to-government relationship. Further, it states "Accordingly, the Departments will carry out their responsibilities under the Act in a manner that harmonizes the Federal trust responsibility to Tribes, Tribal sovereignty, and statutory missions of the Departments…." All branches of the U.S. Government have the responsibility to uphold the tenets of this relationship and to consider the rights, needs, and values of Native American Tribes.

The Service developed and adopted a Native American Policy in 1994. The Service's purpose in creating this policy is to "articulate the general principles that will guide the Service's government-to-government relationship to Native American governments in the conservation of fish and wildlife resources."

The Native American Policy of the U.S. Fish and Wildlife Service (1994) is outlined as follows:

- The Service recognizes the sovereign status of Native American governments.

- There is a unique and distinctive political relationship between the United States and Native American governments…that differentiates Native American governments from other interests and constituencies.
- The Service will maintain government-to-government relationships with Native American governments.
- The Service recognizes and supports the rights of Native Americans to utilize fish and wildlife resources on non-reservation lands where there is a legal basis for such use.
- While the Service retains primary authority to manage Service lands, affected Native American governments will be afforded opportunities to participate in the Service's decision-making process for Service lands.
- The Service will consult with Native American governments on fish and wildlife resource matters of mutual interest and concern to the extent allowed by the law. The goal is to keep Native American governments involved in such matters from initiation to completion of related Service activities.
- The Service will assist Native American governments in identifying Federal and non-Federal funding sources that are available to them for fish and wildlife resource management activities.
- The Service will involve Native American governments in all Service actions that may affect their cultural or religious interests, including archaeological sites.
- The Service will provide Native Americans reasonable access to Service managed or controlled lands and waters for exercising ceremonial, medicinal, and traditional activities recognized by the Service and by Native American governments. The Service will permit these uses if the activities are consistent with treaties, judicial mandates, or Federal and Tribal law and are compatible with the purposes for which the lands are managed.
- The Service will encourage the use of cooperative law enforcement as an integral component of Native American, Federal, and State agreements relating to fish and wildlife resources.
- The Service will provide Native American governments with the same access to fish and wildlife resource training programs as provided to other government agencies.
- The Service's basic and refresher fish and wildlife law enforcement training courses that are provided to other governmental agencies will also be available to Native Americans.
- The Service will facilitate the education and development of Native American fish and wildlife professionals by providing innovative educational programs and on-the-job training opportunities. The Service will establish partnerships and cooperative relationships with Native American educational institutions. The Service will also ensure that Native American schools and children are included in its environmental education outreach programs.
- The Service will actively encourage qualified Native Americans to apply for jobs with the Service, especially where the Service is managing fish and wildlife resources where Native Americans have management authority or cultural or religious interests.

- The Service will work with Native Americans to educate the public about Native American treaty and federally reserved rights, laws, regulations, and programs related to fish and wildlife.

You may view this policy on the Web site *http://www.fws.gov/northeast/nativeamerican/imp_plan.html* (accessed March 2011).

Other Mandates

Although Service and refuge system policy and the purpose(s) of each refuge provide the foundation for its management, other Federal laws, executive orders, treaties, interstate compacts, and regulations on conserving and protecting natural and cultural resources also affect how we manage refuges. 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 the CCP for each refuge to identify its archaeological and cultural values. Many of these that are relevant to Nantucket NWR are summarized below.

The following summaries were taken, in most cases, directly from our "Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service," located at: *http://www.fws.gov/laws/Lawsdigest.html* (accessed March 2011), and from our Draft U.S. Fish and Wildlife Service Tribal Consultation Guide (Monette 2009).



Karen Terwilliger/TCI

Great Point Lagoon

The Antiquities Act of 1906 as amended (PL 59-209; 34 Stat. 225; 16 U.S.C. § 431-433) is the earliest and most basic legislation for protecting cultural resources on Federal lands. It provides misdemeanor-level criminal penalties to control unauthorized uses. Appropriate scientific uses may be authorized through permits, and materials removed under a permit must be permanently preserved in a public museum. The 1906 act is broader in scope than the 1979

Archaeological Resources Protection Act (ARPA), which partially supersedes it. Uniform regulations in 43 CFR Part 3 implement the act.

The Historic Sites, Buildings and Antiquities Act (16 U.S.C. § 461–462, 464–467; 49 Stat. 666) of August 21, 1935, popularly known as the Historic Sites Act, as amended by Public Law 89–249, approved October 9, 1965, (79 Stat. 971), declares it a national policy for the first time to preserve historic sites and objects of national significance, including those located on refuges. It provides authorization to the Secretary of the Interior through the National Park Service to conduct archaeological surveys, and to designate, acquire, administer, protect, and purchase properties of historic significance. National Historic and Natural Landmarks are designated under the authority of this act, which are eventually incorporated into the National Historic Register under the 1966 National Historic Preservation Act.

The Archeological and Historic Preservation Act (16 U.S.C. § 469–469c; PL 86–523,) approved June 27, 1960, (74 Stat. 220) as amended by Public Law 93–291, approved May 24, 1974, (88 Stat. 174) carries out the policy established by the Historic Sites Act (see above). It directs Federal agencies to notify the Secretary of the Interior whenever they find that any alteration of terrain caused by a Federal or Federal-assisted licensed or permitted project may cause the loss or destruction of significant scientific, prehistoric, or archaeological data. This expands the number of Federal agencies responsible for carrying out this law. The act authorizes the use of appropriated, donated or transferred funds for the recovery, protection, and preservation of those data.

The National Historic Preservation Act of 1966 (16 U.S.C. § 470–470b, 470c–470n), Public Law 89–665, approved October 15, 1966, (80 Stat. 915) and repeatedly amended, provides for the preservation of significant historical properties (buildings, objects, and sites) through a grant-in-aid program to the states. It establishes a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. § 468–468d). This act establishes an Advisory Council on Historic Preservation, which became a permanent, independent agency in Public Law 94–422, approved September 28, 1976, (90 Stat. 1319). The act created the Historic Preservation Fund. It directs Federal agencies, and any state, local, or private entity associated with a Federal undertaking, to conduct a Section 106 Review, or to identify and assess the effects of their actions on items or sites listed or eligible for listing on the National Register. Most significantly, this act established that archaeological preservation was an important and relevant component at all levels of modern society, and it enabled the Federal Government to facilitate and encourage archaeological preservation, programs, and activities in the state, local, and private sectors.

American Indian [Native American] Religious Freedom Act of 1978 as amended (PL 95-431; 92 Stat. 469; 42 U.S.C. § 1996) resolves that it shall be the policy of the United States to protect and preserve for the American Indian, Eskimo, Aleut, and Native Hawaiian the inherent right of freedom to believe, express, and exercise their traditional religions, including access to religious sites, use and possession of sacred objects, and freedom to worship through ceremonial and traditional rites. Federal agencies are directed to evaluate their policies and procedures to determine if changes are needed to protect such rights and freedoms from agency practices. The act is a specific expression of First Amendment guarantees of religious freedom. It is not implemented by regulations.

The Archaeological Resources Protection Act (ARPA) (16 U.S.C. § 470aa–470ll; Public Law 96–95) approved October 31, 1979, (93 Stat. 721), largely supplanted the resource protection provisions of the Antiquities Act of 1906 for archaeological items. ARPA establishes detailed requirements for issuance of permits for any excavation for, or removal of, archaeological resources from Federal or Native American lands. It also provides detailed descriptions of prohibited actions, thereby strengthening enforcement capabilities. It establishes more severe civil and criminal penalties for the unauthorized excavation, removal, or damage of those resources; for any trafficking in those removed from Federal or Native American land in violation of any provision of Federal law; and for interstate and foreign commerce in such resources acquired, transported or received in violation of any state or local law.

Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, as amended (PL 101-601; 104 Stat. 3048; 25 U.S.C. § 3001 et esq.) establishes rights of American Indian Tribes and Native Hawaiian organizations to claim ownership of certain cultural items, including human remains, funerary objects, sacred objects, and objects of cultural patrimony, held or controlled by Federal agencies and museums that receive Federal funds. It requires agencies and museums to identify holdings of such remains and objects, and to work with appropriate Native Americans toward their repatriation. Permits for the excavation and/or removal of cultural items protected by the act require Native American consultation, as do discoveries of cultural items made during Federal land use activities. The Secretary of the Interior's implementing regulations are at 43 CFR Part 10. In the case that human remains are discovered on the refuge, NAGPRA establishes a procedural framework to follow, and this process may also be coordinated with the Commonwealth of Massachusetts and its laws and procedural framework as necessary.

Executive Order 13007 (Indian Sacred Sites), dated May 24, 1996, establishes new requirements for the protection and preservation of Indian religious practices. Each Federal agency is required to accommodate access to, and ceremonial use of, Indian sacred sites by Indian practitioners, and avoid adversely affecting the physical integrity of such sacred sites. Each agency is required to develop and implement procedures in compliance with the Presidential memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments," including consultation with Tribal governments. The developed procedures, where practicable and appropriate, are to ensure that reasonable notice is provided about proposed actions or land management policies that may restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites. Each agency is to report to the President the procedures implemented or proposed to facilitate consultation with appropriate Tribes and religious leaders and the expeditious resolution of disputes relating to agency action on Federal lands that may adversely affect access to, ceremonial use of, or the physical integrity of sacred sites.

On June 5, 1997, the Secretaries of the Interior and Commerce jointly issued Secretarial Order 3206 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act). This order provides guidance about the Federal-Tribal relationship, and its relationship to Tribal rights, trust responsibilities, and the ESA. It clarifies responsibilities when action is taken under the ESA that affects (or may affect) Indian lands, Tribal trust resources, or the exercise of Indian Tribal rights. It further acknowledges the trust responsibility and treaty obligations of the United States toward Tribes and Tribal members, and the government-to-government relationship in dealing with Tribes. It directs that the responsibilities under the ESA are to be carried out

in a manner that harmonizes trust responsibilities, Tribal sovereignty, statutory missions, and strives to ensure that Tribes do not bear a disproportionate burden for the conservation of listed species.

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

The Environmental Justice program, established by Presidential Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations), requires Federal agencies, including the Service, to ensure that all environmental policies and the disposal of toxic waste do not adversely impact minority and low-income communities, including Tribes. The common concern is that these communities are exposed to unfair levels of environmental risk arising from multiple sources, often coupled with inadequate government response.

Chapter 4 in the EA/draft CCP, "Environmental Consequences," evaluates this plan's compliance with the acts noted above, and with the Clean Water Act of 1977, as amended (33 U.S.C. § 1251, et seq.; Public Law 107–303), the Clean Air Act of 1970, as amended (42 U.S.C. § 7401 et seq.), and the ESA of 1973 (16 U.S.C. § 1531–1544), as amended. Finally, we designed the EA/draft CCP to comply with NEPA and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500–1508).

Conservation Plans and Initiatives Guiding our Planning

Strategic Habitat Conservation and Landscape Conservation Cooperatives

The Service has a goal of establishing and building capacity for science-driven landscape conservation on a continental scale. Our approach, known as Strategic Habitat Conservation (SHC), applies adaptive resource management principles to the entire range of species, groups of species, and natural communities of vegetation and wildlife. This approach is founded on an adaptive, iterative process of biological planning, conservation design, conservation delivery, monitoring, and research. The Service is refining this approach to conservation in a national geographic framework. We will work with partners to develop national strategies to help wildlife adapt in a climate-changed world, with a focus on declining species populations. This geographic frame of reference will also allow us to more precisely explain to partners, Congress, and the American public why, where, and how we target resources for landscape-scale conservation, and how our efforts connect to a greater whole.

Twenty-two Landscape Conservation Cooperatives (LCC) have been established throughout the country to ensure the sustainability of North America's land, water, wildlife, and cultural resources. These are private-public partnerships composed of states, Tribes, Federal agencies, non-governmental organizations, universities, and others. Nantucket NWR is located within the North Atlantic Landscape Conservation Cooperative. Within each LCC, the Service is identifying a list of representative species for designing conservation and management strategies that will most effectively sustain fish and wildlife populations at desired levels in the face of land use change, climate change and

other stressors. Representative species are those whose habitat needs, ecosystem function or management responses are similar to a group of other species. It is assumed that conservation planning and actions for a representative species will also address the needs of other species. We considered the SHC and LCC in identifying species of concern in appendix A, and in developing management objectives and strategies under goal 1.

Climate Change

Secretarial Order 3289, issued on March 11, 2009, establishes a commitment by the Department to address the challenges posed by climate change to Tribes and to the cultural and natural resources the Department oversees. This order promotes the development and use of renewable energy on public lands, adapting land management strategies to mitigate the effects of climate change, initiating multi-agency coalitions to address issues on a landscape level, and incorporating climate change priorities in long-term planning. These and other actions will be overseen by a Climate Change Response Council which is responsible for creating a Departmentwide climate change strategy.

As the principal agency responsible for the conservation of the Nation's fish, wildlife, and plant resources, the Service has drafted a Climate Change Strategic Plan and a 5-Year Action Plan to jump-start implementation of the strategic plan. These plans provide a framework in which the Service works with others on a landscape-scale to promote the persistence of native species, habitats, and natural communities. Specifically, these plans are based on three overall strategies. These are: adaptation (management actions the Service will take to reduce climate change impacts on wildlife and habitats), mitigation (consuming less energy and using less materials in administering land and resources), and engagement (outreach to the larger community to build knowledge and share resources to better understand climate change impacts). Both plans can be found at: *http://www.fws.gov/home/climatechange/response.html* (accessed March 2011).

Birds of Conservation Concern 2008 Report

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

Piping plover



Amanda Boyd/USFWS

The report contains 46 lists that identify bird species of conservation concern at national, regional, and landscape scales. It includes a principal national list, regional lists corresponding to the regional administrative units of the Service, and species lists for each of the 35 bird conservation regions (BCRs) designated by the North American Bird Conservation Initiative (NABCI) in the United States, and two additional BCRs we created to fulfill the purpose of the report that include island "territories" of the United States. NABCI defined those BCRs as ecologically based units in a framework for planning, implementing, and evaluating bird conservation.

We hope those national and regional reports will stimulate Federal, state, and private agencies to coordinate, develop, and implement integrated approaches for conserving and managing the birds deemed most in need of conservation. This is one of the plans we considered in identifying species of concern in appendix A and developing management objectives and strategies in goal 1.

North American Waterfowl Management Plan (update 2004) and Atlantic Coast Joint Venture Implementation Plan (ACJV 2008)

Originally written in 1986, the NAWMP describes a 15-year strategy among the United States, Canada, and Mexico to restore and sustain waterfowl populations by protecting, restoring, and enhancing habitat. The plan committee, including representatives from each nation, has modified the 1986 plan twice to account for biological, sociological, and economic changes that influenced the status of waterfowl and the conduct of cooperative habitat conservation. The most recent modification, in 2004, (NAWMP 2004) updates the needs, priorities, and strategies for the next 15 years, increases stakeholder confidence in the direction of its actions, and guides partners in strengthening the biological foundation of North American waterfowl conservation. You may review the plan at: *http://www.fws.gov/birdhabitat/NAWMP/Planstrategy.shtm* (accessed March 2011).

To convey goals, priorities, and strategies more effectively, NAWMP 2004 is comprised of two separate documents: "Strategic Guidance" and "Implementation Framework." The former is geared towards 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 three species Joint Ventures: Arctic goose, American black duck, and sea duck. Our project area lies in the Atlantic Coast Joint Venture (ACJV), which includes all the Atlantic flyway states from Maine to Florida and Puerto Rico. The waterfowl goal for the ACJV is "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."

In 2009, a revision of the original ACJV Strategic Plan (ACJV 2009) was completed. The ACJV 2009 plan presents habitat conservation goals and population indices for the ACJV consistent with the NAWMP update, provides status assessments of waterfowl and their habitats in the joint venture, and updates focus area narratives and maps for each state. That document is intended as a blueprint for conserving the valuable breeding, migration, and wintering waterfowl habitat present within the ACJV boundary based on the best available information and the expert opinion of waterfowl biologists from throughout the flyway. You may review the ACJV 2009 Strategic Plan at: *http://www.acjv.org/resources.htm* (accessed March 2011).

The Black Duck and Sea Duck Joint Venture plans also relate to Nantucket NWR. Black ducks (*Anas rubripes*) have been documented on adjacent TTOR property and multiple species of sea ducks can be found in the nearshore waters of the refuge throughout the year, and may use refuge beaches for resting. These plans can be viewed at: *http://www.pwrc.usgs.gov/bdjv/* (accessed March 2011), and *http://www.seaduckjv.org/pdf/sdjvprospectus.pdf* (accessed March 2011).

We considered these plans in identifying species of concern in appendix A, and in developing management objectives and strategies under goal 1.

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

The refuge lies in the New England/Mid-Atlantic BCR 30 (see map 3-1). BCR 30 provides important resources for migratory birds whose ranges span the western hemisphere. The habitats associated with coastal ecosystems provide the highest habitat values and critical staging areas for migratory waterfowl, waterbirds,

shorebirds, and landbirds. Forested upland communities are the second most important habitats for migratory birds in this BCR. Though the plan specifically highlights the Chesapeake and Delaware Bays, the Massachusetts Cape Cod and Islands area provides crucial resources for many migrating birds as they journey from their breeding sites in the north to non-breeding sites in Mexico, Central America, the Caribbean, and South America.

Unfortunately, most of the lands in BCR 30 have been altered from their historic condition. Urban development and agriculture dominates much of the landscape. The loss or degradation of habitat (e.g., by fragmentation, agriculture, and invasive species) are the greatest threats to bird populations in BCR 30. This plan identifies the bird species and habitats in greatest need of conservation action in this region, activities thought to be most useful to address those needs, and geographic areas believed to be the most important places for those activities. This plan is meant to start a regional bird conservation initiative of partners across BCR 30 communicating their conservation planning and implementation activities to deliver high-priority conservation actions in a coordinated manner. You may view the BCR 30 implementation plan at: *http://www.acjv.org/BCR_30/BCR30_June_23_2008_final.pdf* (accessed March 2011). We considered this plan in identifying species of concern in appendix A, and in developing management objectives and strategies under goal 1.

North American Waterbird Conservation Plan (Version 1, 2002)

This plan (Kushlan et al. 2002) represents a partnership among individuals and institutions with the interest in, and responsibility for, conserving waterbirds and their habitats. The plan is just one element of a multi-faceted conservation program. Its primary goal is to ensure that the distribution, diversity, and abundance of populations and habitats of breeding, migratory, and non-breeding waterbirds are sustained or restored throughout the lands and waters of North America, Central America, and the Caribbean. It provides a framework for conserving and managing nesting water-dependent birds. In addition, it facilitates continentwide planning and monitoring, national, state, and provincial conservation, regional coordination, and local habitat protection and management. You may access the plan at: *http://www.nawcp.org/pubs/ContinentalPlan.cfm* (accessed March 2011).

In 2006, the Mid-Atlantic New England Working Group developed the Waterbird Conservation Plan for the Mid-Atlantic/New England/Maritimes (MANEM) Region (MANEM Waterbird Working Group 2007). This plan is being implemented between 2006 and 2010. It consists of technical appendices on (1) waterbird populations including occurrence, status, and conservation needs, (2) waterbird habitats and locations within the region that are crucial for waterbird sustainability, (3) MANEM partners and regional expertise for waterbird conservation, and (4) conservation project descriptions that present current and proposed research, management, habitat acquisition, and education activities. Summarized information on waterbirds and their habitats provides a regional perspective for local conservation action. You may access the plan at: *http://www.fws.gov/birds/waterbirds/manem/index.html* (accessed March 2011).

We considered this plan in identifying species of concern in appendix A, and in developing management objectives and strategies under goal 1.

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

Concerns about shorebirds led to the creation of the U.S. Shorebird Conservation Plan in 2000 which was updated in 2001 (Brown et al. 2001). Developed in partnership with individuals and organizations throughout the United States, the plan presents conservation goals for each U.S. region, identifies important habitat conservation and research needs, and proposes education and outreach programs to increase public awareness of shorebirds and of threats to them. You may read the plan at: *http://www.fws.gov/shorebirdplan/USShorebird/downloads/USShorebirdPlan2Ed.pdf* (accessed March 2011).

Piping plover on nest



Karen Terwilliger/TCI

In the Northeast, the North Atlantic Regional Shorebird Plan (Clark and Niles, North Atlantic Shorebird Habitat Working Group 2000) was drafted to step down the goals of the continental plan to smaller scales to identify priority species, habitat, and species goals, and implementation projects. You may view the North Atlantic Regional Shorebird Plan at: *http://www.fws.gov/shorebirdplan/RegionalShorebird/RegionalPlans.htm* (accessed March 2011).

We considered this plan in identifying species of concern in appendix A, and in developing management objectives and strategies under goal 1.

Partners In Flight Bird Conservation Plans

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

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

Our project area lies in Physiographic Area 09 (see map 3-1), the Southern New England Region (Dettmers and Rosenberg 2000). This plan can be accessed at: *http://www.blm.gov/wildlife/plan/pl_09_10.pdf* (accessed March 2011).

We referred to this plan in developing our list of species of conservation concern in appendix A, as well as our habitat objectives and strategies under goal 1.

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

Partners in Amphibian and Reptile Conservation (PARC) was created in response to the increasing, well-documented national declines in amphibian and reptile populations. Many consider it the most comprehensive effort in herpetofaunal conservation in the nation. PARC members include state and Federal agencies, conservation organizations, museums, the pet trade industry, nature centers, zoos, the energy industry, universities, herpetological organizations, research laboratories, forest industries, and environmental consultants. Its five geographic regions—Northeast, Southeast, Midwest, Southwest, and Northwest—can focus on national and regional challenges in herpetofaunal conservation. Regional working groups allow for region-specific communication. The Northeast working group has developed "Model State Herpetofauna Regulatory Guidelines" which we consulted as we developed our strategy. This document can be found at: *http://www.pwrc.usgs.gov/neparc/products/modelherpregs.htm* (accessed March 2011).

The National State Agency Herpetological Conservation Report (NHCR) is a summary report (PARC 2004) sponsored by PARC that provides a general overview of each state wildlife agency's support for reptile and amphibian conservation and research through September 2004. It lists amphibian and reptile species of concern for each state. Each state report was compiled in cooperation with its agency's lead biologist on herpetofaunal conservation. That report can be accessed at: *http://www.parcplace.org/documents/PARCNationalStates2004.pdf* (accessed March 2011). Its purpose is to facilitate communication among state agencies and partner organizations throughout the PARC network to identify and address regional and national herpetological priorities.

PARC intends to expand the scope of the NHCR to include other states, provinces, and territories. It will include other state agencies that are supporting herpetofaunal conservation and research, such as transportation departments, park departments, and forest agencies. The next NHCR report will integrate a list of the Species of Conservation Concern into each state's comprehensive conservation wildlife strategy (see below).

Massachusetts Comprehensive Wildlife Conservation Strategy (Revised September 2006)

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

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

The Massachusetts plan (MA DFG 2006), commonly referred to as the Massachusetts Comprehensive Wildlife Conservation Strategy (CWCS), resulted from that charge. It creates a vision for conserving Massachusetts' wildlife and stimulates other state and Federal agencies, and conservation partners to think strategically about their individual and coordinated roles in prioritizing conservation.

In addressing the eight elements below, the Massachusetts CWCS helps supplement the information we gathered on species and habitat occurrences and their distribution in our area analysis, and identify conservation threats and

management strategies for species and habitats of conservation concern in the CCP. The expertise convened to compile this plan and its partner and public involvement further enhance its benefits for us. We used the Massachusetts CWCS in developing our list of species of concern in appendix A, and the management objectives and strategies for goal 1. These eight elements are:

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

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

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

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

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

6. Descriptions of procedures to review the plan at intervals not to exceed 10 years.

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

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

The State of Massachusetts submitted its CWCS in October 2005, and it was revised in September 2006. You may view it at: *http://www.mass.gov/dfwele/dfw/habitat/cwcs/pdf/mass_cwcs_final.pdf* (accessed March 2011).

Other Information Sources

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

Continental or National Plans

- National Audubon Society Watch List (Butcher et al. 2007); available at: *http://birds.audubon.org/sites/default/files/documents/watchlist2007-technicalreport.pdf* (accessed March 2011).

- National Wetlands Research Center Strategic Plan; available at: *http://www.nwrc.usgs.gov/about/5-year-plan.htm* (accessed March 2011).

- Coastal Zone Management Act of 1972; available at: *http://www.nps.gov/history/local-law/FHPL_CstlZoneMngmt.pdf* (accessed March 2011).

- Marine Mammal Protection Act (MMPA) of 1972, as amended in 2007; available at: *http://www.nmfs.noaa.gov/pr/pdfs/laws/mmpa.pdf* (accessed March 2011).

Regional Plans

- Gulf of Maine-Ecosystem Priorities (Taylor 2008); available at: *http://www.gulfofmaine.org/ebm/toolkitsurvey/GulfofMaineEBMToolkitSurveyReport.pdf* (accessed March 2011).

State Plans

- Guidelines for Managing Recreational Use of Beaches to Protect Piping Plovers, Terns, and Their Habitats in Massachusetts (MA Natural Heritage Endangered Species Program (NHESP) 1993; see appendix I).

- BioMap Program (MA NHESP 2004); available at: *http://www.mass.gov/dfwele/dfw/nhesp/land_protection/biomap/biomap_home.htm* (accessed March 2011).

- Living Waters Program (MA NHESP 2004); available at: *http://www.mass.gov/dfwele/dfw/nhesp_temp/land_protection/living_waters/living_waters_home.htm* (accessed March 2011).

- Massachusetts Natural Communities (Swain and Kearsley 2001); available at: *http://www.mass.gov/dfwele/dfw/nhesp/natural_communities/natural_community_classification.htm* (accessed March 2011).

- Our Irreplaceable Heritage-Protecting Biodiversity in Massachusetts; available at: *http://mass.gov/dfwele/dfw/nhesp/nhesp.htm* (accessed March 2011).

Local Plans

- Coskata-Coatue Wildlife Refuge Management Plan, TTOR (2001).

- Beach Management Plan, Nantucket Conservation Foundation (1995).

- Beach Management Plan, Town of Nantucket (2005).

Individual Species Plans

- Piping Plover Atlantic Coast Population Recovery Plan (USFWS 1996); available at: *http://www.fws.gov/northeast/pipingplover/recovery.html* (accessed March 2011).

- Business Plan for the American Oystercatcher (National Fish and Wildlife Federation 2008); summary available at: *http://www.nfwf.org/Content/ContentFolders/NationalFishandWildlifeFoundation/GrantPrograms/Keystones/BirdConservation/AMOY_Biz_Plan.pdf* (accessed March 2011).

- Roseate Tern Recovery Plan (USFWS 1998); available at: *http://ecos.fws.gov/speciesProfile/SpeciesReport.do?spcode=B07O* (accessed March 2011).

Refuge Establishing Purposes and Land Acquisition History

The refuge was established in 1973 under the Act Authorizing Transfer of Certain Real Property for Wildlife from the Coast Guard. At the time of acquisition, the refuge totaled approximately 40 acres in size. Since then, the acreage has changed considerably due to the natural processes of sand erosion and accretion (see the Coastal Geomorphology section in chapter 3). The refuge now totals approximately 21 acres. The official refuge establishment purpose is:

> *"…its particular value in carrying out the national migratory bird management program." [16 U.S.C. § 667B (An Act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes)]*

Refuge Administration

The Service administers Nantucket NWR as part of the Eastern Massachusetts NWR Complex, which also includes Assabet River, Great Meadows, Mashpee, Massasoit, Monomoy, Nomans Land Island, and Oxbow NWRs. The refuge complex headquarters is located in Sudbury, Massachusetts.

The refuge complex has 16 permanent staff. Twelve are located at the complex headquarters in Sudbury: a project leader, a deputy project leader, a visitor services manager, a refuge planner, and two wildlife biologists, law enforcement officers, maintenance workers, and administrative staff. A park ranger is located at the visitor center at Assabet River NWR. The other three permanent staff are located onsite at Monomoy NWR: a refuge manager and two biologists, with one biologist having maintenance and boat operations as part of his duties. Two additional biologists and a part-time park ranger are funded on a yearly term basis. In addition, seasonal interns and volunteers assist throughout the year. Nantucket NWR had a summer biological technician in 2010 and 2011.

Refuge Operational Plans ("Stepdown" Plans)

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

The status of step-down plans on the refuge follows. This CCP incorporates by reference those that are up-to-date. Chapter 4 provides more information about the additional step-down plans needed and their schedule for completion.

The following step-down plans have been completed, and apply to all eight refuges in the Eastern Massachusetts NWR Complex. An updated Fire Management Plan that will include Nantucket NWR is scheduled to be completed in 2011 (see appendix F for general fire program direction). Eleven other step-down plans will be completed over the next 5 years (see chapter 4).

- Avian Influenza Surveillance and Contingency Plan—completed in 2007.
- Hurricane Action Plan—completed in 2009, updated in 2011.

Refuge Vision Statement

Our planning team developed this vision statement to provide a guiding philosophy and sense of purpose in the CCP.

> *Nantucket National Wildlife Refuge, though diminutive in size, is an important part of a larger area aptly named Great Point. It has great value to the wildlife that uses its beaches, from coastal birds including piping plovers and terns, to mammals including gray seals. Situated at the tip of a peninsula, it is surrounded by a diverse assemblage of coastal, intertidal, wetland, and marine habitat, attracting a great diversity of fauna. It will continue to be managed as a special place for breeding, wintering, and migratory wildlife.*
>
> *We will continue to provide opportunities for quality, compatible, wildlife-dependent experiences by the public. Nantucket NWR is recognized internationally as a premier fishing location, and the presence of its lighthouse provides the public with a destination that offers cultural perspective and panoramic views. Through strong partnerships, we will promote ecologically responsible use of the property, and continue to promote public awareness about the intrinsic value of dynamic coastal ecosystems.*

Refuge Goals

We developed these 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 above. These goals are intentionally broad, descriptive statements of purpose. They highlight elements of the vision for the refuge that we will emphasize in its future management. The biological goals take precedence; but otherwise, we do not present them in any particular order. Each offers background information on its importance.

Goal 1. Perpetuate and enhance the biological integrity and diversity of coastal habitats on and around Nantucket Island to support and enhance native wildlife and plant communities, with an emphasis on species of conservation concern.

Goal 2. Promote awareness and stewardship of our coastal natural resources by providing compatible, wildlife-dependent recreation and education opportunities on the refuge and within the local and visitor community on and around Nantucket Island.

Goal 3. Perpetuate and enhance long-term conservation and management of wildlife resources on and around Nantucket Island through partnerships and land protection with public and private landowners, Federal, state, and local entities.

Chapter 2



Amanda Boyd/USFWS

Savannah sparrow

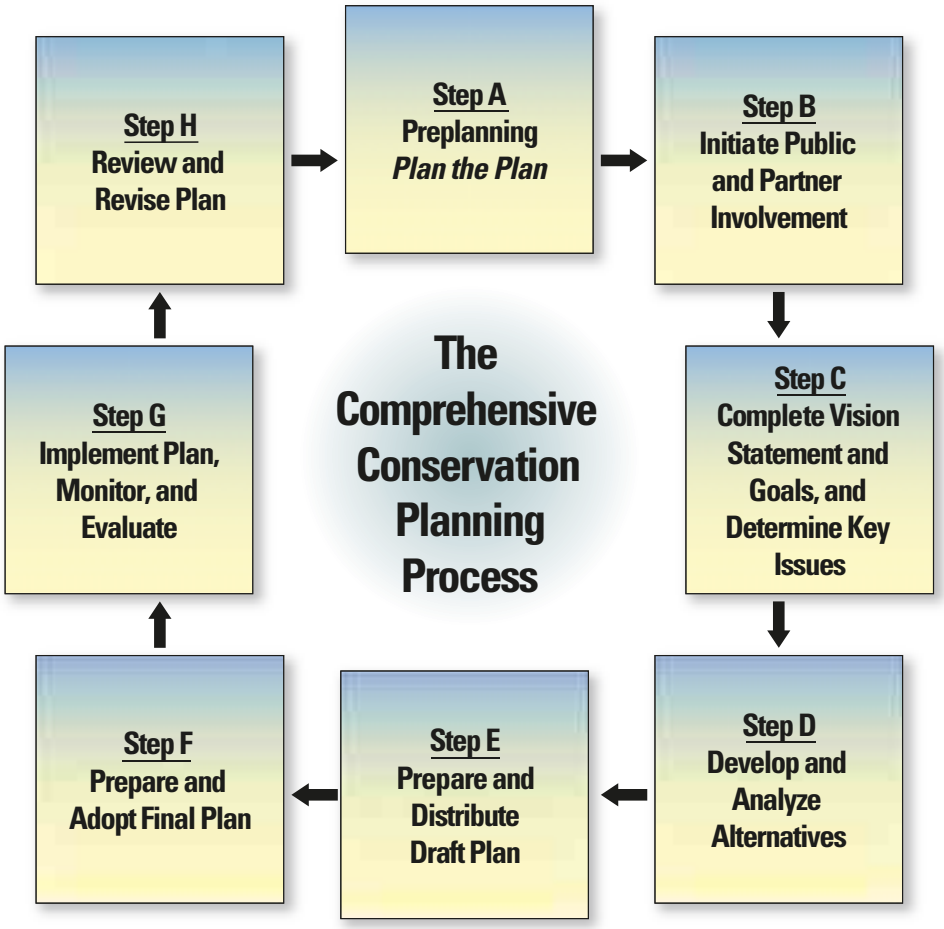
The Planning Process

- **The Comprehensive Conservation Planning Process**
- **Issues, Concerns, and Opportunities**
- **Issues and Concerns Outside the Scope of this Analysis or Not Completely Within the Jurisdiction of the Service**

The Comprehensive Conservation Planning Process

Service policy establishes an eight-step planning process that also facilitates compliance with NEPA (Figure 1.1). Our planning policy and CCP training course materials describe the eight steps in detail. We followed the process depicted below in developing the draft CCP/EA.

Figure 2.1. The CCP Planning Process.



Since 1973, we have focused on conserving lands within the approved refuge boundary, facilitating wildlife-dependent public uses, managing habitat for several focus species, such as piping plovers and least terns, and establishing relationships with the community and our partners. In 1999, we began to prepare for a CCP that would encompass all of the refuges in the Eastern Massachusetts NWR Complex. We published a Notice of Intent in the *Federal Register*, and began public scoping. By 2001, we determined that writing a plan for eight refuges was too cumbersome, and resolved to focus on CCPs for the three northernmost refuges in the refuge complex. The efforts for Nantucket NWR were halted at that time.

After finishing three refuge complex CCPs and initiating two others, we initiated a CCP for Nantucket NWR once again. In April 2008, we published a Notice of Intent in the *Federal Register* announcing the start of the CCP process for Nantucket NWR. In August 2008, we began collecting information on refuge resources, and summarized our biological inventory and monitoring information.

We convened our core team in September 2008, which consists of refuge staff, regional division staff, and representatives from the Massachusetts Department of Fish and Game (MA DFG, MassWildlife), Wampanoag Tribe of Gay Head

(Aquinnah), and Mashpee Wampanoag Tribe. We discussed management issues, drafted a vision statement and tentative goals, and compiled a project mailing list of known stakeholders, interested individuals, organizations, and agencies. We initiated all of those steps as part of "Step A: Preplanning."

Also in September 2008, we once again engaged the public during "Step B: Initiate Public Involvement and Scoping," by distributing a planning update newsletter to approximately 60 individuals, organizations, and agencies, announcing we were beginning the planning process and the upcoming public meeting in October.

In October 2008, we held both the stakeholder and public scoping meetings in Nantucket, Massachusetts, to discuss previously identified public issues and concerns, determine whether new issues existed or previously identified issues had changed, share our draft vision statement and tentative goals, describe the planning process, and explain how people could become involved and stay informed about the process. Those meetings helped us refine the partner and public concerns we would need to address in the planning process. We announced the location, date, and time of the public meeting in local newspapers, in the planning update, and on our Web site. Twenty-eight people attended the public meeting. This meeting was followed by a month-long comment period where we continued to receive public and partner issues and concerns through e-mail, letters, and comment form submission.

Our next planning team meeting was held in mid-December 2008 where we worked on "Step C: Review Vision Statement, Goals, and Identify Significant Issues." We also initiated "Step D: Develop and Analyze Alternatives." We identified key issues, decided upon our three management alternatives, and identified strategies under each alternative.

In February 2011, we distributed a newsletter summarizing the three management alternatives we analyzed in detail for the EA/draft CCP. That completed Step D.

The EA/draft CCP represented "Step E: Prepare Draft Plan and NEPA document." On August 2, 2011, we published a notice of availability in the *Federal Register* announcing our release of the draft for public review and comment. The notice indicated the comment period was for 30 days, but in fact we extended the comment period an additional 30 days until October 1, 2011. During that comment period, we also held two public meetings to obtain comments and attended a meeting at the Nantucket Anglers Club in which we reiterated the comment period and upcoming public meetings. We received comments by regular mail, e-mail, and at the public meetings. After the comment period ended, we reviewed and summarized all of the comments we received, developed our responses, and published them in appendix J to this final CCP.

Once we prepared the final CCP, we submitted it to our Regional Director for approval. Our Regional Director determined that it warrants a Finding of No Significant Impact (FONSI; appendix L), and found its analysis adequate to issue a decision at that time. We will announce the final decision by publishing Notice of Availability in the *Federal Register*, where we will also notify people of the availability of the final CCP. That will complete "Step F: Prepare and Adopt a Final Plan."

Then "Step G: Implement Plan, Monitor, and Evaluate" can begin. As part of "Step H: Review and Revise Plan," we will modify or revise the final CCP as warranted following the procedures in Service policy (602 FW 1, 3, and 4) and NEPA requirements. Minor revisions that meet the criteria for categorical exclusions (550 FW 3.3C) will require only an environmental action memorandum. As the Improvement Act and Service policy stipulate, we will review and revise the CCP fully every 15 years.

Issues, Concerns, and Opportunities

We define an issue as "any unsettled matter requiring a management decision." An issue can be an "initiative, opportunity, resource management problem, threat to a resource, conflict in use, or a public concern." Issues arise from many sources, including our staff, other Service programs, State agencies, other Federal agencies, our partners, neighbors, user groups, or Congress. One of the distinctions among the proposed management alternatives is how each addresses those issues. The following summary provides a context for the issues that arose during the scoping process.

Habitat and Species Management

The primary purpose of National wildlife refuges is the conservation of wildlife and habitats. That is our highest priority, and serves as the foundation for all that we do. Many refuges were established for a very specific purpose, such as protecting a particular species or habitat. Based on the establishing purpose for this refuge, and the discussions that took place up to the time of its establishment, the primary justifications for creating Nantucket NWR were protecting federally listed and State-listed shorebirds, such as the piping plover and least tern, and a regionally important migratory bird area.

How best to protect, restore, and/or enhance coastal habitat and its associated species on the refuge is an important issue we address in this plan. We heard many opinions on specific actions or techniques to accomplish that. Many of these recommended maintaining a balance between public access and wildlife protection, as many felt their recreational enjoyment of the refuge on Great Point was in jeopardy. In particular, the presence of federally listed piping plovers and other beach nesting birds of conservation priority cause changing circumstances throughout the summer months for vehicular and pedestrian access, and these access restrictions and beach closures are a public concern. More recently, the presence of seals on the point and the increasing frequency of beach closures as a result, are a concern to beachgoers and anglers, and anglers expressed concern over seals taking their fish.

Other concerns raised were the absence of a consistent use of the refuge by beach nesting species, despite seemingly ample habitat, and how to manage dune erosion. Conducting compatibility and appropriate use determinations will help guide management decisions. Management actions can best be accomplished in partnership with adjacent land managers.

The following key issues and concerns arose during scoping concerning habitat and species management:

- How can we effectively protect, enhance, restore, or create quality wildlife habitat on the refuge that will promote nesting shorebird populations and provide adequate migratory staging grounds?
- How can we address the presence of seals on the refuge in the context of the regional population, Federal mandates, and in terms of public health and safety?
- What steps can we take to reduce the incidence of nest failures due to predation on the refuge?
- What are the most effective and efficient measures we can undertake to control dune erosion?

Public Use/Community Relations

National wildlife refuges sustain fish and wildlife, and they sustain people as well. We know that the lands that comprise the Nantucket NWR are important for residents and visitors. Fishing, walking on the beach, and being at the point where Nantucket Sound meets the Atlantic Ocean are enjoyable and rejuvenating. As a destination for beachgoing, seal watching, and fishing, the refuge also contributes economically to Nantucket's local economoy. We aspire to

understand the various communities of Nantucket and how we can contribute to these communities while adhering to our mission. We will do our best to nurture and cultivate the mutually beneficial relationships we have developed using the resources we have available.

During public scoping, we learned that many people are only vaguely aware of the refuge, and that there was some confusion about the refuge boundaries. Many considered the entire peninsula to be TTOR land. Those that are aware of the refuge are not necessarily knowledgeable about the opportunities and services we offer, or the impacts of our management actions. Others mentioned concerns over management actions to protect wildlife that impinge upon their use and enjoyment of the refuge. To them, allowing recreational opportunities was the best way to increase community interest and involvement in the refuge. Two common issues associated with access were continuing to allow over-sand vehicle (OSV) access and allowing dogs on the refuge. Some feedback suggested ways we might provide a stronger presence, and conduct interpretation and outreach. Others recommended integrating our management plans with TTOR and Nantucket Conservation Foundation (NCF) to share resources and provide consistency between all three land managers on the peninsula. Finally, some who felt well-informed and satisfied about refuge activities valued the contribution of the refuge to the community and their quality of life.



Amanda Boyd/USFWS

Surfcasting on Great Point at Nantucket National Wildlife Refuge

In response to those comments and the issues listed below, we evaluated a range of quality, wildlife-dependent, recreational opportunities, and proposed measures to promote Service visibility, community understanding and support for refuge programs.

The following are key issues or concerns that arose during scoping about public use and community relations:

- How can we continue to provide satisfactory public access and quality, wildlife-dependent experiences while meeting Federal mandates to protect nesting habitat for federally listed and State-listed shorebird species?
- What is the best approach to address vehicular access to the refuge to both maintain access for refuge users, while incorporating measures to effectively manage federally protected wildlife, and protect sensitive habitats?
- How do we effectively conduct outreach to notify people of and explain our refuge policies and regulations, and how can we address nonwildlife-dependent public use of the refuge?
- How can we most effectively work with our partners to continue to provide interpretive and educational opportunities on the refuge?
- What administrative facilities, such as an office, visitor contact facilities, and roads are needed to manage the refuge, what other logistical support for potential future onsite staff can we provide, and where should these be placed or located?

- How do we improve the visibility of the Service and the refuge on Great Point and in the local community?
- What other opportunities can we provide for compatible, priority, wildlife-dependent public uses?

Land Protection

Nantucket NWR was established for its benefit as a wildlife sanctuary for migratory birds. The ability of the refuge to meet its purpose is currently limited by its small land area and intensive public use. Protection of other lands on the island of Nantucket as part of Nantucket NWR would allow the refuge to better fulfill the Service mission.

Regionally, the Service manages many coastal refuges along the Atlantic Coast and on Long Island Sound. Since this is an important flyway for migratory birds, including additional land area as part of the refuge system would further the Service mission, and provide a regional continuum of protected coastal habitat available to migrating birds. The importance of Nantucket NWR not only to migratory birds, but for other federally listed or candidate species is addressed in our Land Protection Plan (appendix G). The following key issues and concerns arose during scoping about land protection and acquisition:

- How can we ensure that as Coast Guard and other Federal lands become available, we have the knowledge and ability to acquire them if possible?
- How should we prioritize lands for acquisition as they become available in the future?
- How can we best work with our partners to accommodate future easement acquisitions?
- What will be our public use policies on future land acquisitions and, if the acquisition of easements on partner lands lead to potentially conflicting public use policies, how can we address those differences fairly for the best possible outcomes?

Issues and Concerns Outside the Scope of this Analysis or Not Completely Within the Jurisdiction of the Service

The resolution of these issues falls outside the scope of this CCP or outside the jurisdiction or authority of the Service. These issues are only briefly addressed elsewhere, or are not addressed again in this CCP:

- *Control the deer population to reduce the risk of Lyme disease.* Given its size (approximately 21 acres) and location on the tip of a narrow peninsula, the refuge does not support a sizable deer population and, in our opinion, does not contribute undue risks for increasing the occurrence of Lyme disease locally. In addition, an extended deer hunting season is allowed on the adjacent TTOR lands. We will provide a link to TTOR's hunt information on our refuge Web site. Given the negligible impact that we predict deer hunting and other control measures for Lyme disease on the refuge would have, we determine those measures are outside the scope of this CCP at this time.
- *What are the potential impacts on the refuge from offshore energy developments?* Although offshore energy developments could be an increasing issue in the future, particularly for potential nearshore energy development projects, without a specific proposal for which the Service has jurisdiction, evaluating the impacts from these activities falls outside the scope of this CCP at the present time. However, we will continue to review proposals where the Service has jurisdiction when they arise, and will address specific Federal concerns as appropriate and warranted.

Chapter 3



Karen Terwilliger/TCI

Tip of Nantucket National Wildlife Refuge featuring the rip at Great Point

Refuge Resource Descriptions

- Introduction
- The Physical Landscape
- Major Historical Influences Shaping Landscape Vegetation
- Land Use History
- Current Conditions
- The Regional Socioeconomic Setting
- Refuge Administration
- Refuge Natural Resources
- Refuge Biological Resources
- Refuge Visitor Services Program
- Refuge Archaeological, Historical, and National Resources

Introduction

This chapter describes the physical, biological, and sociological environment of Nantucket NWR. We begin with a description of the physical landscape, and then follow with descriptions of the land use history in the area, current refuge administration, natural resources, visitor services, and archeological and cultural resources.

The Physical Landscape

Setting

Nantucket NWR is primarily a barrier beach system at the northern-most point of the Coskata-Coatue Peninsula on the eastern side of Nantucket Island (map 1-1). It is at this point that two longshore currents meet, running north, creating a riptide that extends offshore. Nantucket Island, "the land far at sea," is located about 25 miles south of Cape Cod in Nantucket Sound (map 1-2). Bounded by Nantucket Sound to the north and the Atlantic Ocean to the south, Nantucket Island is heavily influenced by maritime processes. Wind and wave energy and storms can alter the size and shape of the land due to sand movements. The location of the refuge on Great Point creates ever-changing coastlines and habitats through erosion and deposition of sand.

Nantucket Island, together with the small islands of Tuckernuck and Muskeget, constitutes the town of Nantucket, Massachusetts, and the coterminous Nantucket County, which are consolidated. Part of a larger sand spit known as Great Point, Nantucket NWR is at the tip of the long, narrow Coskata-Coatue Peninsula containing the approximately 1,100-acre wildlife refuge owned by TTOR. Nantucket NWR is situated on this terminal beach spit where the currents of the Atlantic Ocean and Nantucket Sound meet, providing important coastal habitat for migrating birds, as well as a long tradition of wildlife-dependent recreation at the northeastern-most point on Nantucket Island.

Watershed

A watershed is a terrestrial concept that describes an area where all the water (subsurface and surface) converges in the same place. This is a hierarchical system that derives from the smallest stream outward to regional watercourses. Because it is an island, Nantucket is hydrologically isolated and receives its fresh water from precipitation. According to the Nantucket Land Council, 10 watersheds were identified and delineated for Nantucket Island in 1990 (*http://www.nantucketlandcouncil.org/WaterProt.html*; accessed March 2011). This map delineates a watershed that includes the refuge, with much of the outermost portions of the Coskata-Coatue Peninsula, and portions of the eastern and northern shores of the island. Island groundwater flow is generally from the center of the island outwards towards ponds and harbors.

Nantucket Island was formed from glacial activity and is characterized by a combination of hills on the north side and flat outwash plains to the south. Elevation ranges from sea level to 108 feet above sea level (NCSS 1979). The island also consists of about 28 miles of shoreline which is constantly changing due to wind and tidal influences (*http://www.umb.edu/nantucket/nantucket/index.html*; accessed March 2011). There are 28 ponds and lakes on the island, the sole repositories of fresh water.

The Massachusetts Office of Energy and Environmental Affairs designated the Nantucket Island watershed which includes Nantucket Island, Muskeget Island, and Tuckernuck Island. Watershed priorities set forth by the State of Massachusetts for the Nantucket Island watershed are:

- Improve the quality of marine waters and fisheries habitat by reducing nutrients entering waterways from point and nonpoint source pollution.

- Support a comprehensive water resources management plan to address pollution from wastewater.
- Work to develop a comprehensive wastewater management plan for the island, including sewer for Monomoy and a wastewater facility in Siasconset, Massachusetts.
- Identify key parcels of open space for acquisition and/or restriction to protect future water quality.
- Ensure that the watershed has the necessary resources to gain measurable improvements in water quality.

You may view this information at: *http://www.mass.gov/eea/air-water-climate-change/preserving-water-resources/mass-watersheds/* (accessed March 2012).

Extrapolating outward, the refuge does not fit into the traditional watershed concept at a more regional scale because it is a maritime island and is therefore isolated and subject to oceanic processes. However, Nantucket and associated islands are included in the Cape Cod and Islands watershed (U.S. Geological Survey (USGS) HUC 01090002), which includes Nantucket (including Muskeget and Tuckernuck Islands), Martha's Vineyard (including Nomans Land Island), and the Elizabeth Islands (U.S. Environmental Protection Agency (EPA), *http://cfpub.epa.gov/surf/huc.cfm?huc_code=01090002*; accessed March 2011). Nantucket Island is 49 square miles, out of a total of 159 square miles in total land area for the watershed.

Geographical Setting

Biophysical Ecoregion

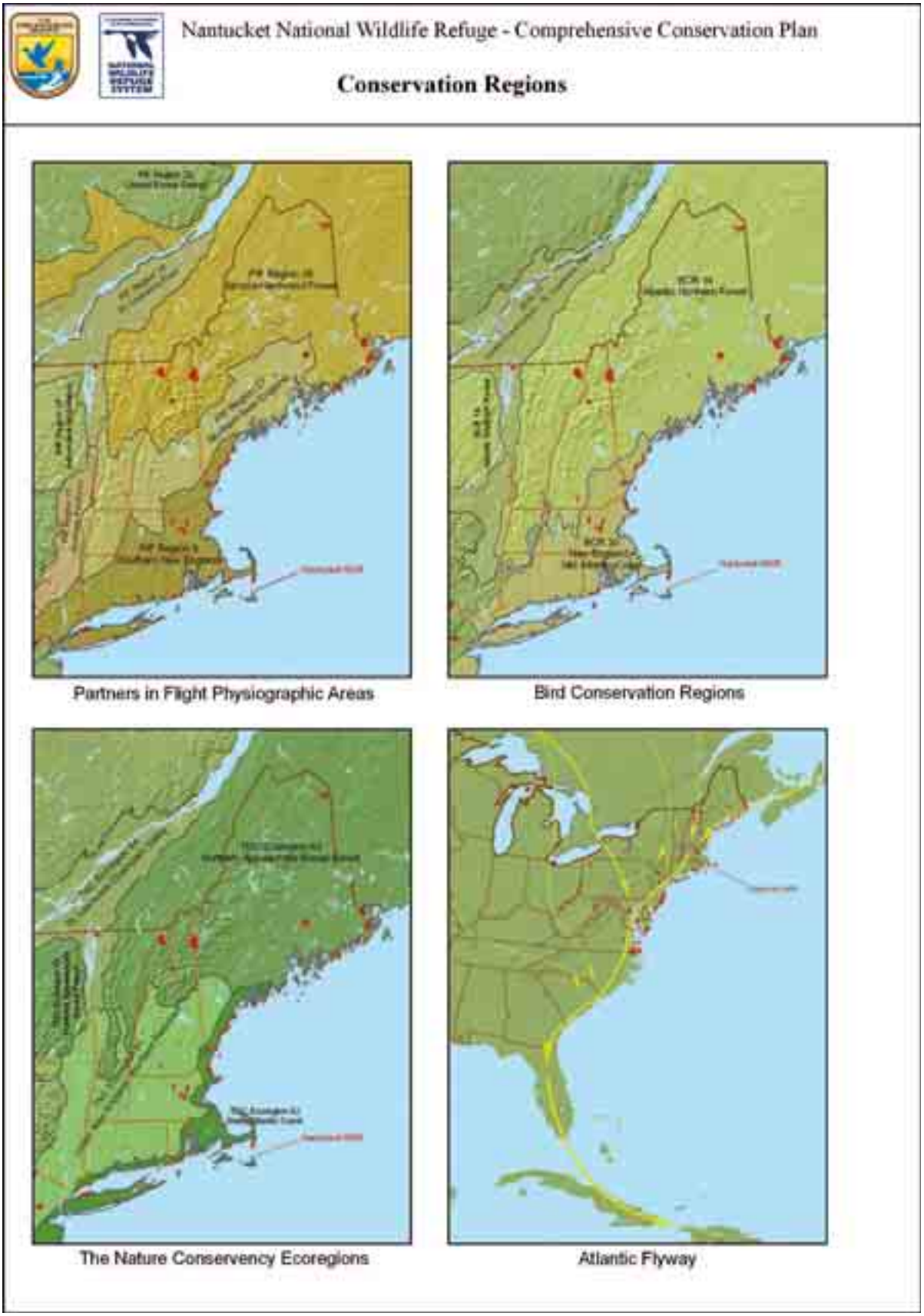
The Nature Conservancy (TNC) has divided the continental United States into 63 ecoregions which are large geographic areas that share similar geologic, topographic, ecological, and climatic characteristics. These ecoregions are modified from the U.S.D.A. Forest Service "Bailey System" (Bailey 1995). TNC has developed Ecoregional Conservation Plans that identify conservation targets and prioritize conservation actions for each ecoregion.

Nantucket NWR is in the North Atlantic Coast (NAC) ecoregion as described by TNC (see map 3-1). This ecoregion extends from Pemaquid Point in Maine south to Delaware Bay. Flat topography, low elevations (less than 600 feet), scattered moraines, large rivers draining into estuaries and bays, and a mild, humid climate characterize this region. Rocky coasts dominate the shorelands in the north, grading into salt marsh communities to the south. The once extensive forest graded from white pine-oak-hemlock forest in the north, to dry oak-heath forests, to mesic coastal oak forests in the south. Wetlands, beaver meadows, pine barrens, and heathlands were embedded in this forested landscape. Hundreds of years of land clearing, agriculture, and widespread development has fragmented the landscape and eliminated large areas of forest. Still, smaller ecological systems remain, including barrier beaches and dunes, salt marshes, and freshwater wetlands (TNC 2006). Current action sites for TNC exist on Martha's Vineyard and Cape Cod, where land protection and management activities are already occurring.

Atlantic Coast Flyway

Nantucket NWR is within the Atlantic Flyway (see map 3-1). Flyways have been used for many years in North America as the unit for managing waterfowl populations, because they allow land managers to link efforts to conserve migratory bird species and their habitats on breeding, migration, and wintering grounds. The ACJV area includes the entire U.S. Atlantic Coast lying completely within the Atlantic Flyway. In this large area, the ACJV partners work together to assess the status, trends, and needs of bird populations and their habitats. The

Map 3-1. Conservation Regions



partners then use this information to help guide the distribution of resources to the needs and issues of highest priority.

Landscape Conservation Cooperatives
In cooperation with the USGS, the Service is initiating a new approach to landscape conservation through a national geographic network that will create a spatial frame of reference to build partnerships and connect projects to larger-scale biological priorities. These 21 geographic areas are aggregates of BCRs (see chapter 1), and provide a basis for forming LCCs with other Federal agencies, non-governmental organizations, States, Tribes, universities, and other stakeholders to accomplish conservation goals. Nantucket NWR is located in the North Atlantic Landscape Conservation Cooperative (LCC) which combines BCRs 14 (Northern Atlantic Forest) and 30 (New England/Mid-Atlantic Coast), and contains 12 out of 13 Northeast States as well as the District of Columbia (map 3-2). Near Nantucket NWR, there exist many conserved lands with which the refuge can partner along Cape Cod and associated islands (map 3-3).

Consisting of a diverse array of ecosystems, from high elevation spruce-fir forests to coastal islands, there will be many different conservation priorities to be addressed in the North Atlantic LCC. The U.S. Fish and Wildlife Service recently completed a year-long effort to identify representative species "for designing conservation and management strategies that will most effectively sustain fish and wildlife populations at desired levels in the face of land use change, climate change, and other stressors occurring within the North Atlantic LCC". Many partnerships for watershed, fish, and migratory bird conservation already exist within this geographic region and will provide a basis from which to initiate the LCC, which will also incorporate Canadian partners. Eighty-seven terrestial species were selected as representative species for this LCC, 34 of which are in the southern New England Region (which encompasses Nantucket NWR). A different selection process was used for selection of aquatic species, but they are not relevant to this CCP. For more information, go to, *http://www.fws.gov/science/SHC/lcc.html* (accessed March 2011).

Notable Physiographic and Landform Features

Geomorphic regions or "physiographic provinces" are broad-scale subdivisions based on terrain texture, rock type, and geologic structure and history. Our project area lies in the Sea Island Section of the Atlantic Coastal Plain delineated by the USGS (*http://tapestry.usgs.gov/physiogr/physio.html*; accessed March 2011). Many of these islands off the coast of Massachusetts mark the southern limit of the last glacial maximum (21,000-18,000 years before present (BP)), and are where terminal moraines of clay-rich, poorly sorted glacial materials were deposited. This had an influence on the subsequent development of beaches, offshore islands, and other landforms (*http://tapestry.usgs.gov/features/features.html*; accessed March 2011).

The island of Nantucket, along with Martha's Vineyard, marks the southern extent at the last glacial maximum. As a result, the surface of Nantucket Island is a combination of terminal moraines which are marked by hills, finely textured soils, and outwash plains which are flatter areas with coarse materials and dry soils (Foster and Motzkin 2003).

According to the NCF, the glacier's retreat has left Nantucket Island with many unusual landforms. Extending west to east, just south of the town of Nantucket, a line of low, rolling hills is final evidence of the terminal moraine. The weight of huge, melting blocks of ice left imbedded in the till and outwash formed depressions called kettleholes, which are scattered throughout the island. West of town, the sea has cut into the exposed northern edge of the moraine, creating the Nantucket Cliffs. The movement of glacial meltwaters down the slope of the

Map 3-2. USFWS Land Conservation Cooperatives



Map 3-3. Conserved Lands in the Vicinity of Nantucket National Wildlife Refuge



outwash plain to the sea formed numerous north-south oriented depressions, or glacial river valleys. Today, some of these depressions are dry valleys and others are fresh water ponds. (*http://nantucketconservation.org;* accessed March 2011*).*

Coastal Geomorphology
Coastal geomorphology is the study of the processes that influence coastal landforms. These natural coastal processes include accretion and erosion, or the deposition and removal, of sand along shorelines. Sand that is eroded from one beach will be transported downdrift and will accrete on another. These processes are influenced by many factors, some of which include 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 can fluctuate between accretion and erosion over long periods of time (MA CZM 2002). These processes provide continually changing coastlines and habitats for many species of wildlife.

Great Point at one time was an island north of Coskata, made of Pleistocene material that extended farther to the east than at present. Today, Point Rip marks the location of that deposit, a gravelly shoal just offshore at the point. Eventually, a sandbar formed connecting this island to Coskata, now known as The Galls, and Holocene deposits now characterize the substrate on Great Point (Rosen 1972). Two longshore currents run north parallel to the shore; these occur on both the east and west beaches of Great Point and The Galls. At the tip of Great Point, these two longshore currents meet, creating a riptide that extends offshore over the gravel shoal at Point Rip. The action of these currents causes beach drift to occur. Sand is slowly being transported from the east side of the point and is deposited on the west side, resulting in the gradual westward movement of Great Point over time.

Great Point provides an example of the dynamic nature of coastlines. The changing coastline is something that coastal States have monitored over the last century, and these data assist shoreline planning efforts. In Massachusetts, there have been four shoreline analyses conducted, dating back to the mid-1800s. The most recent analysis, based on data from 1994, was finalized in 2001. It evaluated over 800 miles of Massachusetts coast at 40-meter intervals, and compared the most current shoreline with the historic shorelines to determine rates of shoreline change (WHOI 2003).

According to this most recent shoreline analysis, 68 percent of the Massachusetts shoreline is in a long-term erosional trend, 30 percent is in a long-term accretional trend, and 2 percent shows no net change. Overall, results indicate that the Massachusetts shore is eroding at a long-term average annual rate of 0.58 to 0.75 feet (mid-1800s to 1994). This coincides with the 75 percent of U.S. coastline that is eroding (WHOI 2003).

For Nantucket Island, the long-term average shoreline change rate over the same time period is a loss of 2.1 feet per year, but the short-term trend rates will vary by and within communities. These long-term annual averages take into account long-term erosion or accretion periods, potentially resulting in deceptively low change rates, when in fact the short-term trend change rates for a particular location can be much higher (WHOI 2003). Great Point has shifted southwest since the mid-1800s, with a long-term change rate of -4.59 feet per year (eroding) on the northeast shore (close to the tip), and -0.79 feet per year (eroding) on the western shore, near the point (*http://www.mass.gov/czm/hazards/shoreline_change/shorelinechangeproject.htm*; accessed March 2011). This not only affects the overall size of the refuge, but also the available habitat for species that rely on



Karen Terwilliger/TCI

Changing refuge beaches

shoreline habitat. Accretion and erosion are very important components of these coastal ecosystems, because they are one of the major influences on the amount and quality of habitat for beach-nesting species (MA DFG 2006).

Major Historical Influences Shaping Landscape Vegetation

Estimating the historic natural vegetation types, how they were distributed, and what ecological processes influenced them prior to major, human-induced disturbance, can help us evaluate future management options. However, many ecologists caution against selecting one point in time and instead recommend evaluating the "historical range of variation" for each habitat type.

According to noted ecologist Robert Askins of Connecticut College, "This approach recognizes that the proportions of grassland, shrub land, young forests, and old-growth forests have shifted constantly over the past few thousand years as the climate changed and people have modified the land by hunting, burning, and farming. Preserving the biological diversity of any region requires a range of habitat types, including those created by natural disturbances. If there are no natural or artificial disturbances generating grassland, shrub land, and young forest, then not only will early succession obligates be in trouble, but so will mature forest specialists that use early succession habitats at key points in their life cycles. Only large public lands like refuges, parks, preserves can sustain the full range of early succession and forest habitats, so in most regions land managers will need to cooperate to ensure that these habitats are adequately represented across the regional landscape" (Askins 2000).

A brief summary of influences on natural vegetation patterns across the landscape follows.

Glaciation

Massachusetts, like all of New England, was covered by the Laurentide ice sheet during the last glacial maximum, approximately 21,000 to 18,000 BP. The glacier reached its southernmost extent at the islands of Martha's Vineyard, Nantucket, and Nomans Land, marked by the deposition of terminal moraines on these islands (*http://pubs.usgs.gov/gip/capecod/glacial.html*; accessed March 2011). Terminal moraines are formed when the glacier becomes static, having reached the southernmost point where its rate of advancement is roughly equal to that of its rate of melt, resulting in essentially zero net advancement. These terminal moraines are a build-up of the rock debris, or glacial till, embedded in the glacier that gets sloughed off and deposited along the leading edge of the glacier. The

sedimentation on these islands is consistent with this process (Motzkin and Foster 2002).

At the last glacial maximum, much of what is now the submerged continental shelf along the Massachusetts coast was exposed dry land because much of the world's water was locked up in continental ice sheets. It is estimated that worldwide sea levels were lower than today by 279 to 427 feet (Pielou 1991). By approximately 18,000 BP, the ice sheet began to retreat in response to the warming climate and by about 14,000 to 15,000 BP it had at least reached what is now the northern border of Massachusetts. As the ice sheets retreated, sea levels gradually rose. In addition, the earth's crust was slowly rebounding from the heavy weight of ice, but not as fast as sea levels were rising. This caused coastal flooding along the northern New England coast as far south as Boston (Jorgensen 1971). By about 12,000 BP the coastline between the Bay of Fundy and Cape Cod was much as it is now (Pielou 1991).

The advance and subsequent retreat of the glacier, and changing climate had a profound impact on the local biota. With the advance of the glacier, many northern species were locally displaced and subsisted in southern areas of refugia. The retreating glacier marked a period of time when much of the physical environment was in a constant state of flux. Climatic factors such as temperature, precipitation, humidity, and atmospheric carbon dioxide were fluctuating. The earth's crust was rebounding at the same time that sea levels were rising, and the local hydrology was still in a dynamic state. The glacier itself was directly altering the landscape as it retreated by depositing till, boulders, isolated slabs of ice that melted to form kettle hole ponds, and by forming proglacial lakes as a result of the voluminous meltwater pouring off the retreating glacial front (Williams 2002, Jackson et al. 2000, Prentice et al. 1991). Combined, these factors made for ever-changing conditions as plant and wildlife species recolonized the area.

As the climate warmed and the ice retreated farther north, continual weathering and erosion of rock over time released nutrients and created new soils for plants to grow. Just south of the glacier, it is thought that tundra-like vegetation was dominant on the landscape, though there may have been places where the ice abutted spruce (*Picea* spp.) forests (Pielou 1991, Jackson et al. 2000). The tundra-like landscape was dominated by sedges and dwarf shrubs for several thousand years. As the climate warmed, these plants and associated animals followed the glacier as it receded north. The tundra continued to retreat, eventually restricted to the highest mountaintops (Davis 1983, Marchand 1987).

It has been shown that climatic temperature alone does not adequately explain the post-glaciation vegetation history, but regional temperature and moisture levels working in concert may explain the variability in the post-glacial phytogeography in southern New England. By 14,600 BP spruce populations were prevalent in New England and they persisted until 11,600 BP when white pine (*Pinus strobus*) became the dominant species, replacing spruce during a drier, warmer climatic period. Hemlock (*Tsuga canadensis*), beech (*Fagus grandifolia*) and birch (*Betula* spp.) increased by about 8,200 BP, replacing the white pine after a concurrent rise in moisture availability. Hemlock, a more mesic species, experienced a population crash around 5,400 BP, originally thought to have been due to the first-ever recorded occurrence of a pathogen. However, recent evidence indicates that its decline took place during a drier microclimate which may also have been a factor. Deciduous species such as hickory (*Carya* spp.) and chestnut (*Castanea dentata*) were much slower to reach New England, 6,000 BP and 3,000 BP respectively. This was likely due to regionally cooler temperatures and lower moisture levels than today (Shuman et al. 2004, Shuman et al. 2005).

Large mammals, including mastodons, wandered the spruce parkland and grassy savanna, but disappeared quickly at the same time as the glacier receded and humans advanced across the region. Thirty-five to forty large mammals became extinct 9,000 to 12,000 years ago, while other mammals that lived at that time, such as white-tailed deer (*Odocoileus virginianus*), are still present today (Pielou 1991, Askins 2000).

More Contemporary Influences on Vegetation Patterns

Natural disturbances vary across New England, depending on geographic location, forest type, and local conditions. In pre-settlement times coastal regions experienced the highest rates of disturbance because of the prevalence of sandy pine-oak barrens, high densities of Native Americans, higher frequencies of hurricanes, and longer snow-free periods. These disturbance regimes may have maintained about 1 to 3 percent of the inland northern hardwood forests, greater than 10 percent of the coastal pine-oak barrens, and perhaps 7 percent of spruce swamp and spruce flat habitats in early successional habitat (Lorimer and White 2003).

Native insects and disease, ice storms, droughts, floods, landslides, and avalanches have caused minor and major disturbances. Lorimer and White (2003) depict hurricane frequencies as varying from 85 years in southeastern New England, 150 years through central Massachusetts and the southeast corner of New Hampshire, to 380 years or more in northern New England. Lorimer (1977) estimated catastrophic disturbances from fire and windthrow at intervals of 800 and 1,150 years, respectively.

Agriculture, logging, fire, windthrow, exotic pests and diseases, and development have significantly altered the New England landscape. Agriculture had the greatest effect on New England's forests, causing major changes in cover types and soils over a wide area. Although most of the region's forests were cut at least once, most logging did not affect succession or impact soils. Intense fires fueled by logging slash did have a lasting impact on forest vegetation patterns (DeGraaf and Yamasaki 2001).

Sheep Grazing

Grazing was common throughout the New England coast during the eighteenth and nineteenth centuries. As European settlement increased, coastal islands were cleared of forests, and though fire was used to some extent, it was the chronic, intensive disturbance created by plowing, harrowing, and grazing by sheep and cattle that had a more lasting impact on modern vegetation (Motzkin and Foster 2002). As a result, the landscape changed from a primarily forested one with small-scale disturbances that created a shifting mosaic of openings, to one in which grasslands were ubiquitous by the 1800s. On Nantucket, extensive areas of forest were cut for building materials, firewood, and to create pasture land. Estimates for Nantucket Island indicate approximately 15,000 sheep were present by the late 1700s (Foster and Motzkin 2003).

The impacts this had on local vegetation was rapid and long-lasting. Grazing controlled the growth of woody species while increasing grass, herb, shrub, and weed species. Overgrazing, on the other hand, created areas that were nutrient deficient and led to a loss of vegetation cover, wind erosion, and in some cases, dune development (Foster and Motzkin 2003). Extensive sheep grazing continued to alter the soil and habitat resulting in a landscape dominated by low shrubs and grasses (*http://nantucketconservation.org;* accessed March 2011).

Modern shrub, grass, and heathland communities are primarily the result of the intensive agricultural land use practices by European settlers, and likely do not represent ecological communities or species associations found prior to European

settlement (Foster et al. 2002). However, these modern open land communities do support many species of conservation concern and therefore have high conservation value. They provide much-needed habitat for present-day indigenous species that have lost habitat throughout their ranges as a result of human development and other anthropogenic factors.

Fire

The history of fire on Nantucket Island prior to the twentieth century is largely unknown. If the fire history of Nantucket is similar to the fire history on Martha's Vineyard, then there are likely to have been many fires on the island with varying frequency, intensity, and geographic scope caused by differences in physiographic, biotic, and cultural factors (Foster et al. 2002).

There is agreement in the literature that Native Americans did use fire as a tool to clear the forest understory for ease of travel, to manage deer populations, and possibly to create small openings around their seasonal camps (Motzkin and Foster 2002, DeGraaf and Yamasaki 2001). The results of these land use practices have been described as creating a shifting mosaic of localized early successional habitat, but likely did not result in broad-scale alterations to the landscape (Foster and Motzkin 2003). At the time of European settlement, Cape Cod and the islands of Martha's Vineyard and Nantucket were wooded with no large-scale occurrences of grasslands or other openings (Foster et al. 2002).



Amanda Boyd/USFWS

Long-tailed duck

In the Cape Cod region, charcoal evidence from paleoecological studies indicates that the use of fire increased concurrently with the clearance of forests in the time of European settlement. Fire, in combination with other European practices such as logging, plowing, and grazing transformed the landscape from one dominated by forests into one where grasslands and coppice woods were prevalent. In a comparison between pre- and post-European settlement, fossil pollen values on Martha's Vineyard, which has a very similar land use history to Nantucket, show large increases in species such as ragweed, sorrel, and grasses indicating the presence and prevalence of open lands on the island after European settlement (Foster et al. 2002). On Nantucket, the island was virtually treeless by the early to mid-1800s (*http://nantucketconservation.org;* accessed March 2011). Vegetation on the island changed; species composition shifted to those well-adapted to repeated disturbances. Site fertility decreased under the combined pressures of these uses, and thus smaller heath plants gained a foothold, resulting in the sandplain grasslands and coastal heathlands present today (Foster and Motzkin 2003).

Land Use History

Early Native American Influences

There is some indication in the archaeological record of paleo-Indian people populating New England, likely including the Cape Cod region, shortly after the post-glacial recolonization of many plant species in the region (12,000 to 9,000 BP). However, given the paucity of data available from this time period, it is not possible to provide much insight into their relationship to the landscape or their subsistence strategies beyond the now-disabused notion that they were specialized in hunting megafauna. It appears more likely that while seasonal big game movements and hunting were important factors, they also incorporated a more generalist strategy that utilized all the technology and resources available to them (MHC 1987).

The Early Archaic Period (9,000 to 7,000 BP) is represented from archaeological sites found on Cape Cod and Nantucket. These indicate a regional movement pattern around a centralized area, though there were some differences in subsistence patterns noted between those sites found interior, and sites found

associated with hydrological features. The Middle Archaic (7,000 to 5,000 BP) period shows a marked increase in the number of sites found, and thus indicates an increase in the population or at least occupation of the Cape Cod region. Sites representing this time period are found on Cape Cod (34), Nantucket (12), and Martha's Vineyard (25). These sites were associated with headwaters of streams and other areas with access to anadromous fish runs. There is also indication from sites on Martha's Vineyard of hunting and fishing activities. By the Late Archaic Period (5,000 to 2,700 BP), there were several traditions, or tool forms, in use (Laurentian, Susquehanna, Small-stemmed, and Orient) that indicate an adaptability and utilization of a wide range of resources and a more fixed presence on the landscape (MHC 1987).

In the Cape Cod region, Early Woodland (2,700 to 2,000 BP) sites are not well represented, in part due to overlap in traditions (Small-stemmed in particular) from the Late Archaic Period and in part due to problems with ceramic analysis and dating techniques. However, there are sites that represent the Early Woodland Period in conjunction with Middle (2,000 to 1,200 BP) and/or Late Woodland Periods (1,200 to 400 BP) as well. The Early Woodland Period ushers in an era of ceramic use, as well as the use of materials from other geographic locations indicating contacts with other regions which were important, but not pervasive. It was primarily a regionally insular way of life. Quartz, quartzite, and felsite were the primary materials used, and these were easily found along local beaches and river channels. The Late Woodland Period is the time when the prehistoric Cape Cod regional population was at its peak, and sites indicate the use of every habitat type. The remains of sea mammals, terrestrial mammals, shellfish, and great auk (*Alca impennis*) have been associated with these sites (MHC 1987).

Though some archaeological sites on Nantucket indicate earlier occupation, there are indications in the archaeological record that Nantucket became a more intensively used area at least as early as the Middle Woodland Period. A preponderance of these sites is in coastal and estuarine areas, including near Squam Pond, Henecater Swamp, and Hummock pond (MHC 1987). This is not uncommon, as throughout southern New England, there were higher Native American population densities near the coasts, presumably because of a greater diversity of subsistence items including seasonal fish and shellfish. Data suggest that Native Americans during the Woodland Period predominantly utilized a hunter-gatherer strategy throughout the region, using a combination of fishing, shellfishing, and hunting with a moderate use of horticulture (Motzkin and Foster 2002, Foster et al. 2002).

There is some question in the literature as to the extent that Native Americans modified their environments in New England prior to European settlement. New paleoecological evidence and a re-evaluation of ethno-historical data indicate that previous assertions of the widespread occurrence of open land across the pre-European landscape as a result of Native American modifications were overstated. It is clear that agriculture in the form of corn, beans, and squash were being used on the Cape and islands prior to European arrival, and the use of fire was an important tool to clear land for agriculture and to clear forest understories for ease of travel and hunting (MHC 1987, DeGraaf and Yamasaki 2001).

Paleoecological data suggest that islands such as Nantucket were dominated by oak (*Quercus* spp.), pine (*Pinus* spp.), and other hardwoods for thousands of years prior to European influence. Even on islands such as Nantucket and Block Island, that were more densely populated by Native Americans than other nearby islands at that time, fossil pollen for grassland species and charcoal values were very low

right up to European settlement. This indicates that open lands on Nantucket were uncommon if existent at all. Regional charcoal values (Cape Cod) do not seem to correspond to Native American settlement patterns. Any open lands on Nantucket, including heath and grass, were primarily confined to the coastal fringes, and overall vegetation patterns had more to do with physiography than human intervention (Foster et al. 2002, Foster and Motzkin 2003).

Some islands, including Nantucket and Martha's Vineyard, were more densely populated than others. By the time of the Contact Period (around the 17th century), there was an estimated 2,000 to 3,000 Native Americans living on Nantucket. Though no evidence has been found thus far to identify village centers, they may have been associated with quality shellfishing sites and near anadromous fish runs. Subsistence was through a mix of agriculture, fishing, hunting, and shellfishing, though fishing appeared to have been more important than hunting or agriculture on Nantucket. There were no European settlements during this period, but there were occasional European explorers, traders, or fishermen that made brief contact (MHC 1987). By the late 1600s, deeds indicate the presence of five main sachemships on Nantucket; Seiknout, Pattacohonet, Attapeat, Wanachmamack, and Nickanoose. The island was divided among them, with some shared areas (Little 1996).

European Influences

While it is likely that European explorers, traders, and fishermen may have had contact with the Native Americans on Nantucket as early as the 15th century, it wasn't until Bartholomew Gosnold's voyage in 1602 that the island was explored or described by a European. As European interests in Nantucket and the New World grew, the island was originally deeded to be a part of New York, before being turned over to Massachusetts in 1692. In 1635, King Charles I granted lands including what is present day New York and Nantucket Island to the Earl of Sterling, and then in 1639 granted the island of Nantucket to Sir Ferdinand Gorges, resulting in a conflict of ownership. During the 1640s, a man named Thomas Mayhew and his son, who were merchants and missionaries, were interested in converting the island's Native Americans to Christianity, and in creating European settlements. In 1641, the Mayhews secured Nantucket, Tuckernuck, and Muskeget from both Stirling and Gorges. In 1659, the Mayhew's bought the rights to the land on Nantucket from the two leading sachems on the island, Wanackmamack and Nickanoose (Jacobson 2000, MHC 1987).

Mayhew then sold Nantucket to a partnership of 10 individuals, known as the First Purchasers, who moved to and settled on the island by 1660, and kept a section for himself. These purchasers not only secured the rights to the western half of the island from the Wampanoag sachems Wanackmamack and Nickanoose, but also the timber and grazing rights throughout the island, except during the planting season (MHC 1987, Little 1996). These first 10 purchasers brought family and others with them, and Nantucket began to attract those not satisfied with life on the mainland (Jacobson 2000).

During this period, the European settlers were establishing a community in the area near Capaum Pond, and were engaged in agriculture (corn and possibly rye, wheat, oats, and barley) and animal husbandry. Cattle, horses, domestic fowl, pigs, and sheep were brought to the island, and sheep were fast becoming prominent. In 1669, these European settlers had to limit grazing rights for each shareholder due to evident overgrazing of common grazing lands. These restrictions were for each shareholder to limit themselves to "no more than forty sheep, three cows, and one horse" (Little 1996). This began a period of time when the island's Wampanoags and Europeans made a number of land transactions to try to ensure there was enough room and resources on the island for both communities and ways of life.

While agriculture was an important component of life on Nantucket, it was evident that it was not as productive compared to the mainland. European settlers also hunted, fished, shellfished, and gathered wild plants as part of their subsistence, and by the late 1600s there was a noticeable shift from agriculture to fishing as a way of life (MHC 1987). Codfishing and whaling stations were established around the island by 1672, and road networks were built to connect them for easy access. These areas included Siasconset, Polpis Harbor, Quidnet, and Great Point. Codfishing crews were made up of the island's Wampanoag residents, as were the codfishing camps that contained the fish houses. The island's Wampanoag residents also taught the European settlers whaling technology and made up the majority of the whaling crews. The whalers established lookout stations which were manned by whalemen during the season. When a whale was sighted from the observation tower, a crew would chase and harpoon it. The whale was then dragged ashore, and the blubber was removed to process oil. Huts, and later houses, were built near the shore and two villages grew out of this development, one of them being Sconset, which is still a viable town and the other eventually grew into the town of Nantucket (Jacobson 2000). By 1775, there were a reported 150 boats in Nantucket's whaling fleet, more than any other whaling community during colonial times (MHC 1987).

The European population on Nantucket blossomed throughout the 18th century. The fisheries were growing in prominence throughout the region, and transportation and trade ships were regularly running from the mainland to Nantucket. A Quaker community was established on the island by 1711, and by the end of the 18th century, half of the island population belonged to the Quaker community (Jacobson 2000). Even though the fisheries were becoming the main trade, the Wampanoag Tribe continued to hunt, fish, shellfish. and produce corn. The European settlers, too, continued agriculture and husbandry, but sheep became the prominent farm product (MHC 1987). Land was cleared to accommodate the settlements, farms, grazing practices, and whaling stations that arose out of European habitation on Nantucket, and to build houses, ships, and to provide fuel. By the late 1700s, Nantucket was essentially devoid of trees; fuelwood was imported from the mainland, and peat was harvested from bogs as a source of fuel (*http://nantucketconservation.org;* accessed March 2011).

Likely due to the influx of so many European settlers, a plague seriously impacted the Native American population on the island in 1763. It is estimated that only several hundred individuals were left, from an original estimated Nantucket Wampanoag population of about 2,400 at the time of the island's first European settlement. The first census in 1765 of the entire island, Native Americans and Europeans combined, reported 3,320 inhabitants (MHC 1987). The Native American population continued to decline due to disease and economic hardship. In 1822, the last full-blooded Nantucket Native American died (Jacobson 2000).

Things changed with the onset of the Revolutionary War and Nantucket's economy was decimated. The whaling fleet was lost, the land was void of timber, and agricultural fields were no longer as productive. The whaling industry had relied heavily upon the Native community for operation and the island's declining Wampanoag population caused a labor deficit. To make up for this, formerly enslaved Africans who had escaped or been freed became a vital component of the whaling crews. An African settlement grew on the southern half of the island. The whaling industry was slowly rebuilt and became a dominant economic force. However, due to the Embargo Act imposed by Thomas Jefferson and silt building up in Nantucket harbor, the industry slowed down again. The industry grew after the War of 1812, but then subsided again when whale populations decreased

(Jacobson 2000). A few vessels still attempted to procure whale oil, but the sperm whale (*Physeter macrocephalus*) population was depleted and it became too expensive to continue. People of Nantucket began to try other economic ventures to support the exhausted whaling economy. By 1865, the population had decreased by almost half, from 9,012 in the 1840s, down to 4,800 persons. In 1869, the last whaler left Nantucket, and much of the population was leaving as well, due to the declining economy. There were 111 farms still productive in 1865, producing barley, corn, potatoes, and cranberries (MHC 1987).

After the Civil War, Nantucket began to be marketed as a vacation resort (Jacobson 2000). In the 1870s, the tourist industry began to take hold on the island, with hotels being established in the main towns of Nantucket, Siasconset, and Head of the Harbor. A railroad was built on the island to transport tourists from Nantucket Town to Sconset in the 1880s, and a steamboat ran twice daily between Woods Hole and Nantucket Town (MHC 1987). The economy has focused on the tourist industry since then. Land use and the division of land parcels have been centered on accommodating the new industry (Jacobson 2000).

Though sheep-grazing was gradually reduced from a peak of approximately 15,000 sheep in the late 1700s, dairy and vegetables became valuable farm products in the late 1800s and early 1900s. Cranberry production continued during this time, though not at high levels, and commercial scallop fishing was initiated in the late 1880s, giving Nantucket an excellent reputation for fine scallop fishing throughout New England (MHC 1987).

Human Influences over the past 100 years

During the 20th century, land use and the economy remained focused on the tourist industry. Inns, cottages, and summer houses were built to attract summer visitors, and community residents took in boarders (*www.nantucketchamber.org/visitor/history.html*; accessed March 2011). These activities tapered off during World War I, but began again in the 1920s with a new focus on the island's whaling history (MHC 1987). The 1900s also marked the end of sheep grazing, thus a reestablishment of shrubs throughout the island has occurred. Today, woodlands do occur on Nantucket, but in much less quantity than before European settlement.



Amanda Boyd/USFWS

Aerial view of Nantucket National Wildlife Refuge from Great Point Lighthouse

The last 100 years has also marked an era of land conservation on the island. The NCF owns and manages almost 8,900 acres of conservation lands, and TTOR owns and manages 1,117 acres of conservation lands. Many other conservation organizations exist on Nantucket and contribute to raising awareness and protecting declining coastal habitats and wildlife. These organizations include; Nantucket Land Bank Commission, Massachusetts Audubon Society, Nantucket Land Council, Maria Mitchell Association, and others. Together, these conserved lands protect (although not in perpetuity) a significant portion of Nantucket's coastal habitats and natural communities (see appendix G).

Current Conditions

General Climate Description

Nantucket Island is bound by Nantucket Sound to the north and the Atlantic Ocean to the south, resulting in a maritime-influenced climate which is characterized by warmer temperatures in the winter and cooler temperatures in the summer compared to mainland Massachusetts locations. On Nantucket Island, approximately 44 inches of precipitation fall annually, with almost half of the precipitation occurring from April through September (NCSS 1979). Average low temperatures range from 26 degrees Fahrenheit in January to 63 degrees Fahrenheit in July. Average high temperatures range from 40 degrees Fahrenheit in January to 78 degrees Fahrenheit in July (U.S. Weather Bureau). Average monthly water temperatures range from 32 degrees Fahrenheit in January to 75 degrees Fahrenheit in August (*http://www.nantucket.net/links/weather.php*; accessed May 2012). Prevailing winds are from the southeast, and are usually greatest in February (NCSS 1979).

Climate Change

Climate change is a significant concern to the Service and to our partners in the conservation community. Scientists are predicting changes in temperature, precipitation, soil moisture, and sea level, all of which could adversely affect vegetation and ecological systems. We expect that species ranges will shift northward or toward higher elevations as temperatures rise, but responses likely will be highly variable and species-specific. Under those rapidly changing conditions, migration, not evolution, will determine which species are able to survive (USFWS 2006). Species that cannot migrate will suffer the most. For example, plants, mussels, and amphibians are more vulnerable to shifts in temperature that may affect their ability to survive, grow, and reproduce.

Climate change impacts in coastal regions include a higher frequency of intense hurricanes and storms, more severe impacts of lesser-intensity storms, including nor'easters, warming ocean waters, and rising sea levels (Frumhoff et al. 2007). Sea level rise is one of the most potentially serious consequences of climate change for coastal ecosystems like Nantucket NWR. According to the USGS, sea levels have been steadily rising 1-2 millimeters (0.04 to 0.08 inches) per year since the 19th century (*http://geochange.er.usgs.gov/poster/sealevel.html*; accessed March 2011). This is a result of a reduction of ice caps, ice fields, and mountain glaciers, in combination with the thermal expansion of ocean waters. If sea level continues to rise, this could have serious impacts on coastal islands including Nantucket NWR.

The Intergovernmental Panel on Climate Change's (IPCC) most recent climate change report offers a range of estimates of sea level rise over the next century based on model projections under different emissions scenarios. With no likelihood attributed to any of these scenarios, the lowest estimate is 0.18 to 0.38 meters (7 to 15 inches) under the B1 scenario, and the highest estimate is 0.26 to 0.59 meters (10 to 23 inches) under the A1FI scenario (IPCC 2007). It is important to note, however, that these upper bounds do not represent the upper limit of potential sea level rise, because of limitations in knowledge for all of the drivers of sea level change.

Local impacts would be determined by whether the land is subsiding (lowering in elevation due to underground changes, e.g., ground water pumping) or uplifting, topography, and the presence of sea walls and other anthropogenic factors (Galbraith et al. 2002). In the Northeast, sea level rise is higher than the global average because of land subsidence, and parts of both Nantucket and Martha's Vineyard have been classified as areas of high vulnerability to sea level rise by the USGS. Coastal communities in Massachusetts such as Gloucester and Marshfield are predicted to lose more than 5 percent of their land area due to rising ocean waters by 2100 (TNC 2006). By the mid-1990s, Boston had already

seen an increase in mean sea level since 1950 by 5 to 6 inches, and was predicted to see another increase of 22 inches by 2100 (TNC 2006, EPA 1997).

These losses in coastal land area include intertidal, salt marsh, and drier coastal upland habitat, resulting in a decrease in feeding, resting, and breeding habitat for many coastal fish and wildlife species. These include many marine and coastal bird species, lobsters, and clams, commercial fish including menhaden (*Brevoortia tyrannus*), alewife (*Alosa pseudoharengus*), and herring (*Clupea harengus*), among other species (Frumhoff et al. 2007).

In recognition of this, Nantucket NWR was one of several coastal refuges in the northeast which underwent a SLAMM (Sea Level Affecting Marshes Model) analysis. SLAMM incorporates existing information (such as elevation data) and five processes that affect wetland fate (inundation, erosion, overwash, saturation, and accretion). The models then project potential coastal habitat changes correlated with sea level rise by 2025, 2050, and 2100. They included the IPCC A1B Mean and Maximum scenarios, as well as 1.0 and 1.5 meter sea level rise projections. In particular, the analysis highlighted significant findings for Nantucket NWR, and will enable the refuge manager to take steps to mitigate for any of the potential outcomes.

SLAMM analysis results were completed in February 2009, and indicate that the refuge will lose at least one-fifth of its dry land, and half of its land designated as ocean beach by the end of this century as a result of sea level rise associated with climate change (see table 3.1). The most extreme scenario presented a loss of 70 percent of the refuge's dry lands and almost 90 percent of its ocean beaches.

Table 3.1. Losses in Refuge Lands Characterized as Dry Land or Ocean Beach Under the Four Different Sea Level Rise Scenarios by 2100. Taken from Application of the Sea Level Affecting Marshes Model (SLAMM 5.0) to Nantucket NWR Report (Clough and Larson 2009).

Sea level rise by 2100 (meters)	A1B Mean Scenario 0.39	A1B Max Scenario 0.69	1 Meter Scenario 1.0	1.5 Meter Scenario 1.5
Dry Land (percent loss)	20	33	51	71
Ocean Beach (percent loss)	49	57	77	89

All scenarios predicted losses in land area by 2100. The tip of Great Point was the first to disappear in all of the scenarios, followed by intrusions to the east and west beaches by ocean water, until in all scenarios there was no more land designated as Ocean Beach on the western side of the refuge, and only a very small portion left on the eastern side by 2100. The lands designated as Ocean Beach that did remain became much more scattered and redistributed throughout what remained of the refuge in the model scenarios.

When using models, there can always be uncertainties in the results due to limitations in input data and knowledge of all of the components of an ecosystem. However, this does not mean that the use of models is uninformative, nor does it undercut their importance as tools to help with management decisions. It simply highlights the need to place the results in the appropriate context for decision-making. For Nantucket NWR, there was some known uncertainty because of poor resolution from a lack of accurate elevation data. Since no light detection and ranging (LiDAR) elevation data was available for the refuge, National Elevation Data (NED) was used instead which was based on a survey conducted in 1972. NED indicated that none of the refuge was over the 10-foot contour line, causing poor resolution of what was considered dry land on the refuge. For the model results, this means that the predictions in the losses of dry land could be refined with more accurate elevational input data. See appendix H for the report.

Nevertheless, this analysis provides us with some picture of what to expect in the next century, and provides an opportunity to begin to consider our options for management and mitigation of these potential outcomes. Ocean beaches are particularly vulnerable to sea level rise, and Nantucket NWR was considered even more so because of its low elevation (less than 10 feet above sea level). These results indicate that in the absence of any mitigation, much of the refuge habitat for beach-nesting birds will be lost.

Originally designed for coastal marshes, the SLAMM model does not adequately incorporate other oceanic processes, such as erosion and accretion (see the section on Coastal Geomorphology). Therefore, predicted shoreline changes are compounded by these additional factors and may not be fully comprehensive. However, given that the refuge is approximately 21 acres at the tip of a barrier beach system, these erosion and accretion patterns will likely affect the overall acreage and orientation of the refuge over time; it is likely that with a moderate increase in sea level, the refuge will be subject to heavy losses in acreage as predicted. As climate change becomes better understood, our ability to model climate change impacts increases; therefore the refuge will continue to look for opportunities to take advantage of the latest scientific advancements to aid in refuge management.

Air Quality

The Massachusetts Department of Environmental Protection (MA DEP) monitors levels of ozone and particle pollution from several stations in Massachusetts for attainment or exceedance of the National Ambient Air Quality Standards (NAAQS) set by the EPA. These standards are reviewed every 5 years by the EPA and may be changed due to new scientific information. It is incumbent upon each State to ensure these standards are met and maintained. In the case of an exceedance of these standards, pollution control strategies are implemented, and once the standards are attained, a plan is developed to maintain that standard in such a way that incorporates future economic and emissions growth.

Great Point Lighthouse



Elizabeth Wunker/USFWS

In 2008, Massachusetts was in attainment of the air quality standards for all pollutants except ozone. Ozone at ground level is a respiratory irritant that can reduce the overall function of the lungs, cause asthma attacks, and aggravate chronic lung diseases. It also inhibits vegetation growth, and is often found in higher concentrations far downwind from the origination of the precursors that react to form it (MA DEP 2009). Over the last decade, the State of Massachusetts has made progress in reducing the number and severity of ozone exceedances, and in January 2008 submitted a State Implementation Plan to the EPA that describes strategies to attain the 8-hour ozone standard by 2010 (MA DEP 2008a).

There are a total of 14 air quality monitoring stations across Massachusetts. Based on information collected from these sites, there were a total of 49 exceedances of NAAQS for ozone over 15 days in 2008. The closest two monitoring stations to the refuge are included in those that registered exceedances: Fairhaven, Massachusetts (4 days) and Truro, Massachusetts (3 days). Exceedances at a station averaged over 3 years can lead to a violation of NAAQS. Based on data from 2006 to 2008, both of these stations were in violation of the 8-hour ozone standard (MA DEP 2009).

Water Quality

Summary of the General Condition of Nantucket
Nantucket Island contains freshwater and saltwater wetland habitats including saltmarsh, intertidal flats, and ponds. The only source of fresh water is from precipitation and infiltration. Nantucket Sustainable Development Corporation recently examined ground water sustainability in a report "Sustainable Nantucket—A Compass for the Future." The report summarized three items necessary to maintain groundwater supply: the amount of water pumped out of the ground to use, the amount of rainfall, and groundwater level. In the past 10 years, only the amount of water being used has dramatically changed.

The EPA has designated Nantucket as a Sole Source Aquifer because there is no other alternative for drinking water if this aquifer should fail (*http://www.epa.gov/region01//eco/drinkwater/solenan.html*; accessed March 2011). This designation means that Federal funding will not be available for any project the EPA determines poses a threat to the water quality of the aquifer through recharge. The benefit of such a designation is an increased public awareness that there is only one source of drinking water for the entire community, and therefore the community may be more willing to protect it locally. Groundwater recharge is through precipitation events; Nantucket receives approximately 44 inches of water each year, 25 inches of which are recycled back to the atmosphere through evaporation and transpiration, 1 inch migrates overland becoming surface runoff, and the remaining 18 inches infiltrates into the soil, recharging the groundwater (*http://www.nantucketlandcouncil.org/WaterProt.html*; accessed March 2011).

The refuge consists of approximately 21 acres of barrier beach and dune habitat at the tip of the Coskata-Coatue Peninsula. It does not contain any fresh water, nor is it affiliated with any public wellfields on the island. It is surrounded on three sides by ocean waters.

Long-Term Trends and Status of Water Quality for Nantucket
In 2001, the Massachusetts Department of Public Health received Federal funding to begin monitoring marine beaches throughout the State. Any public or semi-public beaches are tested daily or weekly for Enterococci as an indicator organism for water quality throughout the bathing season. In the 2004 bathing season, 17 beaches in Nantucket were part of the marine beaches testing program. Six of these beaches recorded single sample exceedances of the standard (MA DPH 2005).

Biological assessments of water quality in 2000 had only one coastal embayment in the Nantucket Islands Watershed, Madaket Harbor, which was listed as supporting aquatic life. The other three salt pond/coastal embayments (Polpis Harbor, Hither Creek, and Long Pond) were reported as impaired for aquatic life. Fish consumption advisories were placed in effect for Tom Nevers Pond, Gibbs Pond, and Miacomet Pond. Great Point Pond, the closest inland waterbody to the refuge, was tested for shellfishing and primary and secondary contact recreation use (prolonged and accidental contact with the water, including swimming, wading, and boating) and was found supportive of all three. It was not assessed for aquatic life, fish consumption, or aesthetics (MA DEP 2003).

All surface waters subject to tidal influence within the Nantucket drainage area were classified as SA, or excellent habitat for fish, aquatic life, wildlife, and primary and secondary contact recreation (MA DEP 2003).

The waters immediately north of Nantucket, in Nantucket Sound, are designated as a No Discharge Area (NDA). This means that no boats may discharge any sewage, treated or otherwise, in these waters immediately adjacent to Nantucket Island. This designation is applied when a community or the State determines that an area is ecologically or recreationally important enough to warrant additional protection. These influxes of sewage from boats, even when treated, can discharge nutrients, chemicals, and pathogens into the water, increasing public health concerns as well as overall concern for water quality. Increased levels of nitrogen, a component of sewage, can have wide-ranging effects on waterbodies, including encouraging algal blooms, decreasing dissolved oxygen content, and increasing turbidity (or poor water clarity), which can all have impacts on the species reliant upon these coastal waters.

Water quality measures from 2006 and 2007 from 19 sampling sites throughout Nantucket Sound indicate a generally good condition for nitrogen (0.28 to 0.32 milligrams Nitrogen/liter), water clarity (using Secchi disk, 2.9 to 4.8 meters), and chlorophyll-a (2.4 to 4.9 micrograms/liter), though there was a gradient present with poorer results in the vicinity of the south shore of Cape Cod, particularly from Yarmouth to Chatham from land-based discharge. While these three water quality measures were within the range that supports high nitrogen-related water quality, there has been a yearly trend of increasing nitrogen input into Nantucket Sound, which is cause for concern (*http://www.nantucketsoundkeeper.org/water-quality-results.asp*; accessed March 2009).

State-reported Impaired Waters

In 2008, the DEP released the 305(b)/303(d) Integrated List of Waters (report; MA DEP 2008b). It combines both the 305(b) Water Quality Assessment and the 303(d) Report on Impaired Waters for each river basin. The DEP compiled those reports and submitted them to the EPA and Congress to satisfy the Federal reporting requirements under section (b) 305 of the Clean Water Act.

Much of the data in this report comes from a number of different third-party sources including Federal, State, and non-governmental agencies, as well as projects with State, local, or Federal funding that submit individual watershed reports. Though the sources of data are varied, they must all have a Quality Assurance Project Plan, use of a State certified lab, QA/QC for data management, and documentation in a citable report. This ensures they are all subject to the same documentation and validation procedures.

The report on impaired waters in the State describes segments of streams, lakes, and estuaries that exhibit violations of water quality standards, details the pollutant responsible for the violation(s), and the cause and source of the pollutant, if known. There were 174 impaired waters in the USGS HUC 0109002 watershed (including the Nantucket Islands Watershed). Of these, pathogens were the most-reported cause (122). In the Nantucket Islands Watershed (Martha's Vineyard, the Elizabeth Islands, and Nantucket), there were 18 waterbodies listed as impaired. Pathogens were the primary cause for impairment, but other impairments included nutrients, organic enrichment/low dissolved oxygen, other habitat alterations, turbidity, and noxious aquatic plants. There are no impaired water bodies on the Nantucket NWR. Nantucket waters that were listed as impaired were: Nantucket Harbor (pathogens, nutrients, noxious aquatic plants), Polpis Harbor (pathogens, nutrients, other habitat alterations), Sesachacha Pond (pathogens), and Gibbs, Miacomet, and Tom

Nevers Ponds (metals other than mercury) (*http://iaspub.epa.gov/tmdl_waters10/huc_rept.control?p_huc=01090002&p_huc_desc=CAPE%20COD*; accessed March 2011). There is a draft pathogen total maximum daily load (TMDL) for the Nantucket Islands Watershed and a nitrogen TMDL for the Nantucket Harbor Embayment System (*http://www.mass.gov/dep/water/resources/wqassess.htm*; accessed March 2011).

Submerged Aquatic Vegetation (SAV) as an Indicator of Water Quality
SAV is a critically important component of the aquatic environment in shallow coastal ecosystems, and its presence and robustness are indicators of good water quality. SAV can only thrive in shallow depths where light reaches the benthic zone. The rooted aquatic beds provide shelter and food for numerous aquatic invertebrates. SAV also recycles nutrients, helps to stabilize sediment, and oxygenates the water (*http://www.mass.gov/dep/water/resources/eelgrass.htm*; accessed March 2011).

SAV composition varies with salinity. In Massachusetts, the most common species is eelgrass (*Zostera marina*) along the coastline. The MA DEP began a program in 1995 to track and monitor changes in existing eelgrass beds to provide an indicator of water quality. Eelgrass is an ideal species because it is sensitive to nitrogen loading and to physical disturbance, and can be documented using aerial photos.

Head of the Harbor, located just a few miles southwest of Nantucket NWR is one of the sites used by the MA DEP Eelgrass Mapping Project. Measurements taken in 1995 and again in 2001 at Head of the Harbor showed a 38.1 percent decrease in acreage of eelgrass, from 408.9 acres down to 252.9 acres (*http://www.mass.gov/dep/water/resources/eelgrass.htm*; accessed March 2011).

The Regional Socioeconomic Setting

Socio-economic Factors: Regional

Nantucket County has the lowest population of any county in Massachusetts. At the time of the 2000 census, the population of Nantucket County was 9,520 (51.3 percent male and 48.7 percent female), which is about 0.15 percent of the entire population in Massachusetts. The median age was 36.7 years with 7,692 people over the age of 18 years and 1,000 people over the age of 65 years. The population has been steadily increasing since then. In 2009, the population estimate was 11,322, an increase of 18.9 percent since 2000 (*http://quickfacts.census.gov/qfd/states/25/25019.html*; accessed March 2011).

Nantucket Sustainable Development Corporation examined the stability of the local population on Nantucket Island in a report "Sustainable Nantucket—A Compass for the Future." It stated, "… most full-time residents of Nantucket have lived here for more than 10 years, and 28 percent of us have lived here for 20 years or more. Among full-time residents, 19 percent have lived here less than 5 years, and 18 percent have lived here 5 to 10 years. (*http://www.sustainablenantucket.org/wp-content/uploads/2010/06/Indicators_Final_Report.pdf*; accessed February 2011).

The peak season population on the island has increased 33 percent since 1990. Estimates of Nantucket's summer population range from approximately 50,000 to 60,000 people, not including shorter visits of one week or less (*www.nantucket-ma.gov/Pages/NantucketMA_Visitor/nantucketfacts.pdf*; accessed March 2011).

Table 3.2 illustrates the population changes over the last century.

Table 3.2. Population Change on Nantucket Island.

Year	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010
Population	3,006	2,962	2,797	3,678	3,401	3,484	3,559	3,774	5,087	6,012	9,520	10,172
Percent Change	–	-1	-6	+31	-8	+2	+2	+6	+35	+18	+58	+7

Economic Base

The median household income for Nantucket County in 2008 was $69,993. This was the fourth highest income in the State, exceeded only by Norfolk County ($80,944), Middlesex County ($78,040), and Plymouth County ($72,931) and is higher than the State average ($65,304). In 2000, the median household income was $55,522. A large portion of the income in Nantucket County is generated by tourism and construction of second homes.

The economy of Nantucket has evolved over time from the riches and ultimate economic crash associated with the harvesting of whales into an economy that is very dependent on tourism. The State of Massachusetts reports that in 2010 there were on average 5,704 jobs on the island. Over one-third of these jobs were in the tourism-related sectors of retail trade (14.6 percent) and Accommodations and Food Service (21.8 percent). Another ten percent of the jobs on the Island were in Construction, as a large percentage of the island's housing consists of secondary vacation homes. Employment on the Island is highly seasonal. The State reports that employment roughly doubled between January 2011 (5,077) and July 2011 (10,305), which reflects the increasing demand for goods and services from summer residents. The annual average unemployment rate has increased over the past several years to 7.8 percent in 2010, which is consistent with national trends. In 2011 unemployment on the Island ranged from a high of 15.3 percent in February 2011 to a low of 3.5 percent in August 2011. These statistics are reflected in Tables 3.3 and 3.4.

Table 3.3. 2010 Nantucket Average Employment and Wages.

Industry	Establishments	Total Wages	Average Employment	Average Weekly Wage
Total, All Industries	1,032	$259,842,085	5,704	$876
Construction	284	$32,367,978	566	$1,100
Manufacturing	16	$2,219,760	63	$678
Wholesale Trade	13	$2,599,050	51	$980
Retail Trade	164	$30,498,003	831	$706
Transportation and Warehousing	24	$10,508,447	215	$940
Information	11	$5,314,727	86	$1,188
Finance and Insurance	11	$5,553,851	59	$1,810
Real Estate and Rental and Leasing	62	$6,916,747	136	$978
Professional and Technical Services	60	$8,897,155	156	$1,097
Administrative and Waste Services	102	$19,818,840	428	$890
Health Care and Social Assistance	27	$26,671,207	472	$1,087

Industry	Establishments	Total Wages	Average Employment	Average Weekly Wage
Arts, Entertainment, and Recreation	26	$14,323,545	383	$719
Accommodation and Food Services	121	$37,400,288	1,244	$578
Other Services, Ex. Public Admin	81	$10,788,275	272	$763
Public Administration	15	$17,026,205	260	$1,259

Source: Executive Office of Labor and Workforce Development, State of Massachusetts. http://www.mass.gov/lwd/economic-data/. Accessed March 2012.

Table 3.4. Nantucket Laborforce, Employment, and Unemployment (not seasonally adjusted).

Month	Year	Labor Force	Employed	Unemployed	Unemployment Rate
12	2011	6,364	5,781	583	9.2
11	2011	6,522	6,030	492	7.5
10	2011	7,789	7,382	407	5.2
9	2011	9,138	8,730	408	4.5
8	2011	10,677	10,303	374	3.5
7	2011	10,717	10,305	412	3.8
6	2011	9,600	9,170	430	4.5
5	2011	7,651	7,189	462	6.0
4	2011	6,465	5,928	537	8.3
3	2011	5,942	5,134	808	13.6
2	2011	5,809	4,921	888	15.3
1	2011	5,986	5,077	909	15.2
Annual	**Year**	**Labor Force**	**Employed**	**Unemployed**	**Unemployment Rate**
Average	2010	7,876	7,260	616	7.8
Average	2009	7,820	7,284	536	6.9
Average	2008	8,441	8,166	275	3.3
Average	2007	8,551	8,354	197	2.3
Average	2006	8,412	8,218	194	2.3
Average	2005	8,138	7,940	198	2.4
Average	2004	7,840	7,643	197	2.5
Average	2003	7,691	7,496	195	2.5
Average	2002	7,469	7,324	145	1.9
Average	2001	7,118	7,002	116	1.6
Average	2000	7,289	7,181	108	1.5

Source: Executive Office of Labor and Workforce Development, State of Massachusetts. http://www.mass.gov/lwd/economic-data/. Accessed March 2012.

Land Type and Ownership Pattern
Over 40 percent of Nantucket Island (over 12,000 acres) is owned by conservation organizations (*http://www.umb.edu/nantucket/nantucket/*; accessed March 2011). The NCF is the largest landowner on Nantucket Island and owns almost 8,900 acres (*http://nantucketconservation.org*; accessed March 2011).

Refuge Revenue Sharing Payments

The Refuge Revenue Sharing Act of 1935, as amended, provides annual payments to taxing authorities, based on acreage and value of refuge lands. We have contributed refuge revenue sharing payments to the town of Nantucket since the refuge was established. Money for these payments comes from the sale of oil and gas leases, timber sales, grazing fees, the sale of other refuge system resources and from Congressional appropriations. The actual Refuge Revenue Sharing Payment does vary from year to year because Congress may or may not appropriate sufficient funds to make full payment, which it has not done since at least 1997. Payments are based on one of several different formulas, whichever results in the highest payment to the local taxing authority. In Massachusetts, the payments are based on three-quarters of one percent of the appraised market value. The purchase price of a property is considered its market value until the property is reappraised. The Service reappraises their properties every 5 years.

Table 3.5. Refuge Revenue Sharing Payments for Nantucket NWR from 1997-2010.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Payment	$2,163	$1,910	$1,798	$1,683	$1,468	$1,499	$553	$531	$470	$531	$491	$475	$346	$244



Amanda Boyd/USFWS

Female common eider

Refuge Administration

Refuge Establishment and Land Acquisition

In 1973, we acquired what was then approximately 40 acres of land at the tip of the Coskata-Coatue Peninsula through the Act Authorizing the Transfer of Certain Real Property for Wildlife from the Coast Guard. Today, the refuge is approximately 21 acres (see Coastal Geomorphology section). The Coast Guard continues to maintain control of a less than one-acre inholding on the refuge that contains the Great Point Lighthouse.

The Eastern Massachusetts NWR Complex and Staffing

When the refuge was established, it was administered as a satellite of Parker River NWR in northeastern Massachusetts. In 1980, management was transferred to Great Meadows NWR, which is now part of the Eastern Massachusetts NWR Complex located in Sudbury, Massachusetts. We use the term "refuge complex" to describe two or more individual refuges, typically in the same region of a State or adjoining States, administratively combined under a single refuge manager's responsibility. Present staffing for the complex include 16 permanent positions, 12 located at the complex headquarters in Sudbury, 1 located at Assabet River NWR and 3 located on Monomoy NWR, 2 full time term biologists, 2 part time park ranger, and several seasonal biological technicians and interns. There is no permanent staff stationed on Nantucket NWR, however, complex biologists conduct site visits several times a year and a seasonal technician was present onsite in 2010 and 2011. The refuge manager is responsible for determining how to distribute staff time to accomplish priority work.

Funding

The funding for the Nantucket NWR is embedded in the budget for the entire refuge complex. Operational funding includes salaries, supplies, travel, and all other operational activities (wildlife and habitat surveys and management) that are not funded by special projects. Our annual funding fluctuates according to the number and size of the projects funded that year (e.g., vehicle or equipment replacement, visitor service enhancements, and facility improvements). Revenue sharing with TTOR and NCF from permits to access Coskata-Coatue Refuge and the refuge must be explored. This source of funds could support management through interpretive signs, a Service vehicle, law enforcement presence, seasonal staff, overhead costs for a visitor center, and/or assistance in maintaining facilities. The table below summarizes the levels of funding for the entire Eastern Massachusetts NWR Complex, including Nantucket NWR, in fiscal years 2007 through 2010.

Table 3.6. Fiscal Year Funding for the Eastern Massachusetts NWR Complex for 2007-2011.

	2007	2008	2009	2010	2011
Operations	$2,070,809	$2,181,898	$1,919,276	$2,124,250	$2,109,679
Construction	$2,898,619	$497,465	$4,560,000*	$2,022,800*	$227,302
Total Fiscal Year Budget	$4,969,428	$2,679,363	$6,479,276*	$4,147,050*	$2,336,981

**Includes ARRA funded projects, road work and construction of a new visitor center at the Assabet River NWR.*

Refuge Facilities and Maintenance

The facilities on the refuge are sand access "roads" and interpretive signs. Several portable restrooms are provided and maintained by TTOR. Under this CCP the Service will explore the establishment of additional facilities on the island to provide refuge staff with the resources needed to conduct business while on the refuge, as well as increase visitor awareness of the refuge and refuge staff.

Findings of Appropriateness and Compatibility Determinations

The following list represents the compatibility determinations that have been approved by the refuge manager and Regional Refuge Chief for Nantucket NWR:

- Environmental Education and Interpretation
- Wildlife Observation and Photography
- Recreational Fishing
- Research Conducted by Non-Service Personnel
- Commercial Guides, Tours, and Outfitting
- Outdoor Events and Ceremonies
- Non-Motorized Boat Landing and Launching

- Beachcombing
- Sunbathing and Swimming

See appendix B for the full compatibility determinations and associated findings of appropriateness for refuge activities. Appendix B also provides the analysis which finds several other activities, such as organized picknicking, camping, fires, and pets as inappropriate uses of the refuge. Chapter 1 describes these two processes. See also the discussion below on special use permits.

Partnerships

Since Nantucket NWR was established, we have combined our resources with others to form several outstanding partnerships. These partners have conducted research, and have played a critical role in monitoring wildlife and protecting wildlife habitat, and in engaging visitors through interpretation and educational programs. Some of these partners include MassWildlife and the Massachusetts Audubon Society. The Maria Mitchell Association is a relatively new local partner to the refuge. With a mission of promoting astronomy, science, and education on Nantucket Island, they offer unique collaborative research and public engagement opportunities.

Our most enduring partnerships involve TTOR and NCF, two non-profit organizations that have worked with the Service to provide access to the refuge and to manage and protect all of the Coskata-Coatue peninsula, particularly for the federally listed piping plover and State-listed least tern *(Sterna antillarum),* and their associated wildlife habitat. Both organizations are highly regarded on Nantucket and provide leadership in species conservation and habitat management.

All overland access to the Nantucket NWR is through the Wauwinet Gatehouse, which is approximately five over sand miles from Great Point. TTOR requires all vehicles to have an oversand permit to access their property and by default the refuge. The NCF owns the gatehouse through which access is granted for the entire Coskata-Coatue Peninsula, and partners with TTOR to staff the gatehouse. TTOR shares revenues collected from the sale of oversand vehicle permits with NCF. TTOR also monitor vehicular access to both properties by establishing driving routes and enacting closures when necessary due to the presence of nesting plovers and terns, and/or erosion.

Under a now-expired MOU with the Service, TTOR has monitored and protected wildlife and habitat on the refuge for many years. TTOR has and will to some degree continue to act as a liaison with the community by being an onsite point of contact, and by providing interpretive opportunities and educational programs to the public.

Community Outreach

Reaching out to the Nantucket community is a key aspect to informing the public about refuge management. Due to the lack of on-site staff, Service-based outreach is conducted primarily through the media. Newspaper articles inform the public about upcoming events, meetings, or CCP-related information. We maintain a refuge Web site and established a Facebook page in 2011. We are able to communicate through e-newsletters for refuge updates in the future.

Special Use Permits, Including Research

Special use permits are issued to individuals, organizations, and agencies that request the use of refuge facilities or resources beyond what is available to the general public through the visitor services program. In order to ensure that wildlife disturbance is minimized, each activity authorized by a special use permit must be an appropriate and compatible use of the refuge. Special conditions and restrictions are often imposed by the refuge manager in the



Amanda Boyd/USFWS

Visitors enjoying the refuge on a summer's day

issuance of a special use permit. Further details on special use permits are available from the refuge headquarters.

Refuge Natural Resources

Nantucket NWR is located at the very tip of the Coskata-Coatue Peninsula, in an area known as Great Point (map 3-4). This area encompasses both the refuge and parts of the adjacent TTOR land above the area known as The Galls. The refuge constitutes approximately 21 acres on the northernmost tip of the peninsula. A third conservation organization, the NCF, owns both the Coatue Wildlife Refuge and The Haulover, found south of TTOR's Coskata Refuge. Within the landholdings of these three organizations on Coskata-Coatue, there lies an extremely diverse assemblage of habitats, and though we focus on Nantucket NWR, we must incorporate discussion of these lands as well to provide the appropriate landscape context. Many species may be seen on or near the refuge, but in fact breed in habitats provided on these adjacent lands, and vice versa.

Soils—General Description

Two soil types were identified for the refuge, and 10 soil types were identified for the rest of the Coskata-Coatue Peninsula using the most recent data available according to the Web Soil Survey (NRCS, *http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm*; accessed March 2011). Of the two identified for the refuge, beaches are found along the perimeter of the refuge at the ocean's edge, while udipsamments are found in the interior. See tables 3.7 and 3.8 for descriptions of each.

Table 3.7. Nantucket NWR Soils.

Soil Type	Percent Slope	Drainage Class	Parent Material	Landform
Udipsamments, rolling	4 to 16	Not Available	Loose sandy eolian sands	Barrier beaches
Beaches	Not Available	Not Available	Reworked sandy beach sand derived from igneous and metamorphic rock	Not Available

Map 3-4. Coskata-Coatue Peninsula, Great Point and Nantucket NWR



Table 3.8. Coskata-Coatue Soils.

Soil Type	Percent Slope	Drainage Class	Parent Material	Landform
Udipsamments, rolling	4 to 16	Not Available	Loose sandy eolian sands	Barrier beaches
Beaches	Not Available	Not Available	Reworked sandy beach sand derived from igneous and metamorphic rock	Not Available
Pawcatuck mucky peat	0 to 1	Very poorly drained (non-saline to moderately saline)	Partly decomposed herbaceous organic material over loose sandy glaciomarine deposits	Marshes (marine)
Riverhead-Nantucket Complex	3 to 8	Well drained	Friable coarse-loamy eolian deposits over loose sandy glaciofluvial deposits derived from granite and gneiss	Outwash plains
Ridgebury variant silty clay loam	0 to 3	Poorly drained	Dense clayey lodgment till	Depressions
Plymouth-Evesboro complex	3 to 8	Excessively drained	Loose sandy ablation till	Moraines
Woodbridge variant loam	0 to 3	Moderately well drained	Friable coarse-loamy eolian deposits over dense fine-loamy lodgment till derived from granite and gneiss	Moraines
Berryland variant loamy sand	0 to 3	Very poorly drained	Loose sandy glaciofluvial deposits derived from igneous and metamorphic rock	Terraces
Medisaprists	0 to 1	Very poorly drained	Organic deposits	Bogs
Klej and Pompton soils	0 to 3	Poorly drained	Loose sandy glaciofluvial deposits derived from granite and gneiss and/or firm fine-loamy lacustrine deposits and/or firm fine-loamy marine deposits	Outwash plains

Refuge Habitat Types and Vegetation

Barrier Beach Dunes

Most of the refuge is characterized as barrier beach dunes, which includes the beach, berm, and dune system. Barrier beach dunes generally begin at the high water line and extend inland and upland. Dune systems vary in topography, elevation, and relative amounts and types of vegetation, and are greatly influenced by wind and wave energy. Barrier beach dunes are also found throughout the Coskata-Coatue Peninsula, and comprise a large portion of the edges of Nantucket Island. In 2010, a comprehensive vegetation survey was started (table 3.9). Many plants are still being identified to species and cross-referenced with the newest checklist of Massashusetts plants (Cullina et al. 2011). Efforts to correctly identify plants on the refuge will continue in future years, but a list of identified plants to date is below.

Table 3.9. Nantucket NWR Plant List.

Common Name	Scientific Name
Bayberry	*Morella pensylvanica*
Beach Heather	*Hudsonia tomentosa*
Beach Pea	*Lathyrus japonicus*
Dunegrass	*Ammophila breviligulata*
Japanese Rose**	*Rosa rugosa*
Poison Ivy	*Toxicodendron radicans*
Reindeer Moss	*Cladonia rangiferina*
Sea Rocket	*Cakile edentula*
Seabeach Knotweed	*Polygonum glaucum*
Seaside Goldenrod	*Solidago sempervirens*
Seaside Spurge	*Euphorbia polygonifolia*

Common Name	Scientific Name
Cyperus (genus unidentified)	*Cyperus*
Orach*	*Atriplex patula*
Tall Wormwood	*Artemisia campestris*
Jointweed	*Polygonum articulatum*
Poor-man's Pepper	*Lepidium virginicum*
Eastern Red Cedar	*Juniperus virginiana*
Sweet Everlasting	*Pseusdogaphalium obtusifolium*
Saltwort (Prickly or Carolina)	*Salsola kali*
Oenothera (genus unidentified)	*Oenothera*
Fireweed	*Erechtites hieracifolia*
Sea Chickweed	*Honckenya peploides*

** species introduced*
*** species introduced and invasive*

The barrier beach dune systems on coastal islands support a variety of birds. Beach berm habitat in general, between the high tide water line and the toe of the dunes, support nesting piping plovers, common terns *(Sterna hirundo)*, least terns, and American oystercatchers (*Haematopus palliates)*. Unfortunately, these species nest in beach habitat that is also desirable to summer tourists (on foot and OSVs), making them vulnerable to disturbance and reproductive failure. Conservation organizations on Nantucket Island work to protect nesting habitat according to Federal guidelines by seasonally closing nesting areas and minimizing disturbance.



Bill Thompson

Ruddy turnstone

Intertidal

Intertidal areas are found along the perimeter of the refuge, interfacing with the ocean, and encompass virtually all of the Coskata-Coatue Peninsula and Nantucket Island. Nantucket Island has approximately 28 miles of changing coastline, all of which is tidally influenced to some degree. The width of the intertidal area varies depending on the slope of the sand flats adjacent to the shoreline. Although little vegetation grows in most of the intertidal areas, this habitat is very rich as a result of daily tidal influence and renourishment. These intertidal habitats generally support a variety of invertebrates (e.g., soft shell clams and horseshoe crabs (*Limulus polyphemus*)), foraging birds (American oystercatchers and piping plovers), and marine mammals (gray (*Halichoerus grypus)* and harbor *(Phoca vitulina)* seals). Other species that benefit from these habitats that are found on adjacent lands include greater yellowlegs (*Tringa melanoleuca*), lesser yellowlegs (*Tringa flavipes*), sanderlings (*Calidris alba*), semipalmated sandpipers (*Calidris pusilla*), ruddy turnstones (*Arenaria interpres*), and short-billed dowitchers (*Limnodromus griseus*).

Invasive Plants

Non-native invasive species often out-compete native plants, reducing available food and habitat required by other native avian and mammalian species. No comprehensive survey of invasive plants has been conducted on the refuge due to a lack of staff time and availability of funds. The only documented invasive species to date are Japanese rose and sea poppy.

Coskata-Coatue and Nantucket's Contextual Landscape: Habitat Types and Vegetation

Wetlands

Wetlands on the Coskata-Coatue Peninsula include both freshwater and saltwater ponds, marshes, and swales. Each site has a unique species assemblage; therefore it is difficult to categorize them. However, there are some commonalities described below.

Saltmarsh

Saltmarshes generally occur in calm intertidal areas, but are some of the most productive ecosystems because of the amount of biomass associated with them. Salt and brackish marshes are located in the swales east of Coskata Woods at The Glades, and on the Coatue points. These habitats support a variety of salt-tolerant vegetation including: saltmarsh cordgrass (*Spartina alterniflora*), salt meadow grass (*Spartina patens*), spike grass (*Distichlis spicata*), black grass (*Juncus gerardi*), sea lavender (*Limonium latifolium*), saltmarsh aster (*Symphyotrichum subulatum*), seaside goldenrod (*Solidago sempervirens*), seabeach knotweed (*Polygonum glaucum*), and ladies' tresses, a native orchid (*Spiranthes*). Saltmarshes also serve as sources of algae, plankton, and small crustaceans as a result of daily tidal influence and renourishment, which in turn support a number of shorebirds and waterbirds. Many species use saltmarshes in the early stages of their life cycles before becoming large enough to leave for deeper waters. These species include mollusks, crustaceans, striped bass, and flounder. Saltmarsh habitat also provides rich feeding habitat for foraging shorebirds such as least sandpiper (*Calidris minutilla*). Wading birds such as great egrets (*Ardea alba)* will also feed in this habitat. In addition, species such as American oystercatcher, willet (*Tringa semipalmata),* and common terns will nest in slightly elevated patches of saltmarsh. There is no saltmarsh on Nantucket NWR. There are some freshwater marshes associated with the swales, and these habitats potentially support species including snapping turtles (*Chelydra serpentina*), painted turtles (*Chrysemys picta*), spring peepers (*Pseudacris crucifer*), and green frogs (*Rana clamitans*) (*http://nantucketconservation.org;* accessed March 2011*).*

Ponds and Wetlands

There are several ponds on the Coskata-Coatue Peninsula, although there are none on Nantucket NWR. The Great Point Lagoon and Coskata Pond are two of the largest. Great Point Lagoon is approximately 40 acres, and the Coskata Pond and associated wetlands (The Glades) total approximately 300 acres. These habitats support a variety of flora including many of the saltmarsh species listed previously, as well as sea-blite (*Suaeda calceoliformis*), lady's thumb (*Polygonum persicaria* L.), fall panic-grass (*Panicum dichotomiflorum*), and saltmarsh fleabane (*Pluchra odorata*). Great Point Lagoon undergoes fluctuations in salinity, and therefore species composition is subject to change, and it has reduced in size in recent years. This area also supports peatlands. Various fauna rely on these wetlands including terns, gulls, herons, egrets, and osprey (*Pandion haliaetus*).

Freshwater ponds and wetlands support feeding, resting, and nesting birds such as American black duck, belted kingfisher (*Ceryle alcyon*), mallard (*Anas platyrhynchos*), and red-breasted merganser (*Mergus serrator*). They also provide fresh water for drinking and preening and are utilized by species such as terns and gulls. Amphibians and reptiles potentially found in these habitats include snapping turtles, painted turtles, green frogs, and spring peepers (TTOR 2001, *http://nantucketconservation.org;* accessed March 2011).

Maritime Hardwood Forests

Hardwood forests are limited on Nantucket Island, with the largest concentrations occurring on the northeastern portion of the island. Maritime forests grow on dry, upland soils, and are surrounded by salt water influences (marsh, pond, harbor, ocean) and sand dunes. Coskata Woods represents one of the only woodlands on the Coskata-Coatue Peninsula, and one of the only

woodlands left intact through European settlement on Nantucket. Having survived the land clearing during Nantucket's initial period of settlement starting in 1659 and beyond, a local law was passed in 1711 that prevents its cutting.

Today, it is a mature stand of white (*Quercus alba*) and black (*Quercus velutina*) oak, with occasional eastern red cedar (*Juniperus virginianus*), and tupelo (*Nyssa*), spanning approximately 60 acres. Subject to salt spray, these trees are twisted and stunted in growth and appearance. The understory varies due to moisture and substrate, but is primarily characterized by beaked hazelnut (*Corylus cornuta*), sweet pepperbush (*Clethra alnifolia*), arrow-wood (*Viburnum dentatum*), poison ivy, and swamp azalea (*Rhododendron viscosum*). Other species found in these woods include a diverse invertebrate community. Leaf beetles and caterpillars, lynx spiders, lace wings, ladybird beetles, ground beetles, and saltmarsh mosquito are common. Birds seen associated with these woodlands include barn swallow (*Hirundo rustica*), tree swallow (*Tachycineta bicolor*), red-tailed hawk (*Buteo jamaicensis*), American crow (*Corvus brachyrhynchos*), kestrel (*Falco sparverius*), osprey, northern harrier (*Circus cyaneus*), and summer tanager (*Piranga rubra*). White-tailed deer and a variety of small mammals are also found in these woods (TTOR 2001). There is no forest on Nantucket NWR.

Eastern Red Cedar Savanna
TTOR's Coskata-Coatue Wildlife Refuge contains the largest stand of Eastern Red Cedar Savannah in New England, at over 400 acres, which is known locally as "The Cedars." The stand grows on a Holocene deposit and has been shaped by past land uses, including fire and grazing. Species associated with TTOR's Red Cedar Savanna include common hairgrass (*Deschampsia flexuosa*), red fescue (*Festuca rubra*), and prickly pear cactus (*Opuntia humifusa*). In addition, species like black oak, black cherry (*Prunus serotina*), and beach plum (*Prunus maritima*) also grow within this stand. These woods also support many of the species listed under Coskata Woods (TTOR 2001).

Special Status Plants

Though no comprehensive surveys have been conducted, Seabeach knotweed (*Polygonum glaucum*) was identified on the refuge in 2009. Seabeach knotweed is listed as a species of special concern in Massachusetts.

On the Coskata-Coatue Peninsula, there are several additional species of rare plants. These include the eastern prickly pear cactus (State-listed endangered), oysterleaf (*Mertensia maritima*, State-listed endangered), and American sea-blite (*Suaeda calceoliformis*, State-listed special concern).

Unique and Significant Natural Plant Community Types on the Surrounding Nantucket Landscape

According to the Massachusetts BioMap program, the Coskata-Coatue Peninsula and other Nantucket Island coastal beaches contain a Maritime Dune Community, listed as Imperiled, and a Maritime Juniper Woodland/Shrubland which is listed as Critically Imperiled. The Maritime Dune Community supports all three Massachusetts' populations of prickly pear cactus, two of the best populations of American sea-blite, and the globally rare Seabeach knotweed. This habitat is important for beach-nesting birds such as American oystercatcher, common terns, the federally protected piping plover, and State-listed least tern. The Maritime Juniper Woodland/Shrubland is a small but high quality evergreen community within the salt spray zone. This means that the trees are typically short, not exceeding 15 feet, and scattered, creating openings for a variety of herbaceous and shrubby species (MA NHESP 2004). There are no unique or significant natural plant communities on the refuge itself.

Nantucket has several key conservation organizations with significant land holdings on the island and surrounding coastal areas. These parcels conserve large acreages representative of Nantucket's habitats and rare communities listed above. These key parcels are listed in detail in appendix G.

Refuge Biological Resources

Federally Listed Endangered or Threatened Species

Piping plovers (federally listed as threatened) occasionally use the refuge to nest during the breeding season, though in small numbers. Roseate terns *(Sterna dougalii;* federally listed as endangered) use the refuge for staging before and after the breeding season.

Birds

Coastal islands are particularly important for nesting shorebirds and seabirds, and migrating songbirds, seabirds, and shorebirds during north- and southward migrations. Though Nantucket NWR is small and is comprised mainly of dune and beach habitat, it is part of a larger context of conserved lands within the Atlantic Flyway. The Service alone has refuges associated with Cape Cod (Monomoy and Mashpee NWRs), and coastal islands south and southwest of Cape Cod including Nantucket NWR, Nomans Land Island NWR, Faulkner Island (Steward B. McKinney NWR), and Block Island NWR. In past years, bird monitoring on Nantucket NWR has focused on beach-nesting species including piping plovers and terns. Annual surveys and monitoring of nesting attempts have been conducted by TTOR. In 2010 and 2011, a biological science technician staffed the refuge (late May to mid-September in 2010, late April to early November in 2011) and conducted comprehensive wildlife surveys of all birds using the refuge.

The refuge is located at the tip of the Coskata-Coatue Peninsula, on what is known as Great Point, the area north of the narrow sand bar called The Galls. Because Great Point includes both the refuge and TTOR land, it can be difficult at times to distinguish between the two when referring to reports. For the purposes of the discussion below, reference to Great Point will be inclusive of both the refuge and TTOR property.

Shorebirds

Piping plover and American oystercatcher are two species of shorebirds of conservation concern which occasionally use the refuge. Though numbers are consistently low on the refuge, piping plovers and American oystercatchers have regularly nested on Great Point (off of the refuge) and the rest of the Coskata-Coatue Peninsula for decades. TTOR has been managing piping plover habitat on the refuge since 1982. In 2001, a Section 7 evaluation was completed to initiate management of piping plover according to the 1994 piping plover Federal guidelines. Since then, TTOR in conjunction with the Service has established symbolic fencing in early April, and initiated beach closures for piping plover.



Amanda Boyd/USFWS

American oystercatcher with band

Since record keeping began (in 1983) for piping plovers on Great Point, numbers of nesting pairs have ranged from zero (1999) to a high of 12 (1996). In the years 1996 and 2006, there have been nesting pairs on the refuge. In 2007, there was a pair on the refuge displaying territorial behavior by May 28, however, no nest was ever found and the birds were no longer seen after June 12. In 2008, no piping plovers nested on Great Point for the first time since piping plover management began. Of the entire Coskata-Coatue Peninsula, there were a total

of eight piping plover nests monitored that fledged five chicks in 2007. In 2008, a total of four chicks fledged from the three piping plover nests monitored (Melvin 2006, Melvin 2007, USFWS undated, TTOR 2007, TTOR 2008). In 2010 and 2011, no piping plovers nested on Nantucket NWR, but a pair was scraping and exhibiting territorial behavior through the end of May in 2011. Only a few piping plovers were seen foraging in September (USFWS unpublished data).

American oystercatchers have also been regular nesters along the beaches of Coskata-Coatue. Since 2005, TTOR has collaborated with The City University of New York to band individuals each year. This is contributing to a better understanding of American oystercatcher dispersal, migration, survival, and recruitment in the Northeast. In 2007, there were 16 breeding pairs on TTOR property, with two re-nests and five chicks fledged. In 2008, there were 13 breeding pairs on TTOR and private property, with one fledged chick (TTOR 2007, 2008). In 2010 and 2011, no American oystercatchers nested on the refuge but one pair exhibited courtship and territorial behavior for multiple days in June (USFWS unpublished data).

The consistently low numbers of nesting pairs and variable nest success and fledging rates of these shorebird species are cause for some concern. This may be due to any number of factors, but habitat, human disturbance including OSV use, and predation are three that need further investigation. While TTOR has managed beach vehicle access and has erected symbolic fencing to prevent human nest disturbance, they did note the failure of two American oystercatcher nests within a day following the unauthorized presence of dogs in close proximity to the nests. They have also noted nest failures due to predation. An active great black-backed gull (*Larus marinus*) colony on Great Point in 2008 was estimated to have had 200 nesting birds, and similar estimates were posited for the herring gull colony as well. One confirmed rat den on The Galls was located, with an additional two locations suspected (TTOR 2008). These dens represent additional sources of potential nest predation, and continuing threats to shorebird nest success in the future.

The refuge and other areas of the Coskata-Coatue Peninsula provide resting and staging habitat for shorebirds during migration as well. Casual observations of larger numbers of American oystercatcher in late summer seem to indicate that the Coatue property owned by NCF may provide important staging habitat for them prior to fall migration (S. Koch, personal communication, 2010). Other shorebirds including sanderlings (*Calidris alba*), semipalmated sandpipers (*Calidris pusilla*), black bellied plovers (*Pluvialis squatarola*), semipalmated plovers (*Charadrius semipalmatus*), and ruddy turnstones (*Arenaria interpres)*, have all been observed using the refuge during migration. Sanderlings are the most common shorebird species during fall migration and a high count of approximately 300 was recorded at one time on the refuge in early October, 2011 (USFWS unpublished data).

Seabirds

The BCR 30 plan identifies several species of seabirds of conservation concern found on the refuge. Common and least terns, two State-listed species, are regular breeders along the refuge and adjacent beaches, and use the refuge as a staging site prior to migration. Historically, Great Point has been the site of one third of Massachusetts' breeding least terns (TTOR 2001). Since 1978, numbers of least tern pairs have fluctuated on Great Point, ranging from zero in 1991, to over 1,000 in 2 consecutive years (1996 and 1997; USFWS undated).



Stephanie Koch/USFWS

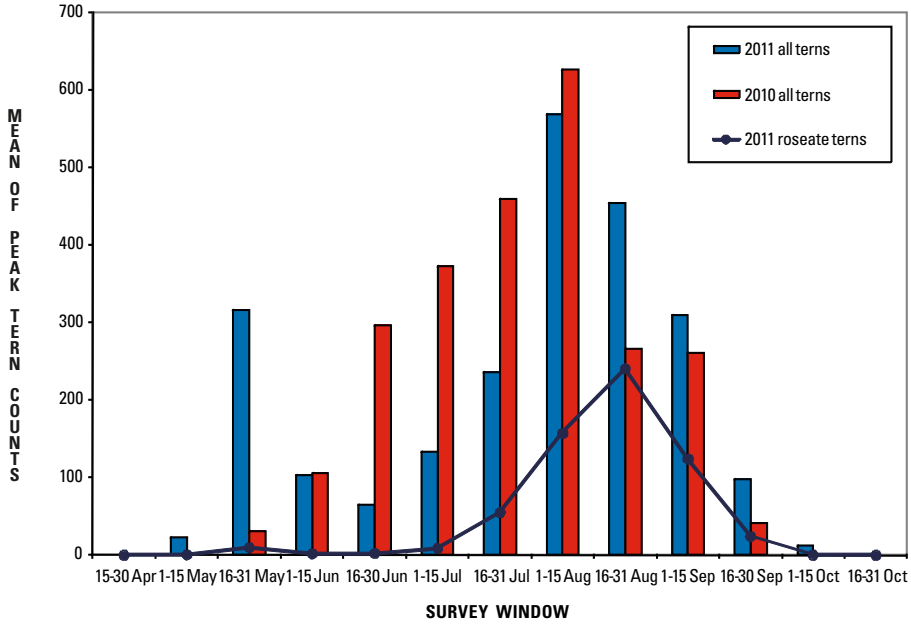
Common tern

In 2005 and 2006, least terns nested on the refuge, hatching 4 and 2 hatchlings, respectively. In 2007, least terns attempted to nest at 4 locations in total; 3 on Great Point and 1 at The Galls. The third nesting attempt consisted of 60 nests at the tip on the refuge. The fourth attempt was initiated in the last week of July with a total of four nests, and was in association with common and roseate tern adults with young. Both the third attempt at the tip of Great Point and the final attempt during the 2007 season on The Galls were destroyed by gulls (TTOR 2007). In 2008, 73 nests were counted in a colony located at The Galls. Eventually, this colony was depredated, and another nesting attempt was initiated on Great Point with 13 nests. This second attempt resulted in three fledged chicks (TTOR 2008). In 2010 and 2011, no least terns nested on the refuge but a small number of birds were observed scraping on multiple days in late May in 2011 (USFWS unpublished data).

Common terns are often found on Great Point in lower numbers, ranging from 1 nesting pair in the early 1980s and again in the early 1990s up to 35 nesting pairs in 1996. In 2007, 1 common tern pair nested in The Glades, and in 2008, 1 nesting pair was located at Great Point, but was depredated. They also use the refuge as a staging area prior to fall migration, along with many other species of terns that congregate in the months of July, August, and September. Daily counts of staging terns frequenty are in the hundreds, and include common, least, roseate, and black terns *(Childonias niger)*. In 2008, informal counts of 280 to 500 staging terns were documented on Great Point daily through the end of August (TTOR 2008). In 2010 and 2011, the very northern tip of the refuge was used extensively as a staging area for common and roseate terns. Tern use was recorded through standardized surveys consisting of systematic counts refugewide, as well as high counts. Standardized surveys are still being analyzed, but daily high counts were averaged over 2-week periods to display seasonality of use in 2010 and 2011 on Nantucket NWR. In 2010, roseate terns were not often identified to species, thus this information is not displayed for 2011.

In general, Nantucket NWR is utilized more during the post-breeding staging period than the pre-breeding staging period, although several hundred birds were using the refuge during the last two weeks of May in 2011. In 2010, regular counts weren't initiated until the last week of May, and this may account for the lower averages that year. We would expect numbers to be lowest during June and the first half of July when most terns are nesting at other sites, but in 2010, we did have large numbers of terns copulating (and some scraping) during the breeding season. During the post-breeding period in both years, numbers of staging terns (all species combined) peaked during the first half of August, but numbers of roseate terns appear to have peaked during the second half of August in 2011 (USFWS unpublished data).

Figure 3.1. Tern Numbers on Nantucket NWR in 2010-2011.



Arctic terns (*Sterna paradisaea*) and roseate terns are two species that are much rarer on Great Point. Roseate terns were historically common breeders along the Massachusetts coast, typically found among common tern colonies on Nantucket Island and Muskeget Island. Originally reduced in number by the plume industry of the late 1800s, the species recovered slightly during the 1900s, but are today in decline due to displacement by gull colonies (MA DFG 2006). As a result, roseate terns are both federally listed and State-listed. Arctic terns, another State-listed species, are at the southernmost extent of their distribution in Massachusetts, and therefore do not occur in large numbers in the State. They have occasionally bred on Great Point; records show 1 nesting pair in 1982, 1993, and again in 1995 (USFWS undated). In 2010, no roseate terns nested on the refuge, but the very northern tip of the refuge was used extensively as a staging area (see above numbers for total terns).

A colloborative study led by USGS involves color-banding and resighting birds to learn more about regional survival and movement throughout the Gulf of Maine. Over 1000 color-banded roseate terns have been resighted at Nantucket NWR in 2010 and 2011, and analyses are still ongoing to determine the relative importance of Nantucket NWR amongst other staging sites. In the 10-year comparison of annual colonial bird surveys for Coskata-Coatue, herring gull (*Larus argentatus*) counts were 278 in 1994-95, and 374 in 2006-07. Great black-backed gull counts were 814 in 1994-95, and 654 in 2006-07 for the same location (S. Melvin, personal communication, 2010). According to TTOR (2007, 2008), Great Point serves as a prime nesting area for great black-backed and herring gull colonies. These gull numbers are increasing and they may be attempting to expand into new nesting areas. Coskata-Coatue is the site of the largest great black-backed and herring gull colonies on Nantucket (*http://nantucketconservation.org;* accessed March 2011*)*. Laughing gulls (*Leucophaeus atricilla*) were also seen on Coskata-Coatue beaches prior to migration (TTOR 2007).

Waterfowl

While the refuge does not support habitat for waterfowl, many waterfowl species can be found in the diverse habitats on adjacent lands, and in the nearshore waters of the refuge. Open ocean habitats and nearshore waters provide rich foraging habitat for seaducks. Bays and inlets provide shelter during high winds and seas. Five of these waterfowl species are of conservation concern and are

listed below in table 3.8 with their conservation tiers based on the 2007 BCR 30 plan. The MA CWCS lists the American black duck as an at-risk breeding species and a species of management concern.

American black ducks, the waterfowl species of greatest concern, may be nesting in areas adjacent to the refuge. They are fairly common in the Great Point Lagoon and at Coskata Pond in the Glades on TTOR property. The limited surveys available from which to obtain count or abundance data make it difficult to estimate how many individuals use the refuge or surrounding habitat during the breeding season.

During the winter, on the other hand, large rafts of waterfowl can be seen in the lakes and ponds on the island, or just offshore. Working collaboratively, the Service and MassWildlife conduct aerial mid-winter inventories in January that have resulted in overwinter counts for mallard (*Anas platyrhynchos*), American black duck, scaup species (*Aythya* spp.), common goldeneye (*Bucephala clangula*), bufflehead (*Bucephala albeola*), canvasback (*Aythya valisineria*), long-tailed duck (*Clangula hyemalis*), scoter species (*Melanitta* spp.), Atlantic brant (*Branta bernicla*), common eider (*Somateria mollissima*), merganser species, Canada goose (*Branta canadensis*), and mute swan (*Cygnus olor*). For most of these species, these counts seem to be highly variable from year to year (see table 3.10), and may represent fluctuations in statewide populations, or simply shifting population centers around the Cape Cod area. These counts provide information on regional waterfowl abundance and can indicate regional population changes over time.

Common eiders, in particular, are extremely abundant in the ocean waters off Massachusetts. They are a species that typically breed farther north, in Labrador south to Maine, but have recently been found nesting on islands off the coast of Massachusetts. During the winter, they congregate in the bays, estuaries, and open ocean environments along the Massachusetts coast; the largest grouping is centered in Nantucket Sound (MA DFG 2006). They feed in waters 6 to 25 feet deep, and their most important food item during the winter (and throughout year) is the blue mussel (*Mytilus edulis*), which is a boreo-temperate species common in North- and Mid-Atlantic waters (MA DFG 2006, USFWS 1989). Common eiders also frequently loaf on the shores of Nantucket NWR and adjacent beaches.

Table 3.10. BCR 30 Priority Waterfowl Species and Survey Results from the Mid-winter Waterfowl Surveys Conducted Annually by the Service and MassWildlife. These results reflect counts from Nantucket Island and surrounding waters.

	BCR 30 Rank	2005	2006	2007	2008	2009
Mallard	High	10	127	318	98	12
American Black Duck	Highest	422	326	896	596	391
Scaup spp.	High	315	265	120	6	0
Common Goldeneye		430	882	50	680	17
Bufflehead		612	260	273	400	94
Long-tailed Duck		931	536	15		7
Scoter spp.		126	677	4,377	1,358	485
Common Eider	High	11,893	4,624	2,765	57,210	125
Merganser		152	591	742	569	14
Canada Goose		181	312	47	89	26
Atlantic Brant	Highest	106	35	211	30	148
Swan spp.		9	27	13	8	0
Misc.					31	

Occasionally, seaduck carcasses will wash up on the refuge, sometimes in large numbers, and these occurrences can be indicative of a large mortality event, or localized die-off. Common eiders especially seem vulnerable to epizootic diseases, perhaps due to their densely populated breeding colonies and large offshore overwinter populations (MA DFG 2006). When possible, refuge biologists record these mortality events when they are observed during site visits and report them to SEANET (Seabird Ecological Assessment Network). This is a collaborative program reliant upon volunteers that endeavors to track mortality events in seaducks and other coastal and marine birds to investigate causes of mortality and threats to these species. The program also endeavors to establish a baseline of normal mortality, based on wash-ups, so that when there are mortality events a comparison can be made.

Songbirds
There have been no comprehensive avian surveys on the refuge. The savannah sparrow (*Passerculus sandwichensis*) is listed as a moderate priority species of conservation concern in BCR 30 and they are a common grassland generalist species that can also be found in coastal openlands. They are one of several species that feed in the dune habitats along Coskata-Coatue (*http://nantucketconservation.org;* accessed March 2011*).* In mid-September 2010, a large group of tree swallows (*Tachycineta bicolor*) was recorded on the refuge. During one of the wildlife surveys, approximately 1,700 tree swallows were recorded in the dunes of the refuge.

Raptors
No comprehensive raptor surveys have been conducted on the refuge and no nesting raptors have been documented. Adjacent TTOR lands do provide raptor nesting habitat, particularly for northern harrier and osprey, and occasionally some individuals will be seen foraging on the refuge.

During migration, however, raptors are a little more common on the refuge, and species including peregrine falcon (falco peregrinus)and merlin (falco columbarius) are observed. Also, short-eared owls (*Asio flammeus*) and bald eagles (*Haliaeetus luecocephalus*) are reportedly seen on the refuge for brief periods during the winter.

Fish and other Aquatic Species

Numerous saltwater fish species have been identified in Nantucket Sound and the Atlantic Ocean in New England. This information was derived from the Division of Marine Fisheries Trawl Surveys, 1978-1999 (Arnold Howe, Senior Marine Fisheries Biologist, 50A Portside Drive, Pocasset, MA 02559).

Mollusks and Crustaceans
While no surveys have been conducted on the refuge, a variety of aquatic invertebrates are found in the intertidal and deep waters on and around the islands of Nantucket County.

Mammals
Though no comprehensive terrestrial mammal surveys have been conducted, there are not many mammal species other than seals that are likely on the refuge. Evidence of feral cats and rats have both been documented widely on adjacent lands, as well as ocassionaly on refuge lands. These species are not native to the island, but are species that are typically associated with humans. They can have a serious impact on wildlife, and are documented nest predators of some of the beach-nesting species that use the refuge, including terns and the piping plover.

In recent years, Great Point has become a haul-out site for gray seals. Gray seals were found along the northwestern Atlantic coast until the 17th century, and were considered locally extinct until the 1980s (see Wood 2009 for detailed



Tom Eagle/USFWS

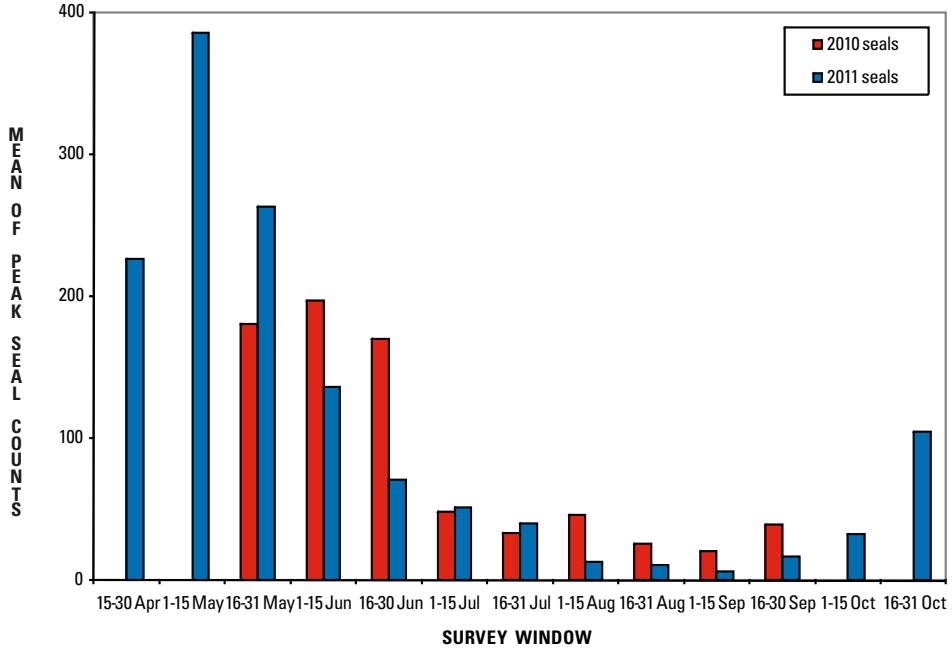
Gray seal pup

accounts of seal numbers). While their pupping grounds are historically further north on Sable Island and in the Gulf of St. Lawrence in Canada, there has been a year-round breeding population around Cape Cod and associated islands since the late 1990s. In fact, Muskeget Island and the associated shoals supports the largest breeding population of gray seals in the U.S. and represents one of only two sites in Massachusetts where gray seals pup. The other site is Monomoy NWR. Though there is currently no estimate for the U.S. population, surveys conducted since their arrival in the 1980s indicate a steady increase in abundance in both Maine and Massachusetts, though it is unclear if this is due to population expansion or immigration (Waring et al. 2009). Even if the US population is truly increasing, the increase in seal numbers on the refuge may not reflect the degree of increase in the entire seal population; seals are using many other sites throughout the northeast and surveys need to encompass all these areas to accurately reflect changes in the US population.

A dynamic small closure that was established in 2008 to protect visitors from the seals and the seals from visitors has been maintained by TTOR and the Service generally year-round, when seals are present. The closed area expands and contracts as seal use changes. Seal use was recorded through standardized surveys consisting of systematic counts refugewide, as well as high counts, in 2010 (May–September) and 2011 (April–October). Standardized surveys are still being analyzed, but daily high counts were averaged over 2-week periods to display seasonality of use in 2010 and 2011 on Nantucket NWR. Generally seal numbers are lowest in July and August, and begin building in the early fall through the winter. Service staff are not onsite regularly in the winter time, but TTOR does conduct period counts and seal numbers are generally variable from day to day. Numbers of seals are generally consistently high again in the spring.

A small numbers of gray seals also give birth to pups on Nantucket NWR and adjacent property. Nantucket NWR has also recently been added to the flight path for regionwide aerial seal surveys conducted by NOAA, and this information will be helpful in tracking importance of this site to pupping.

Figure 3.2. Seal Numbers on Nantucket NWR in 2010-2011.



Seals are food generalists and will consume a wide variety of prey items, focusing on abundant species. Ampela (2009) conducted a long-term diet study of seals in the northeast and found that sand lance (*Ammodytes*) was the most dominant prey item by weight (53 percent). Sand lance combined with winter flounder *(Pseudopleuronectes americanus)*, hake (*Urophycis* spp.), and Atlantic cod *(Gadus morhua)* accounted for 82 percent of seal diet by weight. Smooth skate *(Malacoraja senta)* and alewife *(Alosa pseudoharengus)* were also important diet items. There is no specific diet information for seals that are using Nantucket NWR as a haul-out site. Instances have occurred in which a seal will take, or attempt to take, fish off the line of an angler. However, there is no conclusive information regarding the prey items Nantucket seals are feeding on. USFWS staff collected seal scat on Nantucket NWR in 2011, but they have not yet been analyzed.

Reptiles and Amphibians

There are no known reptiles or amphibians associated with the refuge. The reptiles and amphibians that occur in the freshwater ponds and bogs throughout Nantucket include: snapping turtles, painted turtles, spotted turtles, spring peepers, green frogs, and northern water snakes (*Nerodia sipedon*) (*http://nantucketconservation.org;* accessed March 2011*)*. A preliminary snake cover board study completed in 2007 throughout Nantucket Island and Tuckernuck Island identified the presence of eastern garter snake (*Thamnophis s. sirtalis*), northern ring-necked snake (*Diadophis punctatus edwardsii*), eastern milk snake (*Lampropeltis t. triangulum*), ribbon snake (*Thamnophis s. sauritus*), and smooth green snake (*Opheodrys vernalis*). Out of five study sites on the island of Nantucket, the closest two to the refuge were located at Coskata Woods and Wyers Point, and these sites yielded eastern garter snake and smooth green snake, respectively (Smyers 2008).

Invertebrates

Mosquitoes, greenheads, and horseflies can all be found on the Coskata-Coatue Peninsula (TTOR 2001), as can butterflies and dragonflies (species unknown; E. Wunker, personal communication, 2010).

Refuge Visitor Services Program

Priority Wildlife-Dependent Recreational Uses

Nantucket NWR is a common destination for recreation on Nantucket Island. Of the six priority wildlife-dependent, recreational uses on NWRs, five—fishing, wildlife observation and photography, and environmental education and interpretation—all occur on the refuge. Only hunting does not occur on the refuge. The refuge is open year-round to pedestrians and oversand vehicles (OSV). There are generally seasonal closures on parts of the refuge to either pedestrians or vehicles to protect nesting piping plover habitat, least tern nesting sites, staging terns, and/or seal haul-out sites.

Because of the distance from the Wauwinet Gatehouse to the point, OSV use is permitted on portions of the refuge when public access is allowed. The refuge is most often accessed through the Coskata-Coatue Wildlife Refuge, although occasionally visitors arrive by boat or by foot. Vehicular access to Coskata-Coatue is limited to those who have purchased TTOR over sand permits, which are required year round and are valid from April 1 to March 31. Pedestrians can walk to the refuge without purchasing an over sand permit, but it is about a 5 mile walk to the tip from the Wauwinet Gatehouse, which is beyond most people's abilities or interest to undertake. Vehicular access to the refuge is not available when TTOR closes the Galls to protect unfledged piping plovers.

Located within the refuge is a half-acre inholding owned by the Coast Guard that contains the Great Point Lighthouse. At the lighthouse is a small parking area. Portable restroom facilities are provided by TTOR, which also maintains the lighthouse through a management agreement with the Coast Guard.

There is a permanent "entrance" sign south of the lighthouse on the southern boundary of the refuge, and several official boundary signs are located along the western and southern boundary; otherwise there is no discernable demarcation between TTOR and Service properties. Other signs on the refuge are temporary and signify beach closures due to seals or shorebirds.

The refuge is particularly attractive to anglers and has been considered a premier destination on the island for its bluefish and striped bass. Ardent anglers surfcast for bluefish and striped bass in May and June. In the summer, bluefish are a great attraction to tourists. Striped bass come by the refuge beginning in August during their fall migration and are a major attraction. Fishing for stripers as well as the occasional false albacore and bonita continues into the fall. Albacore and also Spanish mackerel are more commonly fished on the sound side of the Coskata-Coatue peninsula. (S. Nicolle, personal communication, 2012) The Nantucket Anglers Club hosts the annual "Cranny" Cranston Beach Bluefish Tournament each October; Great Point is a major destination for this tournament. For decades, anglers had been able to access "the rip" which is located at the tip of Great Point, on the eastern side of the refuge. The rip currents that extend right off the Point make it very easy for shore-based anglers to target striped bass and blue fish during their seasonal runs. This section of the refuge has long been considered by anglers as the primary destination for surf-fishing, although considerable numbers of anglers fish on the refuge's western beach as well as along the Atlantic Ocean and on the sound side on TTOR's both sides of the Coskata-Coatue peninsula. Since 2008, however, symbolic fencing has been erected at the seal haul-out site on the tip to ensure visitor protection and to comply with the Marine Mammal Protect Act. Currently, seals are utilizing the closed area much of the year. This closed area has also served as a seasonal staging area for common and roseate terns. Because our primary mission is to protect wildlife and its habitat, Service staff are obligated to maintain seasonal adaptive closures, even if and when this makes some areas unavailable to anglers. We recognize the challenges and frustration this represents to the angling community. Although unrestricted access to the refuge has not been authorized

in recent years due to wildlife management priorities, we are committed to providing as many angling opportunities on the refuge as possible when and where appropriate.

Although fishing has historically been the primary recreational use of the refuge, in recent years there has been a shift in visitor use. Some visitors come to the refuge just to be at the very tip of Nantucket Island. The beach itself attracts many visitors, as does the Coast Guard lighthouse. Many visitors now come to the refuge to look at the seals and birds. They also participate in interpretive programs which are primarily conducted by TTOR or the Maria Mitchell Association. TTOR provides several programs and activities on Coskata-Coatue including a Natural History Tour, Fishing Discovery and Fishing for Kids, Science Discovery Thursdays, Shipwreck and Lifesaving Museum and Great Point Tour, and the Sunset and Lighthouse tours that engage members of the public and promote understanding of these unique barrier beach ecosystems and the resources they provide. Some of these tours also include the refuge, and help to provide onsite interpretive programming. When possible, refuge staff and partners offer on-the-spot interpretation and structured educational programming to help visitors understand not only the history of the refuge, but the importance of managing willdife and habitat.

Over a decade ago, the Service commissioned a study to estimate the regional economic contribution of recreational and commercial activities on the Monomoy and Nantucket National Wildlife Refuges to provide information to assist land managers and the public in evaluating the economic implications of changes in management practice.[1] That report estimated annual visits to be 35,000 in 1998 and 70,000 in 1999. This is published information but it is impossible to indicate the accuracy of this data, as these estimates were not based on empirical data counts but rather reflected "best guesses" by TTOR and Service staff. Consequently, it is difficult to make any long-term, historical statements about visitation trends to the refuge without being overly speculative. Because we do not maintain any permanent staff presence at the refuge we are very dependent on the general estimates provided to us by TTOR to calculate both the number of visitors and types of activities undertaken at the Point.

Historically, information about the number of refuge visitors has been obtained from TTOR. This is based in part on the number of vehicles that go through the Wauwinet gatehouse. TTOR installed a car counter at the Wauwinet Gatehouse in 2009 in order to better track visits and estimate visitor numbers.[2] In 2009 the Service used this data to estimate that there were 41,300 visitors to the refuge.[3] 2010 visitation data was estimated to decline by about four percent to 39,700 visitors. 2011 visitation data was not estimated by the Trustees because of a broken vehicle counter. Anecdotally, however, visitation was likely down In 2011 as the Trustees restricted vehicle access from June 5th through August 20th because of nesting, federally protected piping plovers on their property. Restricted vehicle access is a common occurrence during the summer months but in 2011 the restrictions lasted longer than usual due to anomalies in the plover's nesting period.

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[1] Economic Assessment of the Nantucket and Monomoy National Wildlife Refuges. Industrial Economics, Incorporated, Cambridge, MA. May 2000.

[2] The Trustees estimate the total number of visitors by dividing in half the total number of vehicle "clicks" (because one visiting vehicle clicks the counter upon entry and again upon exiting the gatehouse) and then multiplying the total number of vehicle visits by an average of 2.3 occupants per vehicle.

[3] The Service did not attempt to adjust Wauwinet Gatehouse data for vehicle trips not extending all the way to the Nantucket NWR (e.g., Trustees service vehicles, patrols, and trips to private property). TTOR has estimated that 80 percent of visitors travelled all the way up to Great Point on the NWR.

The average number of OSV permits sold by TTOR in the past few years has averaged slightly less than 2,250 permits a year; the number has been decreasing each year since at least 2007 (S. Nicolle, personal communication). The decline in total sales is attributed to the closing of the Galls for plover protection along with overall declining economic conditions on the island. Some anglers may no longer be fishing at all on the refuge because the rip is closed due to seals or migratory birds, however it is not known whether they are purchasing an OSV permit anyway to access fishing opportunities on TTOR land. Anecdotally, while the Woods Hole, Martha's Vineyard, and Nantucket Steamship Authority report that passengers carried from the mainland to Nantucket during the months of July and August declined from 207,490 passengers in 2009 to 205,467 passengers in 2011,[4] the Nantucket Anglers' Club reported a slight increase in the number of anglers participating in the 2011 Nantucket Inshore Fishing Classic Fishing Tournament compared to the previous year. Specifically, the Club reported that a total of 232 anglers participated in the event in 2011 compared to 211 anglers in 2010.[5] Anglers entering the event can fish from shore or boat throughout the waters of the Island, including Great Point.

In 2010 and 2011, a Service biological science technician was stationed on the refuge for most of the summer. The technician was present on the refuge 4-5 days a week from late May to mid-September in 2010 and late April to early November in 2011. In addition to collecting biological information, the technicians provided informal interpretation through regular patrols and recorded numbers of visitors and their primary activity on the refuge through standardized surveys. The number of visitors recorded on these surveys can't be reliably extrapolated to a total count of visitors because surveys were unequally distributed through time. A high count of 346 visitors was recorded on one day in August 2011, however. Comparisons of relative amount of visitation between years is also confounded by unequal sampling effort and different levels of access to refuge properties (due to closures on and off refuge property). These detailed analyses are still ongoing. However, counts of visitors do provide useful information about the most common recreational activities, and these are presented here. In 2010, 1876 visitors were recorded on surveys and in 2011, 2143 visitors were recorded on surveys (USFWS unpublished data). This information is presented in Table 3.11.

Table 3.11. Observed Public Use by Category in 2010 and 2011.

User Group Description	2010 number, percentage of total	2011 number, percentage of total
general beach enthusiast (activity not covered by other descriptions)	1056, 56%	833, 39%
passenger in vehicle	188, 10%	443, 21%
angler	323, 17%	291, 14%
wildlife watcher (includes birds and seals)	94, 5%	266, 12%
photographer	27, 2%	33, 1%
lighthouse visitor	88, 5%	226, 11%
tour group participant	100, 5%	51, 2%

This data is interesting when compared to information we received as part of an informal public use evaluation conducted in 1999 at Nantucket NWR. The evaluation was focused on filling knowledge gaps regarding the following:

[4] *http://www.steamshipauthority.com/ssa/traffic.cfm* (Accessed on 1/4/2012).

[5] Memo from Ms. Carol Crowell, 2011 Committee Chairperson Nantucket Anglers' Club Inc. to Mr. Steve Nicole, Trustees of the Reservation, December 6, 2011.

types of recreational use/activities, time intervals and locations of recreational activities, where cars are parked, the condition of facilities, if wildlife is present, activity in grass/dune areas, presence of dogs and if on/off leash, and TTOR presence. Offsite information included if any Nantucket NWR information was disseminated at the entrance gate, and what information was provided regarding the Nantucket NWR and/or beach regulations at rental car facilities.

Originally intended to be an observation-based evaluation at the refuge by volunteers representing the Service (though not in uniform), the actual evaluation period also included direct feedback from refuge visitors through informational interviews and survey questionnaires. The evaluation took place between August 26-28, 1999, a consecutive Thursday, Friday, and Saturday to be representative of the kind of use on both week and weekend days. Service volunteers spent the three days in shifts spanning the daylight hours on the refuge conducting observations and interacting with refuge visitors.

Visitors to the beach were also asked to fill out evaluation forms. Evaluation forms were filled out by 68 people on the refuge over the course of the evaluation period. These 68 evaluations included 39 tourists, 21 summer residents, and 8 year-round residents. It should be noted that the summaries below may only be relevant within the context of the evaluation period, and provide only a sampling of perspectives of the various visitor-type groups as this was not intended to be a statistically representative study.

Most tourists came to Great Point for reasons other than fishing, were with family groups, and came primarily during the middle of the day. Many of these visitors found out about Great Point through friends, and 31 percent were return visitors from previous years. They perceived visitation at Great Point (number of cars and people) to be "higher than normal," but did not provide a definition of what normal was.

Summer residents, on the other hand, were there primarily to fish (all but one) and almost all of them were returning lifetime visitors. This group visited Great Point more regularly than the other two groups evaluated, and perceived visitation to Great Point to be lower than average.

Year-round residents noted that fishing at Great Point was the best on the island, and almost all of them were there to fish. This group was more aware that the tip of Great Point was a refuge, and had been visiting Great Point throughout their lives. This group felt that visitation was average or lower than normal, but over half suggested that visitation had been steadily increasing over the last 5 years.

In the economic analysis report conducted back in 2000, the Service estimated that the total economic contribution associated with visitor expenditures to Nantucket NWR ranged between $5.4 to $10.8 million (1999 dollars). In current dollars, these estimates would range between $7.34 to $14.7 million (2011$).[6] This was estimated to be nearly one percent of the baseline output to lodging, grocers, restaurants, and sporting and outdoor stores in the region. These expenditures helped support between 86 to 171 jobs in the region. The wide range in expenditures reflects the discrepancy between the number of estimated visitors in 1998 and 1999. It was estimated that back at the time of the study, recreational fishermen spent nearly $91.00 (1999$) per day on transportation, food, lodging, and supplies, while other visitors to the refuge spent approximately $99.00 per day (1999$). Expenditures were partly based on data obtained from the 1996 National Survey of Fishing, Hunting, and Wildlife Associated Recreation and do not specifically reflect expenditures associated with visitation to the refuge.

[6] $1.00 in 1999 has the same purchasing power as $1.36 in 2011. *http://www.bls.gov/data/inflation_calculator.htm*

Unfortunately, USFWS has limited data to estimate how both expenditures and visits have changed over time. The Service is not aware of any other studies that have estimated the economic contribution of visitors fishing or viewing wildlife at the refuge.

Fees collected by TTOR for OSV permits have generated over $300,000 a year. This represents a significant revenue source for TTOR, with much of these revenues staying on Nantucket Island. TTOR provides a portion of these funds to NCF for gatehouse staff, to provide restrooms at the Great Point lighthouse, and to hire rangers and staff and conduct oversight and interpretative programs which benefit Nantucket NWR. TTOR staff help keep Service staff informed of refuge conditions. They make beach access recommendations, explain refuge regulations to the public in an effort to increase compliance, and provide onsite interpretation. TTOR has been our primary liaison to the public by providing information about Service policies, management actions, and natural resource value. It is estimated that 80 percent of the individuals who purchase OSV permits do so to visit the refuge, and while none of those permit fees come to the Service, we do obtain benefit from TTOR's stewardship of their lands as well as Nantucket NWR. Historically, the Service has not collected or used funds from permit fees. Should the Service wish to collect fees in the future, we will conduct additional outreach and obtain public comment before making a decision to implement access fees.

Other Public Use Activities

Other Activities Allowed

In general, for a public activity to be allowed on a refuge, it must first be found appropriate and compatible, in compliance with Service policies (see chapter 1). Activities that have been found both appropriate and compatible for Nantucket NWR are: environmental education and interpretation, wildlife observation and photography, recreational fishing, research conducted by non-Service personnel, commercial guides, tours, and outfitting, many outdoor events and ceremonies, non-motorized boat landing and launching, beachcombing, and sunbathing and swimming. Not all these are wildlife-dependent activities, but they are enhanced by the presence of a natural environment. All other activities are not allowed or can only be allowed under a Special Use Permit, assuming they are appropriate and compatible. See appendix B for an updated list of compatibility determinations and findings of appropriateness.

Law Enforcement Concerns and Activities Not Allowed

Most visitors respect the refuge rules and regulations on public uses and activities. TTOR rangers and the Massachusetts Environmental Police officer stationed on Nantucket Island regularly patrol TTOR's Coskata-Coatue Refuge as well as Nantucket NWR and they, as well as Service law enforcement officers, have observed the recurrence of several unauthorized public uses at the refuge. Some activities, such as pets and kite flying, have been determined to never be appropriate or compatible.

Many visitors bring their pets, primarily dogs, onto the refuge. While there are visible and legible signs posted around the refuge stating the refuge's no dog policy and information on TTOR and Service websites, many visitors may be confused because TTOR allows dogs on their adjacent property from September 15 through March 31. Visitors who do understand the differing regulations but bring their dogs onto the refuge despite this do so intentionally, though perhaps with little knowledge of the impacts. The presence of dogs, whether on- or off-leash, is not allowed on the refuge at any time because they are extremely disruptive to wildlife. Beach-nesting bird species perceive dogs as predators, and their presence can lead to the abandonment of nests. Dogs off-leash can also directly impact nests and individual birds by entering fenced-off areas where

nests are located, and they can be disruptive to other beachgoers. Even during the September 15 through March 31 period, there is wildlife on the refuge, such as loafing common eiders and seals, that are disturbed by dogs and people engaged in non-wildlife-dependent activities with their dogs.

Kite-flying or any activity associated with kites have similar effects; beach-nesting species respond to kites as they would to aerial predators, and again this can lead to nest abandonment or undue stress to the birds.

The other two major violations of refuge policy are those who choose not to respect seasonal beach closures and those who walk through sensitive dune and vegetation. These areas are closed to public use to both protect habitat and wildlife from thousands of beachgoers who may be well-intentioned, but who collectively can have a large, deleterious impact. Beach closures are not only intended to protect wildlife from human impacts, in compliance with Federal guidelines, but also are intended to protect beachgoers from wildlife such as seals which can be aggressive. In addition, these species are all federally protected under the Endangered Species Act, Migratory Bird Treaty Act, and/or the Marine Mammal Protection Act.

Though not within the jurisdiction of the refuge, it has also been reported that boats will attempt to get close to marine mammals in the water in order to "get a better look" or "a longer look," possibly to please clientele in the case of chartered boats. These actions are in fact a violation of the 150-foot buffer zone delineated in the MMPA (16 U.S.C. § 1371-1372). In some cases, refuge staff have observed that violations of this act from boats speeding around the point that resulted in propeller injuries to seals (E. Wunker, personal communication, 2010). Other violations of this act include attempting to feed marine mammals. These actions also disrupt anglers casting from shore who are acting within the law.

Other refuge activities not allowed are camping, trespassing in areas closed to the public, and setting campfires. Since the refuge was established, we have not allowed those activities for the following reasons:

- First, those activities are not wildlife-dependent, recreational uses, nor are they necessary for the safe, practical, or effective conduct of a priority public use.

- Second, they are likely to cause the disturbance of wildlife in critical habitats. Specifically, due to the predominant choice of shoreline locations for those activities, they may lead to nest abandonment or failure for federally listed nesting shorebirds.

- Finally, they are likely to interfere with the visitors engaging in priority public uses.

Through our partnership with TTOR, and their efforts to educate the public about these rules, we are attempting to eliminate these unauthorized activities on the refuge. The efforts of the Massachusetts Environmental Police are also invaluable in monitoring and enforcing State and Federal laws and refuge policies on the property. However, despite refuge regulations against them, some of those activities persist, and remain significant law enforcement issues. Through consistent monitoring with the help of TTOR and the Massachusetts Environmental Police, increasing public awareness of refuge boundaries and any difference in policies between TTOR and Service properties, and increasing our efforts to educate and inform the public, we expect these activities to decrease.

Refuge Archaeological, Historical, and National Resources

All of Nantucket Island is listed as a National Historic District under the National Historic Landmarks program administered by the National Park Service. This designation includes two concentrations, and these are Nantucket Town, which provides an excellent example of an early New England seaport, and Siasconset, where some of the island's earliest houses still remain. Historic landmarks are designated by the Secretary of the Interior for their significant value in interpreting or representing the heritage of the United States. This was granted to Nantucket because of its history as a world-renowned whaling port (*http://tps.cr.nps.gov/nhl/detail.cfm?ResourceId=581&ResourceType=District*; accessed March 2011).

National Natural Landmarks is another program administered by the National Park Service that recognizes nationally significant natural areas throughout the U.S. in order to encourage their preservation. Muskeget Island has been designated as a National Natural Landmark since April of 1980. Recently, TTOR has proposed the designation of the Coskata-Coatue Peninsula as such, and we are currently endeavoring to include the refuge in that designation.

Archaeological resources have been found throughout Nantucket Island. While there have been no formal surveys done of the refuge itself, there have been cultural surveys conducted throughout the island of Nantucket. These surveys have yielded six native village sites, with the potential for additional sites of archaeological importance (MHC 1987). One of these confirmed sites is located on Great Point, though not on the refuge property. Its close proximity to the refuge implies that similar land uses and histories are present on the refuge, and suggests the potential that similar items of archaeological importance could be found on the refuge. This adds another layer of importance to the protection of refuge resources. This potential will be considered should any refuge management activities take place in the future that could have a potential impact on these resources, in compliance with Federal mandates.

Chapter 4



Amanda Boyd/USFWS

Greater shearwater

Management Direction and Implementation

- Introduction
- General Refuge Management
- Summary by Major Program Area
- Goals, Objectives, and Strategies

Introduction

This CCP includes an array of management actions that, in our professional judgment, work towards achieving the purpose, vision, and goals for the refuge, and State and regional conervation plans. In our opinion, it effectively addresses the key issues identified in chapter 2. We believe it is reasonable, feasible, and practicable.

In all program areas, this CCP will enhance the quality and sustainability of current compatible activities, develop long-range and strategic step-down plans, and promote partnerships.

General Refuge Management

The actions presented in this section represent those that were common to all three alternatives evaluated in the EA/draft CCP. These are actions required by law or policy, or represent actions that have undergone a separate NEPA analysis, public review, agency review, and approval. Or, they are administrative actions that do not necessarily require public review, but are actions we wanted to highlight in our implementation plan. Finally, most of the actions outlined in this part of chapter 4 support multiple goals and objectives, or represent general administrative or compliance activities. We present them below.

Adaptive Management

We will include flexibility in management to allow us to respond to new information, spatial and temporal changes, and environmental events, whether foreseen or unforeseen, or other factors that influence management. Our goal is to be able to respond quickly to any new information or events. The need for flexible or adaptive management is very compelling today because our present information on refuge species and habitats is incomplete, provisional, and subject to change as our knowledge base improves.

We will continually evaluate management actions, both formally and informally, through monitoring or research, to consider whether our original assumptions and predictions remain valid. In that way, management becomes a proactive process of learning what really works. On March 9, 2007, Secretary of the Interior Dirk Kempthorne issued Secretarial Order No. 3270 to provide guidance on policy and procedures for implementing adaptive management in Departmental agencies. In 2007, an intradepartmental working group developed a guidebook to assist managers and practitioners: "Adaptive Management: The U.S. Department of the Interior Technical Guide." It defines adaptive management, the conditions under which we should consider it, and the process for implementing it and evaluating its effectiveness. You may view the guidebook at: *http://www.doi.gov/initiatives/AdaptiveManagement/documents.html* (accessed March 2011).

Adaptive management, as it relates to refuge management, promotes flexible decision-making through an iterative learning process that responds to uncertainties, new information, monitoring results, and the natural variability in ecosystems. It is designed to facilitate more effective decisions and enhanced benefits. At the refuge level, monitoring management actions, outcomes, and key resources will be very important. The refuge manager is responsible for changing management actions and strategies if they do not produce the desired conditions. Significant changes from what we present in this CCP may warrant additional NEPA analysis and public comment.

Generally, we can increase monitoring and research that support adaptive management without additional NEPA analysis. Many of our objectives identify monitoring elements. Our Inventory and Monitoring Plan (IMP) will determine future survey efforts. Implementing an adaptive management approach supports all three goals of the refuge.

Strategic Habitat Conservation

SHC is a framework that utilizes adaptive management to redefine broad scale conservation 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. It starts with explicit, measurable objectives that are based on testable assumptions that can be evaluated, and 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 species that are limited in some way by habitat (though this would be effective for other limiting factors as well), and to use targeted habitat management approaches to meet those objectives. 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.

Controlling Pest Plants and Animals

At times, native plants and animals interfere with management objectives. The Refuge Manual (7 RM 14.4A) defines a pest as "Any terrestrial or aquatic plant or animal which interferes, or threatens to interfere, at an unacceptable level, with the attainment of refuge objectives or which poses a threat to human health." This definition also includes non-native invasive species (see below).

Integrated Pest Management

In controlling pests, whether non-native or native species, we use an integrated approach. The Refuge Manual (7 RM 14.4C) defines integrated pest management (IPM) 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."

The refuge's IPM program will be on file at the refuge complex headquarters when complete. The IPM is a step-down plan from the CCP and supplements both the CCP and Habitat Management Plan (HMP) with documentation on how to manage invasive or pest species. Along with a more detailed discussion of IPM techniques, this documentation describes the selective use of pesticides for pest management on the refuge, where necessary. Pesticide uses with appropriate and practical best management practices (BMPs) for habitat management would be approved for use on the refuge where there likely would be only minor, temporary, and localized effects to species and environmental quality based upon non-exceedance of threshold values in the chemical profiles. Our control program would address the most critical problems first and can be adjusted to reflect Regional Service priorities, the availability of new information, or a new resource.

Managing Invasive Species

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

Multiflora rose and sea poppy are the only invasive plant species which have been identified on Nantucket NWR (see chapter 3). Invasive species on adjacent lands could pose problems for the refuge in the future.



G.A. Cooper @ USDA-NRCS PLANTS Database

Multiflora rose

The unchecked spread of invasive plants threatens the biological diversity, integrity, and environmental health of all national wildlife refuge habitats. In many cases, they have a competitive advantage over native plants and form dominant cover types, reducing the availability of native plants as food and cover for wildlife. Over the past several decades, government agencies, conservation organizations, and the public have become more acutely aware of the negative effects of invasive species. Many plans, strategies, and initiatives target the more effective management of invasive species, including "The National Strategy for Management of Invasive Species for the National Wildlife Refuge System" (USFWS 2003a), "Silent Invasion—A Call to Action," by the National Wildlife Refuge Association (2002), and "Plant Invaders of Mid-Atlantic Natural Areas," by the Service and the National Park Service (Swearingen et al. 2002).

Guidance on managing invasive species on refuges appears in the Service Manual (620 FW 1.7G). The following actions define our general strategies on the refuge:

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

2. Manage invasive species to improve or stabilize biotic communities to minimize unacceptable change to ecosystem structure and function, and to prevent new and expanded infestations of invasive species.

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

4. Conduct refuge habitat management (including working through partners) to prevent, control, or eradicate invasive species using techniques described through an IPM plan, or other similar management plan. The plans comprehensively evaluate all potential integrated management options, including defining threshold/risk levels that will initiate the implementation of proposed management actions.

5. Refuge IPM planning addresses the abilities and limitations of potential techniques including chemical, biological, mechanical, and cultural techniques. See the additional discussion on IPM below.

The following actions define our specific strategies for the refuge:

1. Treat the most problematic species as funding and staffing permit, in accordance with the selected alternative.

2. Develop early-detection/rapid-response readiness regarding new invasions.

3. Remove the parent sources of highly invasive species (e.g., species that are high seed producers or vigorous rhizome producers).

4. Maintain accessibility to affected areas for control and monitoring if possible.

Monitoring and Abating Wildlife and Plant Diseases

The Service has not yet published its manual chapter on Disease Prevention and Control. In the meantime, we derive guidance on this topic from the Refuge Manual and specific directives from the Director of the Service or the Secretary of the Interior. The Refuge Manual (7 RM 17.3) lists three objectives for the prevention and control of disease:

1. Manage wildlife populations and habitats to minimize the likelihood of the contraction and contagion of disease.

2. Provide for the early detection and identification of disease mortality when it occurs.

3. Minimize the losses of wildlife from outbreaks of disease.

The Service published these objectives in 1982. Since then, in addition to diseases that cause serious mortality among wildlife, diseases transmitted through wildlife to humans have received more attention. One example is Lyme disease. In 2002, the Service published a Service Manual chapter (242 FW 5) on Lyme Disease Prevention to inform employees, volunteers, and national service workers about this disease, its prevention, and treatment.

Another serious wildlife disease that receives considerable attention worldwide is avian influenza. Of particular concern is the highly pathogenic Eurasian form (H5N1). In 2006, the Service instructed all refuges to prepare an Avian Influenza Surveillance and Contingency Plan. This plan covers all eight refuges in the Eastern Massachusetts NWR Complex, and was completed in 2007.

In addition to the diseases of wildlife, we will be attentive to the diseases and pests that affect the health of the ecosystems that Nantucket NWR supports. We will continue to opportunistically monitor for, and report, seabird mortality events on refuge beaches. In addition, we will record and report instances of seal entanglements or strandings, because these are instances that could lead to increased susceptibility to disease mortality. It is likely that other monitoring efforts will be minimal, and the occurrence of any wildlife or habitat disease element will be responded to only if they posed an immediate or serious threat to indigenous wildlife and habitat. The Service will respond at a level commensurate with staffing and funding.

These are the general strategies for preventing or controlling disease:

1. Continue to conduct disease surveillance in conjunction with other fieldwork.

2. Cooperate with State agencies, particularly MassWildlife, by providing access for sampling and following protocols in the event of an outbreak.

3. Inform volunteers and others who work in the field about the dangers of Lyme disease and measures to avoid contracting it.

4. Monitor habitats for indicators of the increased occurrence of pests or disease. For example, anecdotally note changes in flowering or fruiting phenology that do not appear to be linked to climate change, and be vigilant for signs of physical damage, decay, weakening, sudden death, particularly of major host species, and changes in wildlife use of habitats, such as the absence of breeding birds that used to appear regularly.

5. Follow the protocols in national, State, and refuge disease prevention and control plans.

Biological and Ecological Research and Investigations

The Refuge Manual and the Service Manual both contain guidance on conducting and facilitating biological and ecological research, and investigations on refuges. In 1982, the Service published three objectives in the Refuge Manual for supporting research on units of the refuge system (4 RM 6.2):



Karen Terwilliger/TCI

Staging terns on the refuge

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

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

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

In 2006, the Service Manual provided supplemental guidance on the appropriateness of research on refuges: "We actively encourage cooperative natural and cultural research activities that address our management needs. We also encourage research related to the management of priority general public uses. Such research activities are generally appropriate. However, we must

review all research activities to decide if they are appropriate or not as defined in section 1.11. Research that directly benefits refuge management has priority over other research" (603 FW 1.10D(4)).

All research conducted on the refuge must be determined in writing to be both appropriate and compatible, unless we determine it to be an administrative activity. Research projects also must contribute to a need identified by the refuge or the Service. In determining the appropriateness and compatibility of future research proposals, we will follow the guidance in the manuals, and will employ the following general strategies:

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

2. Participate in appropriate multi-refuge studies conducted in partnership with the U.S. Geological Survey, or other entity.

3. Coordinate with partners to initiate or conduct research on priority issues identified at local and regional scales. For example, a landscape level roseate tern study is being planned that can better determine the timing and use of Nantucket, and adjacent islands, to determine the refuge's contribution and future need for active management and beach restrictions to benefit roseate terns.

All researchers will be required to submit detailed research proposals following the guidelines established by Service policy and refuge staff. Special use permits will also identify the schedules for progress reports, the criteria for determining when a project should cease, and the requirements for publication or other interim and final reports. All publications will acknowledge the Service and the role of Service staff as key partners in funding and/or operations.

Addressing the Threats of Accelerating Sea level Rise and Climate Change

Climate change is an issue of increasing public concern because of its potential effects on land, water, and biological resources. The issue was pushed to the forefront in 2007 when the Intergovernmental Panel on Climate Change, representing the world's leading climate scientists, concluded that it is "unequivocal" that the Earth's climate is warming, and that it is "very likely" (a greater than 90 percent certainty) that the heat-trapping emissions from the burning of fossil fuels and other human activities have caused "most of the observed increase in globally averaged temperatures since the mid-20th century" (IPCC 2007). The Northeast is already experiencing rising temperatures, with potentially dramatic warming expected later this century under some model predictions. According to the Northeast Climate Impacts Assessment (NECIA) team, "continued warming, and more extensive climate-related changes to come could dramatically alter the region's economy, landscape, character, and quality of life" (Frumhoff et al. 2007).

Other predicted climate-related changes, beyond warming temperatures, include changing patterns of precipitation, significant acceleration of sea level rise, changes in season lengths, decreasing range of nighttime versus daytime temperatures, declining snowpack, and increasing frequency and intensity of severe weather events (Inkley et al. 2004). Since wildlife species are closely adapted to their environments, they must respond to climate variations, and the subsequent changes in habitat conditions, or they will not survive. Unfortunately, the challenge for wildlife is all the more complicated by increases in other environmental stressors such as pollution, land use developments, ozone depletion, exotic species, and disease. Wildlife researchers and professionals, sportsmen, and other wildlife enthusiasts are encouraging positive and preemptive action by land managers. Some recommendations for action include:

reducing or eliminating those environmental stressors to the extent possible, managing lands to reduce risk of catastrophic events, managing for self-sustaining populations, and looking for opportunities to ensure widespread habitat availability (Inkley et al. 2004).

The Service is becoming more aware and knowledgeable about the impacts of climate change on national wildlife refuges. A proposed Climate Change Strategic Plan and a 5-Year Action Plan have been drafted to provide specific direction to the Service's climate change response initiatives (see chapter 1). Nantucket NWR could be a prime location for long-term and remote research and monitoring. To date, a Sea Level Affecting Marshes Model analysis has been conducted to predict refuge shoreline changes over the next century under four different sea level rise scenarios (see chapter 3 and Appendix H). At the refuge, we recognize the need for an increase in biological monitoring and inventories, two actions that are critically important for land managers to undertake in order to effectively respond to the uncertainty of future climate change effects. This would primarily be based on the availability of staff and funds. In addition, it will be important to coordinate with the State's climate change strategies as they are further refined. The establishment of the North Atlantic Landscape Conservation Cooperative (see chapter 3) will also facilitate the exchange of information and coordination among agencies in the region to implement climate change strategies.

Special Use Permits

It is up to the refuge manager to evaluate activities that require a special use permit for their appropriateness and compatibility on a case-by-case basis. Typically, there is a fee associated with these permits. We anticipate the number of special use permits that will be issued to be limited. We will only approve permit requests for activities that are appropriate and compatible uses, or for research that will strengthen our decisions on managing natural resources on the refuge. The refuge manager may also consider research requests that do not relate directly to refuge objectives, but to the protection or enhancement of native species and biological diversity in the region, and support the goals of recognized ecoregional conservation teams, such as the ACJV.

Protecting Cultural Resources

As a Federal land management agency, we are responsible for locating and protecting all historic resources; specifically, archeological sites and historic structures eligible for listing or listed on the National Register of Historic Places. This applies not only to refuge land, but also to land affected by refuge activities. Our consultation with the Massachusetts State Historic Preservation Officer (MA SHPO) indicates that no archeological sites are recorded on refuge land. However, no professional survey has been conducted, and Great Point is a dynamic landform with eroding and accreting areas. Archaeological sites might be exposed at any time through erosion.

We will continue to evaluate the potential for impact on archeological and historical resources as required. We will consult with the MA SHPO and the Tribal Historic Preservation Officers (THPO) for the Wampanoag Tribe of Gay Head (Aquinnah) and the Mashpee Wampanoag Tribe. These activities will ensure that we comply with Section 106 of the National Historic Preservation Act. Compliance may require a State Historic Preservation Records survey, literature survey, or field survey.

Conducting a Wilderness Review

As we described in chapter 1, refuge system planning policy requires that we conduct a wilderness review during the CCP process. The first step is to inventory all refuge lands and waters in Service fee simple ownership. Our inventory of this small refuge determined that the area does not meet the eligibility criteria for a wilderness study area as defined by the Wilderness Act. Therefore, we did not further analyze the refuge's suitability for wilderness

designation. The results of the wilderness inventory are included in appendix C. The entire refuge will undergo another wilderness review in 15 years as part of the next planning process. Specifically, any lands acquired in fee by the Service in the interim, along with existing refuge lands, will become part of that wilderness review in 15 years.

Wildlife-Dependent Recreational Program

The Improvement Act designated six priority public uses on national wildlife refuges: hunting, fishing, wildlife observation, photography, environmental education, and interpretation. As detailed in the Service's "General Guidelines for Wildlife-Dependent Recreation," (605 FW 1), we will strive to meet the criteria for a quality, wildlife-dependent recreation program.

Of the six priority public uses, only hunting is currently not allowed on the refuge. The informal surveys conducted by the Service (USFWS 1999), as well as TTOR (Donnelly and Vaske 1991), indicate that opportunities for the remaining five priority uses are being provided in some degree on the refuge as well as elsewhere through partnerships, and are in demand by visitors and residents of Nantucket (see chapter 3). These activities, as well as hunting, are alsoy provided elsewhere on Nantucket, including on adjacent TTOR land. Refuge management decisions do not eliminate the opportunity for those public uses on the Coskata-Coatue Peninsula, or elsewhere on Nantucket.

In recent years, the Service has recognized the importance of connecting children with nature. Scholars and health care professionals are suggesting a link between a disconnection with the natural world and some physical and mental maladies in our Nation's youth (Louv 2005). We intend to promote the concept of connecting children and families with nature in all of our compatible recreational and educational programming. We look to our partners, TTOR, Maria Mitchell Association, NCF, and others, to help us expand environmental education and to develop and assist with programs for the other priority public uses on refuge lands.

Appropriateness and Compatibility Determinations

Chapter 1 describes the requirements for determinations of appropriateness and compatibility. Appendix B includes all approved findings of appropriateness and compatibility determinations consistent with implementing this plan. As required, future documents will address activities on newly acquired lands as part of the acquisition process. We will allow only the activities determined appropriate and compatible for meeting or facilitating refuge purposes, goals, and objectives.

Activities Not Allowed

According to Service policy (603 FW 1), if the refuge manager determines a use is not appropriate, it can be denied without determining its compatibility. An updated list of activities that have been found both compatible and appropriate are found in appendix B. Uses which are not included on this list are not allowed on the refuge.

Refuge Staffing and Administration

Our proposals in this document do not constitute a commitment for staffing increases or funding for operations or maintenance. Congress determines our annual budgets, which our Washington headquarters and regional offices distribute to field stations. Chapter 3 presents our levels of staffing, operating, and maintenance funds for the refuge. The activities we describe below pertain to staffing, administration, and operations. Some are new activities and others are ongoing.

The Service will investigate additional sources of funding to complement and augment existing budgets. We have the ability to raise revenues through the

establishment of a refuge access fee. Should we decide that we want to do so, we will develop a specific proposal and supporting documentation which will be released for public review and comment. We also have the opportunity to obtain funding through the issuance of a concessionaire license. We will pursue additional funding opportunities as well.

Permanent Staffing and Operational Budgets
Our objective is to sustain levels of annual funding and staffing that allow us to achieve refuge purposes, as interpreted by the goals, objectives, and strategies in this CCP. Often, many highly visible projects are conducted through special project funds that typically have a 1- to 2-year duration. Although those funds are very important, their flexibility is limited because we cannot use them for any other priority project that may arise. Additionally, we cannot anticipate when, or if we will receive these funds.

In response to declines in operational funding Nationwide, we developed a regional "Strategic Workforce Plan for the National Wildlife Refuge System in Region 5" (Phase 2; memo dated 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 will be operating and maintenance funds. Our strategy is to improve the capability of each refuge manager to do the project work of the highest priority, and not to have the refuge budget tied up in inflexible fixed costs. Unfortunately, in a level or declining budget environment, that also may have implications for the level of permanent staffing.

In 2008, the Service approved a national staffing model which identifies the number of staff needed at each refuge or refuge complex throughout the country. The model indicated that the Eastern Massachusetts NWR Complex should have 39.5 permanent positions. As previously indicated, there are currently 16 permanent employees in the refuge complex. Within the guidelines of the new base budget approach, we will seek to fill positions which we believe are necessary to accomplish our highest priority projects, though it is unlikely that all 39.5 positions would be filled. We identify our recommended priority order for new staffing in the Refuge Operations Needs System (RONS) tables in appendix D. Appendix E identifies our plan for current and future staffing growth.

Facilities Construction and Maintenance
We will continue to make progress towards increasing the participation and presence of the Service by installing and maintaining interpretive and informational signs, and other printed materials. We will work with our partners, including TTOR, NCF, Maria Mitchell Association, and Massachusetts Audubon Society, to develop such signage, highlighting our collaborative partnerships. We will investigate opportunities to establish an offsite joint visitor contact facility with TTOR and/or NCF to provide a venue for educating and informing the public about the wildlife resources, habitat management activities, and visitor opportunities on the Coskata-Coatue peninsula. This facility would also provide a much-needed Service outpost on Nantucket Island for refuge staff and supplies. Any addition of signage or other examples of Service infrastructure on the refuge will be consistent with the intent and purpose of the proposed National Natural Landmark designation, and will endeavor to maintain the aesthetic value and quality of Great Point.

Refuge Operating Hours
The refuge is open for public use from ½ hour before official sunrise to ½ hour after official sunset, except at night for surfcasting, seven days a week, to ensure

visitor safety and protect refuge resources. The refuge manager does have the authority to issue a special use permit to allow others access outside those periods. For example, we may permit access for research personnel or volunteers at different times, or organized groups to conduct nocturnal activities, such as wildlife observation, and educational and interpretive programs.

Zone Management
In this CCP, we are proposing a zone management system for the refuge that will indicate areas closed to OSVs and/or pedestrian traffic based on time of year and species presence. Please see map 4-1 for an illustration of the refuge zones and see the visitor access objectives under goal 2.

Partnerships

We will continue to maintain the existing partnerships identified in chapter 3. These relationships are vital to our success in managing all aspects of the refuge, from managing habitats and protecting species, to outreach and education, and providing wildlife-dependent recreation. In particular, we are committed to further strengthening our partnerships with TTOR, NCF, and the Maria Mitchell Association. The Maria Mitchell Association is a local organization that promotes state-of-the-art research and science on Nantucket and offers unique collaborative opportunities for research and public engagement. TTOR has played an invaluable role in managing and monitoring refuge shorebirds, including federally listed and State-listed species, over the last decade and will remain our primary partner in the future. We will establish a new, updated Partnership Agreement which addresses resource management, visitor use, and additional funding sources and support to help contribute to refuge operations. Both TTOR and NCF are our conservation partners on the Coskata-Coatue Peninsula, and both coordinate and oversee public use, staffing, and facilities maintenance. Other important partners include MassWildlife and Massachusetts Audubon Society.

Preservation of Scenic and Aesthetic Qualities

There are important scenic and aesthetic qualities to the refuge which are not well addressed through the biological and cultural landscape analyses included in this plan. These qualities are also important to preserve. We will be careful under all alternatives to meet the guideline in the Service's wildlife-dependant recreational program policy (605 FW 1) that recommends planning "…facilities that … blend into the natural setting." We will also support the entire landform's designation as a National Natural Landmark as recommended by TTOR. The nomination of such landmarks includes a careful analysis of those qualities that make the landform eligible for designation, and will help identify what physical attributes must be protected in order to preserve the experience of visiting Great Point.

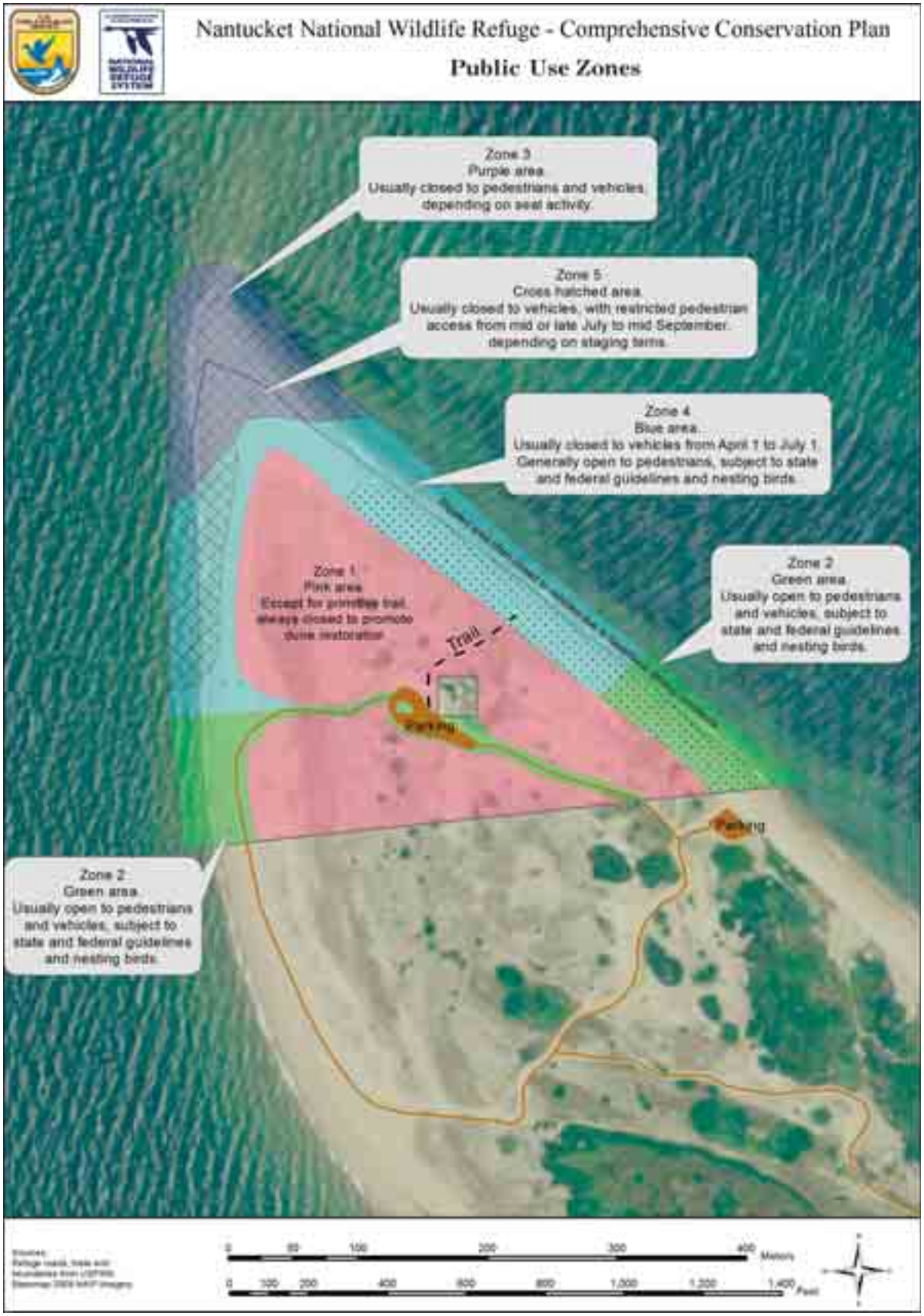
Protecting Land

We will continue to work with the U.S. General Services Administration (GSA) to acquire excess Federal lands in partnership with other agencies, organizations, and willing sellers. We have identified opportunities to increase land protection by 2,036 acres on both Nantucket and associated islands (see appendix G for more specific information).

The permanent protection of land is the keystone of wildlife and habitat conservation. Land brought into the refuge system will be available in perpetuity to support fish, wildlife, and plants. We can restore, enhance, or maintain the land we purchase in fee title to provide optimal conditions for priority species targeted for conservation, such as threatened or endangered species, and those whose populations are in decline. Further, the land we protect through conservation easements will never convert to uses that would remove permanently their value for fish and wildlife.

The refuge conservation easement program targets lands that contain natural resources whose importance merits their inclusion in the refuge system. These are not simply open space easements. The goal of our easement program

Map 4-1. Public Use Zones



is to protect existing natural resources and work with the landowners to enhance those resources, including water quality buffers, while promoting the continuation of traditional uses of the land. The Land Protection Plan (appendix G) elaborates on Service policies and procedures, as well as options and potential impacts under this CCP.

To continue our progress toward our shared objectives in protecting land, we will employ the following, ongoing strategies:

- Work with partners to identify willing sellers in areas of concentrations of priority natural resources.
- Use our criteria for prioritizing land protection for lands that become available for purchase.
- Continue to coordinate regular meetings of land protection partners to facilitate communication and cooperation.
- Continue to seek opportunities to expand our land protection partnerships.
- Seek opportunities for funding via grants and non-traditional means.
- Provide information to elected officials on land protection issues upon request.
- Work with partners and landowners to encourage land conservation outside the refuge boundary.
- Keep residents, organizations, and businesses in Nantucket informed about land protection issues through the distribution of outreach material and personal appearances by staff.



Amanda Boyd/USFWS

Eastern kingbird

Developing Refuge Step-down Plans

Service planning policy identifies 25 step-down plans that may be applicable on any given refuge. Two have been completed for the refuge complex as a whole, which includes Nantucket NWR. We have identified 11 additional plans as the most relevant to this planning process for the refuge, and we have prioritized their completion. Several are ongoing as part of the refuge complex planning, but others will be completed depending upon the alternative chosen and its associated level of funding and staffing to complete them. We list those plans and their planned completion dates below. This CCP presents sections of the refuge HMP that require public review. We will incorporate them into the final version of the HMP within 3 years of approval of the final CCP.

We will develop an Annual Habitat Work Plan (AHWP) and Inventory and Monitoring Plan as the highest priority step-down plans. We describe them in more detail below. To keep them relevant, we will modify and update them as we obtain new information. The completion of these plans supports all refuge goals.

The following completed plans apply to the entire Eastern Massachusetts NWR Complex, including Nantucket NWR:

- Avian Influenza Surveillance and Contingency Plan—completed in 2007.
- Hurricane Action Plan—completed in 2009, updated in 2010.

An updated Fire Management Plan is scheduled to be completed in 2012. Please see appendix F for general fire program direction. Step-down plans scheduled for completion include:

- AHWP, annually beginning within 3 years of CCP approval.
- IPM Plan, within 2 years following CCP approval.
- HMP, within 3 years following CCP approval.
- Fishing Plan, within 3 years of CCP approval.
- Sign Plan, within 3 years of CCP approval.
- IMP, within 5 years of CCP approval.
- Law Enforcement Management Plan, within 5 years of CCP approval.
- Cultural Resources Management Plan, within 5 years of CCP approval.
- Visitor Services Plan, within 5 years of CCP approval.
- Migratory Bird Disease Contingency Plan, within 5 years of CCP approval.
- Continuity of Operation Plan, within 5 years of CCP approval.

Habitat Management Plan
The HMP will incorporate the habitat objectives developed herein, and will identify the "what, where, how, and when" actions and strategies we would implement over the 15-year period to achieve those objectives. Specifically, the HMP will define management areas and treatment units, identify the type or method of treatment, establish the timing for management actions, and define how we will measure success over the next 15 years. We base both the CCP and HMP on current resource information, published research, and our own field experiences. We will update our methods, timing, and techniques as new, credible information becomes available. To facilitate our management, we will regularly maintain our Geographic Information System (GIS) database, documenting any major changes in vegetation or shoreline at least every 5 years, as staffing and funding allow.

Annual Habitat Work Plan and Inventory and Monitoring Plan
The AHWP and IMP for the refuge are also priorities for completion upon CCP approval. These plans also are vital for implementing habitat management actions and measuring our success in meeting the objectives. Each year, we will generate an AHWP that will outline specific management activities for that year. The IMP will outline the methodology to assess whether our original assumptions and proposed management actions support our habitat and species objectives. The IMP may also be used to monitor the potential effects of climate change on refuge habitats and wildlife populations. We will prioritize our inventory and monitoring needs in the IMP. The results of inventories and monitoring will provide us with more information on the status of our natural resources and allow us to make more informed management decisions.

Distributing Refuge Revenue Sharing Payments

As described in chapter 3, we have provided funding in the form of shared revenues to the town of Nantucket for the refuge since the refuge was established. Those annual payments are calculated by formula determined by, and with funds appropriated by, Congress. We will continue those payments in

accordance with the law, commensurate with changes in the appraised market value of refuge lands, or new appropriation levels dictated by Congress.

NEPA Analysis

For all major Federal actions, NEPA requires the site-specific analysis and disclosure of their impacts, either in an EA or environmental impact statement (EIS). Generally, those include the administrative actions listed in chapter 4 of the EA/draft CCP. Most of the actions proposed were fully analyzed in the EA/draft CCP and were described in enough detail to comply with NEPA, and would not require additional environmental analysis. Although this list is not all-inclusive, the following projects fall into that category:

- Development of the HMP.
- Development of the IMP.
- Research, resource inventories, or other information collected.
- Small construction and improvement projects (including addition of a primitive foot trail, signage).
- Operations and maintenance of existing infrastructure and facilities (including addition of signage and/or a kiosk at the entrance gate, and minor renovations should a building be purchased for a visitor facility).
- Law enforcement activities.
- Control of invasive plants.
- Predator or pest management program implementation.
- Changes in our priority public use programs.

Summary by Major Program Area

Habitat Management and Protection

We will take a more active role in habitat and species management both on and off the refuge through partnerships and as facilitated by implementing the North Atlantic LCC (see chapter 3). This includes expanding the Nantucket NWR to include additional lands on Nantucket Island and associated islands identified by the Service totaling 2,036 acres. Our highest priority will be the protection of dynamic coastal beach and dune systems and the focal avian and mammalian species that rely on them for critical nesting, resting, foraging, and staging habitat. This includes identifying and symbolically fencing important wildlife habitat, and evaluating vehicle and pedestrian access routes on the refuge by April 1 annually to avoid and minimize adverse impacts to sensitive beach and dune ecosystems for beach-nesting birds. This adaptive management approach will allow changes in management within a given season or from year to year based on changing beach dynamics and species presence. The result could mean access restrictions and/or closures in some seasons and/or years (see Zone Management section and map 4-1). We will also evaluate the need for dune restoration and monitor for invasive species and treat them as staffing and funding permit.

Species management will follow Federal piping plover recovery guidelines and State plover and tern guidelines, and this will benefit other species such as nesting American oystercatchers. We will protect high quality habitat for staging terns in the late summer and early fall by managing vehicular and pedestrian access to minimize disturbance to terns. We will also maintain symbolic fencing

to minimize disturbance to hauled-out seals. Predator control measures will be employed as necessary to increase productivity of piping plovers, and least, common, and roseate terns potentially nesting on the refuge. We will continue to work closely with TTOR, NCF, and our other partners to accomplish these management actions with an emphasis on the larger landscape level conservation and more consistent management between partners on the peninsula.

Additionally, we will work with partners on partner lands to survey, monitor, and conduct habitat evaluations for New England cottontail on Nantucket, and to possibly assess the feasibility of a New England cottontail release on suitable properties. The Service's New England Field Office will be able to provide leadership and technical expertise as they have overseen New England cottontail monitoring and management throughout the Northeast.

Although we are not able to predict the extent of future acquisitions within the next 15 years, the Service will make a concerted effort to pursue Federal (surplus) land, including the former Coast Guard LORAN and FAA facilities, as well as easements and acquisitions on key parcels on the Coskata-Coatue Peninsula, and on Muskeget Island to further this landscape level conservation approach.

Inventories and Monitoring

We will implement inventories and monitoring protocols to provide key information on the trust resources as funding and time permits. Primarily, the focus will be on piping plover, nesting and/or staging least, common, and roseate terns, and seals. Monitoring resources of concern will allow us to judge success of our management actions, including seasonal pedestrian and vehicle closures. We will work closely with partners to conduct these inventories and surveys.

Visitor Services

We will continue, and where possible, expand existing opportunities for the five priority public uses allowed on the refuge, including fishing and interpretation. Additionally, we will work with current partners and seek new partners to help us achieve new and expanded environmental education and interpretation programs. We will develop and provide distributional materials on refuge wildlife and habitats, and conservation in the region. Closures will be continuously updated on the refuge Web site. We will collaborate with partners to sponsor and participate in additional outreach opportunities for visitors and residents of Nantucket, including fishing events. Offsite messaging (such as brochures and a kiosk at the gatehouse and some web page upgrades) will improve visitor awareness of habitat issues and reduce disturbance to wildlife when visitors are on the refuge. We will also seek alternative transportation study funds to determine the feasibility of implementing a system to transport more people to the refuge without the use of individual vehicles.

We will establish a primitive foot trail from the lighthouse to the refuge's eastern beach for pedestrian and fishing access. We will encourage visitors to help maintain and re-establish native vegetation that historically occurred as well by staying on the primitive trail and out of the dunes. This will enable us to preserve the health and integrity of the dynamic beach habitats on the refuge within the landscape scale and context. We will interpret the significance of the peninsula's proposed National Natural Landmark designation, and how the partners are preserving those qualities through low profile facilities and minimal administrative signs.

Refuge Administration

When funding is provided, we plan to achieve a level of staffing that meets the minimum requirements for a refuge complex of this size and importance by adding 1.5 positions to the refuge: a half-time, year round visitor services specialist and a full-time biologist. Additionally, when funding is available, we

plan to station a new law enforcement officer at Monomoy Refuge in Chatham. This officer will conduct regular patrols of all Cape Cod and island refuges in the complex, including Nantucket NWR. We will base any increases in staffing on available, permanent sources of funding, and will consider them in the context of regional and refuge priorities.

The Service will seek to partner with TTOR and NCF to establish a shared visitor contact facility. Our options include constructing a new building at the gatehouse, retrofitting a building already in use by TTOR or NCF, or purchasing a building. Development of a partnership facility and visitor contact station at a strategic location would allow the Service to better fulfill its mission and additionally provide refuge staff with an office, housing, and storage. For any site chosen, additional NEPA analysis will be required. Further, we will install a kiosk at the Wauwinet gatehouse, and use signs to highlight the conservation partnership on the Coskata-Coatue Peninsula with TTOR and NCF. We will also strive to increase visibility and awareness of Service and refuge policies, and help educate visitors about fish and wildlife and its conservation. Through our collaboration with TTOR and NCF, we will strive to achieve near-seamless management across the three properties on the peninsula. One exception is that we will continue our year-round ban on dogs on the refuge while at this time our partners allow dogs from September through March. Signage throughout the refuge will be augmented to include interpretive panels which will need to be updated and maintained. Any signage or additional infrastructure placed on or off the refuge will be with the intention of maintaining the aesthetics of the property and Nantucket Island.

Goals, Objectives, and Strategies

Relating Goals, Objectives, and Strategies

Refuge goals are intentionally broad, descriptive statements of the desired future condition of refuge resources. By design, they define the targets of our management actions in prescriptive rather than quantitative terms. They also articulate the principal elements of the refuge purposes and vision statement, and provide a foundation for developing specific management objectives and strategies.

Objectives are essentially incremental steps toward achieving a goal and further define management targets in measurable terms. They vary among the alternatives and provide the basis for developing detailed strategies that monitor refuge accomplishments and evaluate progress. “Writing Refuge Management Goals and Objectives: A Handbook” (USFWS 2004) recommends writing “SMART” objectives that are: (1) specific, (2) measurable, (3) achievable, (4) results-oriented, and (5) time-fixed.

Where possible, we incorporated the principles of Strategic Habitat Conservation (SHC) in the development of our objectives and strategies. According to “Strategic Habitat Conservation: A Report from the National Ecological Assessment Team” (USFWS 2006), SHC focuses on “…the ability of the landscape to sustain species as expressed in measurable objectives.” Developing a strategy to attain a biological outcome, such as a population objective, requires documented and testable assumptions to determine whether the objective is met.” Not only will this approach ensure refuges are contributing to the refuge system and Service mission and goals in a strategic, standardized, and transparent way, but also ensures that refuges contribute to local and regional conservation priorities and goals (USFWS 2008b).

A rationale accompanies each objective to explain its context and importance. We will use the objectives to write refuge step-down plans, which we describe later in this chapter.

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

GOAL 1. **Perpetuate and enhance the biological integrity and diversity of coastal habitats on and around Nantucket Island to support and enhance native wildlife and plant communities, with an emphasis on species of conservation concern.**

Objective 1.1. Dune and Shoreline Habitat

Over the next 15 years, protect the entire 21 acres of Nantucket NWR from anthropogenic disturbance and degradation to preserve its biological integrity, diversity, and environmental health. Through seasonal closures, predator management, and public education, manage approximately 9 acres of intertidal beach and beach berm to maintain a minimum productivity of 1.5 chicks per nesting pair of piping plovers and 1.0 chicks per nesting pair of terns over a 5-year period. Manage public access seasonally on approximately 4.4 acres of intertidal beach habitat to provide a viewing buffer distance of approximately 50 yards and minimize disturbance to staging terns and seals.

Rationale

Biological integrity and ecosystem health of dune and shoreline habitat: Throughout the Atlantic coast, quality beach habitat is imperiled due to increases in human uses and development. These naturally unstable, dynamic ecosystems are subject to erosion and accretion, which is dictated by wind and wave action (MA DFG 2006). Many species rely upon these dynamic processes to provide and continually revitalize coastal habitat and food resources. Despite their importance, human modification through beach stabilization, development, and recreational use interrupt these natural processes and result in greater risk to human coastal populations, and a reduction in quality habitat available for wildlife (CBTF 1992, USFWS 1996). According to the Coastal Barriers Task Force (1992), factors including population growth in coastal areas, and increases in affluence, leisure time, motorized vehicles, accessibility, and recreational diversity have led to a greater intensity in human use, development, and modification of coastal resources since World War II. These uses are the greatest threats to coastal habitats because of the subsequent alterations that result (MA DFG 2006). The refuge has the opportunity and responsibility to protect and maintain these important coastal hydrogeomorphological dynamics to maintain coastal dunes and shoreline processes that provide habitat for declining wildlife species.

Birds depending on these coastal beach habitats are some of the fastest declining bird groups because of the habitat loss and degradation of these key waterfront areas. Hence, several national bird conservation organizations and Federal and State agencies advocate management to benefit beach nesting birds in such plans as the PIF Physiographic Area 09 Plan, the BCR 30 Plan, and the MA CWCS. In fact, in these plans, coastal habitats contain the most species ranked as highest or high priority species of conservation concern in the region (Steinkamp 2008). Nantucket NWR and the greater Coskata-Coatue Peninsula have been identified as ACJV land and shorebird focal areas within BCR 30 because of their relative importance in the region and along the Atlantic Coast. Although Nantucket NWR is relatively small, its location on the landscape provides important habitat to a variety of migratory birds and marine mammals of conservation concern. Priority species of conservation concern listed in these plans that have been documented on the refuge include piping plover, American oystercatcher, roseate tern, least tern, and common tern. Nantucket NWR may also provide habitat for migrating shorebirds, but this has not been evaluated yet.

Though bird species make up the visibly predominant taxonomic group on the refuge and act as indicators of habitat quality, other protected species use the refuge and adjacent lands as well. The Coskata-Coatue Peninsula is listed as one of MA NHESP's BioMap Core Habitats. This is because of the extensive maritime dune community that supports rare plant species including the prickly pear cactus, the globally rare seabeach knotweed, American sea-blite, and historically seabeach amaranth.

Clearly, the refuge beach and dune ecosystem provides vital habitat for regional and local species of conservation concern amidst a declining trend in this habitat availability throughout the Atlantic Coast. While habitat protection is an important component of the conservation of priority species, other factors, such as human disturbance, can contribute to declines in available habitat or nesting success and productivity. It is widely acknowledged by Federal, State, and local governments that coastal ecosystems may be adversely impacted by vehicles through the churning of tires, substrate compaction, vegetation destruction, and the destabilization of dunes (Town of Nantucket 2005, Massachusetts General Laws Chapter 131, S 40; 310 Code of Massachusetts Regulations 10, specifically the Barriers Beaches Management 310 Code of Massachusetts Regulations 10.29, Leatherman and Godfrey 1979). In addition, pedestrians, dogs, fireworks, and other human recreational activities including kite-flying, can have adverse impacts on beach-dependent species.

We will assume a more active role in managing Nantucket NWR to optimize benefits for habitat and wildlife. This will include more site visits, especially during the critical wildlife nesting and migration seasons through additional biological, visitor services, and law enforcement positions. We will continue to work with partners to ensure that we protect dunes and that we follow other Service mandates including biological integrity and SHC. This process is also focused on minimizing adverse impacts to sensitive dune habitat by restricting OSV and pedestrian access to certain areas, and redirecting traffic as conditions warrant. It is also important to note that, although our objective statements focus on birds of priority conservation concern identified in regional and State plans, we are also striving through our management to "keep common birds common."

Based on the results of SLAMM analysis, we know that this habitat is subject to loss under sea level rise scenarios over the next century. Given that these are long-term scenarios, immediate action is not warranted; therefore within the context of this CCP over the next fifteen years, we will continue to reduce non-climate environmental stressors. In addition, we will monitor and evaluate shoreline conditions relative to climate change and sea level rise using aerial photos, cooperate with the State on their climate change priorities once refined, and utilize the North Atlantic LCC to facilitate climate change research, education, and collaboration.

Nesting piping plovers: The piping plover is a federally listed and State-listed threatened species. Massachusetts supports the second largest population of breeding piping plovers along the Atlantic Coast. Plovers return to Massachusetts in late March or early April and begin establishing nesting territories along dunes and beach strands. Their nesting season spans from late March through the end of August. Plovers forage along the waterline, on the mudflats, and along the wrack line (MA NHESP 1990). Habitat loss from development has decimated the piping plover along the Atlantic Coast. Predation on eggs and chicks by fox, skunk *(Mephitis mephitis),* raccoon *(Procyon lotor),* and other predators is increasing, while OSV users and other beach goers impede foraging or accidentally crush the cryptic plover eggs or chicks. Protection of

critical habitat from development and restricting recreational use in plover nesting areas is essential to maintaining healthy piping plover populations (MA NHESP 1990).


Gene Nieminen/USFWS

Piping plover

Since the piping plover was federally listed in 1986 and specific management guidelines were developed in 1993 by Massachusetts and 1994 by the Service (revised in 1996), both the Service and State (MA NHESP) have worked to coordinate consistent implementation and enforcement of these guidelines on all private and public coastal landowners in the State. The Federal and Massachusetts guidelines are provided in appendix I.

TTOR took the lead on managing piping plover habitat on the refuge from 1982 through 2009, and continue to assist with management under a partnership agreement with the Service. In 2001, a Section 7 evaluation was completed to initiate management of piping plover according to the 1996 Piping Plover Federal Guidelines. Since then, symbolic fencing has been established by early April, and beach closures for piping plover nest protection were instituted. Piping plovers have regularly nested on Great Point and Coskata-Coatue just south of the Nantucket NWR since at least 1983 (annual nesting numbers range from 0 to 12), but very few pairs have nested on the refuge in the last 25 years. The last recorded nest on the refuge was in 2006.

Piping plover recovery is often in conflict with human recreation, because they both utilize the area above the high tide line on coastal beaches. To mitigate these conflicts, piping plover recovery guidelines stipulate that suitable habitat on public beaches be delineated with symbolic fencing and signs prior to April 1 each year, and that a 50-meter radius be maintained around nests, above high tide line where possible, to minimize disturbance to nesting birds (USFWS 1996). Because of the highly dynamic nature of the timing, abundance, and distribution of these birds on the refuge, vehicular and pedestrian access needs to be assessed in real time as changing circumstances warrant.

Nantucket NWR will be managed according to Federal and State guidelines. Nesting piping plover numbers are consistently low on Nantucket NWR. Available habitat varies between years naturally through sediment deposition, erosion, and storm overwash events, but usually only a few acres are suitable nesting habitat. We, therefore, do not have a target number of nesting pairs, but rather a target productivity level of 1.5 fledged chicks per pair over a 5-year period. This is the minimum productivity to meet and sustain rangewide population goals in compliance with the Piping Plover Recovery Plan (USFWS 1996). Additional monitoring of potential impacts of predators and OSV will guide future management decisions.

Nesting terns: The least tern is a species of special concern in Massachusetts. The least tern was a common bird in Massachusetts in the late 1800s, but was decimated at the turn of the century by the millinery trade. Since recovering, the least tern now faces threats from development, predation, and beach use. Least terns nest on beaches and sandbars with a mix of sand, pebbles, and shells, and lacking in vegetation. The birds arrive in Massachusetts at nesting sites in early May. A high percentage of nests and eggs are lost each year to overwash from high tides and storm surges. Eggs and chicks suffer high predation from avian and mammalian predators including crows, gulls, raptors, coyotes *(Canis*

latrans), red fox *(Vulpes vulpes),* skunk, and raccoon. Historically, Great Point (including Nantucket NWR and adjacent land to the south) has been the site of one third of Massachusetts' breeding least terns (TTOR booklet 1998). Since 1978, numbers of least tern pairs have fluctuated on Great Point, ranging from 0 in 1991, to over 1,000 in two consecutive years (1996 and 1997; USFWS undated), but many of these nests were not on Nantucket NWR.

Common terns are also a species of special concern in Massachusetts. Common terns likely numbered in the hundreds of thousands in the mid-1800s, but are much more scarce today, with approximately 15,000 pairs nesting in Massachusetts in recent years (MA NHESP 2007). Common terns nest on beaches with a mix of sand and vegetation starting in mid-May in Massachusetts. Threats to reproductive success include increasing predator populations and storms. Common terns have nested sporadically on Great Point in low numbers, ranging from one nesting pair in the early 1980s and again in the early 1990s up to 35 nesting pairs in 1996. In 2008, one nesting pair was located at Great Point, but the nest was predated (TTOR 2008).

Prospecting least and common terns may benefit from the closures implemented for piping plovers. In addition, we will protect additional high quality habitat for terns by directing public use away from sensitive areas during critical times. We will also more closely monitor prospecting pairs, nesting attempts, and causes of nest failure.

Staging and migrating terns: The post-breeding dispersal period is an especially sensitive time for terns because parental care may continue well into fall migration and even after arrival at their wintering areas (Ashmole and Tovar 1968, Feare 2002, Nisbet 1976). At fledging, young terns usually have not achieved adult mass, and several studies have demonstrated that post-fledging parental care given prior to departure from their breeding colony sites provides for an increase in mass and later post-fledging survival probability (Feare 2002, Schauroth and Becker 2008, Stienen and Brenninkmeijer 2002). During the post-breeding dispersal period, young terns start to transition to independence, learning skills needed to fish independently, and increasing body condition and strength of flight muscles needed for the 7,000 kilometer (4,350 mile) migration to South America. Much of the presumed recent reduction in post-fledging to first-breeding survival likely results from events that take place during this period (Spendelow et al. 2002). After an initial period of more widespread dispersal, most (if not all) northwestern Atlantic roseate terns congregate at locations around Cape Cod and the offshore islands of Martha's Vineyard and Nantucket, Massachusetts (Gochfeld et al. 1998, Shealer and Kress 1994). Staging roseate and common terns have been recorded on Nantucket NWR beginning in mid-July, but consistent surveys had not been conducted to evaluate the importance of this site prior to 2010. In 2009, high counts of 600 or more staging terns were recorded in late July on Nantucket NWR and both common and roseate terns were observed from mid-July through the end of August, suggesting Nantucket NWR may be an important site. During 2010 and 2011, staging tern counts were conducted multiple times each week, in conjunction with seasonal closures to minimize disturbance. In 2010 and 2011, average high counts peaked at near 600 terns in mid-August (see chapter 3 for more details).

We will continue to proactively establish seasonal closures to vehicles and pedestrians to protect habitat for staging terns. Closures are not fixed, but rather evolve as staging tern use evolves through the season. Closures are generally very small at the start of the staging period, and are expanded to accommodate the increasing number of terns as the staging period progresses. Experimental seasonal closures in 2010 and 2011 minimized most disturbance

to staging terns. In 2010, we conducted 20 surveys to evaluate disturbances to staging terns and only about 15 percent of pedestrians passing by the closure disturbed terns. Additionally, disturbances on average lasted less than a minute (more details are included chapter 3; 2011 data are still being analyzed). We will continue to work with partners to ensure that refuge data can be incorporated in larger landscape studies evaluating importance of staging sites throughout Cape Cod and the Islands.

Migrating shorebirds: Many species of shorebirds *(Charadrii)* that breed in North America migrate up to 30,000 kilometers (over 18,000 miles) annually, traveling from non-breeding grounds as far south as Argentina to breeding grounds as far north as the Arctic Ocean (Brown et al. 2001, Morrison 1984, Myers et al. 1987). During these long distance migrations, shorebirds rely on strategically located stopover sites which provide abundant food and adjacent resting habitat (Helmers 1992, Myers et al. 1987, Senner & Howe 1984). Coastal stopover sites in particular are increasingly being subjected to development and human disturbance, and loss of suitable stopover habitat may contribute to declines in local abundance and overall populations of shorebirds in North America (Brown et al. 2001, Myers et al. 1987, Pfister et al. 1992). In the northeastern United States (Maine to Virginia) "77 percent of the region's human population resides along the coast" (Crossett et al. 2004). Thus, this region is one of the most heavily populated areas in North America and the U.S. Shorebird Conservation Plan has noted the importance of reducing disturbance to migrating shorebirds at key stopover sites in this region (Brown et al. 2001). The importance of Nantucket NWR to migrating shorebirds is currently unknown, but it is likely that Nantucket NWR, in conjunction with Coskata-Coatue, provides important stopover habitat. Migrating shorebirds will likely benefit from the closures that are established for seals and staging terns and use will be monitored in conjunction with other biological work.

Seal haul-out sites: Gray and harbor seals are both protected under the MMPA. In recent years, the tip of Nantucket NWR has become a haul-out site for both species, especially gray seals. While their pupping grounds were historically further north on Sable Island and in the Gulf of Saint Lawrence in Canada, there has been a year-round breeding population around Cape Cod and associated islands since the late 1990s. Muskeget Island and the associated shoals support the largest breeding population of gray seals in the United States. There is evidence that gray seals are now pupping in low numbers on Great Point. The only other site in Massachusetts where gray seals pup is Monomoy NWR. With our permission, TTOR installed symbolic fencing at the tip of Great Point in 2008 to protect the seals from disturbance and prevent potential injury to visitors that wander too close. This symbolic fencing has been maintained since that time to protect both seals and visitors.

Strategies

Continue to:

- Work with partners or volunteers to identify other potential priority resources (flora and fauna) for management consideration at Nantucket NWR and manage for biological integrity, diversity, and ecosystem health.

Piping plovers

- Annually protect existing piping plover habitat refugewide by establishing and maintaining symbolic fencing (sign posts connected with twine) that prevents vehicular and pedestrian access through nesting habitat in accordance with Federal guidelines by April 1. Additionally prohibit vehicle access on most of the beach no later than April 1 to at least July 1, or until nesting piping plovers have fledged chicks.

- Work with TTOR to maintain a vehicle-free area for piping plover chicks extending 1,000 m on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. Closures in areas with piping plover chicks remain in effect until chicks are at least 35 days old, or capable of at least 15 m of sustained flight.

- If no territorial piping plovers have established by July 1, and areas are not part of other zoning closures (see map 4-1), then areas may be opened for vehicular and/or pedestrian access.

Staging Terns

- Annually establish a seasonal closure with symbolic fencing to vehicles and pedestrians on the northwest tip of the refuge (but this location may vary) where staging terns have occurred in recent years. This closure will generally be from mid- or late-July to mid-September. Closure options will be adapted to accommodate shifting habitat and bird use, and closure dates will vary some annually, depending on staging and migration chronology.

- Continue to gain knowledge about relative importance of Nantucket NWR compared to other staging sites in Cape Cod and the islands, and better understand movement patterns of staging terns between sites.

Staging tern habitat on northwest tip of the refuge



Elizabeth Wunker/USFWS

Seals

- Protect seal haul-out sites from human disturbance by annually implementing a closure with symbolic fencing to establish a public viewing distance of 50 yards, in accordance with MMPA and Cape Cod Stranding Network guidelines. The closures will usually be at the very north tip of the refuge where seals are most common, and the closure will remain in effect as long as seals are present at the tip.

- Coordinate with National Marine Fisheries Service and other organizations to continue collecting pertinent data regarding seal use, diet, entanglements, and other interactions with humans.

Within 1-5 years
Biological integrity, diversity, and ecosystem health:

- Maintain a year round closure in the beach dune habitat, with the exception of a pedestrian access trail from the lighthouse to the east beach, to protect dune ecosystem integrity.

- Evaluate the appropriateness of restoring trampled dune vegetation (including beach plantings) resulting from trespass.

- Control invasive species using mechanical, biological, and/or chemical methods.

- Determine impacts of predators and non-native animals (feral cats, rats, gulls, and others) to nesting piping plovers and terns, and implement predator control (lethal and non-lethal) if appropriate.

- Identify data gaps and participate in research relevant to Nantucket NWR which may include: determining refuge importance to migratory shorebirds and bats; human-seal interactions; impacts of recreational use to nesting and migrating birds, and; impacts of vehicles to shoreline and dune integrity. Other research needs and opportunities may be identified in the future.

Nesting terns:

- Annually protect common and least tern nesting habitat refugewide in accordance with State recommendations. Establish and maintain symbolic fencing to prevent vehicular and pedestrian access through suitable habitat by May 15 and until at least July 1. If terns are not established by this date, access restrictions may be lifted. Maintain a buffer of 50 meters around nesting areas in accordance with State regulations.

- When unfledged least tern chicks are present, vehicle closures will be enforced to provide a 100-yard buffer perpendicular to the long axis of the beach, from the perimeter of the colony. Closures are in effect until terns are observed to be capable of flight.

Staging terns:

- Collaborate with partners to initiate a study of staging terns and anthropogenic disturbances on Nantucket NWR that can be incorporated in studies initiated throughout Cape Cod and the Islands. Implement changes to beach management where scientific data support this.

Monitoring Elements
Conduct appropriate inventory and monitoring program as funding and staffing permit to measure our success in achieving our objectives. The results may trigger adjustments to management strategies or refinement of our objectives. Examples of monitoring or surveys that are likely to occur include:

Biological integrity, diversity, and ecosystem health:

- Systematic surveys (4-5 times/week) of all wildlife using Nantucket NWR for 1 additional year (two years already collected) from April–October and compare survey results with regional and national conservation plans to identify additional conservation priorities.

- Refugewide survey for seabeach amaranth and appropriate habitat to evaluate potential for introduction of this species.

- Comprehensive refugewide vegetation survey of native and non-native plants, to establish baseline non-native infestation extent and identify rare plants.

- Annual survey for non-native invasive species to determine future control priorities and evaluate success of control treatments.

- Coastal shoreline change using regional, standardized protocol to determine time periods and geographical locations of erosion and deposition, and potential long-term impacts of sea level rise.

- Survey to help determine importance of refuge to migrating shorebirds.

Nesting Terns:
- Annual surveys of all nesting terns during the breeding season (June) and annually monitor productivity according to State and Federal recommendations.

Staging Terns:
- Systematic surveys of staging terns 4-5 times/week (during pre and post-breeding times) to inform location and timing of closures, evaluate effectivenss of closures as an ongoing effort to determine relative importance of site.

- Resight surveys of staging terns during post-breeding times in collaboration with other partners to characterize movements between sites as an ongoing effort to determine relative importance of site.

Seals:
- Systematic counts of seals refugewide nearly daily from April–October, and weekly during other times of the year, to inform location and timing of closures, evaluate effectiveness of closures, as an ongoing effort to determne relative importance of site.

- Record and report all incidents of seal mortalities, strandings, and entanglements to NOAA and the New England Aquarium.

Objective 1.2. Landscape-level Conservation

Over the next 15 years, upon the invitation of other conservation landowners, we will work cooperatively with partners on their lands to assist in resource protection. We will focus our efforts to minimize the disturbance and degradation of marine intertidal beach, beach berm, and dune habitat in order to preserve biological integrity and benefit breeding and staging birds and marine mammals. When staff is available, up to 25 percent of staff time may be dedicated to habitat management, wildlife management, and inventory and monitoring on partner lands in support of focal species. Our work could include a focus on federally listed species that are found elsewhere either on Nantucket or in the Cape Cod/ Islands area, and could include efforts to introduce or reintroduce species into their former historic range. All this work would be done with permission of and in cooperation with other partners.

Rationale
The Nantucket NWR is part of a larger ecological landscape that has significant coastal bird and marine mammal resources. Our conservation efforts and our ability to balance wildlife protection and public use would be enhanced if we share our expertise and staff resources and work at the invitation of other conservation partners on their lands to benefit habitat and wildlife as well. Conservation efforts both on and off the refuge could be facilitated through the implementation of the Service's North Atlantic LCC, particularly with its focus on representative species. This is an effort to promote regional partnerships to address resource management issues, share latest scientific information, and integrate conservation efforts. We will endeavor to collaborate with partners for resource management on and off the refuge, encourage and participate

in research on and off the refuge on coastal resources of concern and/or the importance of coastal islands for migrating taxa, share latest scientific findings, and become better integrated with the Nantucket and Cape Cod scientific community.

We will also work with partners on partner lands to survey, monitor, evaluate habitat and explore the option of releasing New England cottontail on suitable properties. New England cottontail is a candidate species under consideration for Federal listing under the ESA due to population declines. This species is particularly suited to shrubland habitats and is geographically restricted to the Northeast. New England cottontails were known to historically occur on Nantucket and Martha's Vineyard, but with the introduction of eastern cottontails in the late-1800s and early 1900s, along with other factors, are now considered extirpated from these islands.

Current populations of New England cottontails on Cape Cod are genetically distinct from other known populations and as such should be managed as a distinct unit. These populations exist in an area with tremendous anthropogenic influences, competition from non-native eastern cottontails *(Sylvilagus floridanus),* mammalian predation, and loss of habitat from succession. While densities of New England cottontails in coastal scrub communities have not been assessed, densities of one to two cottontails per acre (target densities for the Region are 1.5 cottontail per acre) is a reasonable estimate (A. Tur, personal communication, 2010). The decision to release New England cottontails would depend on the amount and connectivity of available habitat.

In the last several years, efforts throughout New England have been made to locate remnant New England cottontail populations, and to fill in knowledge gaps about their home ranges, habitat requirements, genetic diversity, and population dynamics. Despite these efforts, there is still much that remains unknown about the ecology of the species. This includes evaluating similar introductions on coastal islands, evaluating the genetic viability of a population on portions of Nantucket, the feasibility of New England cottontail management over time, and assessing the impact of such an introduction on other rare or sensitive species located on potential release sites. Coordination has already begun with State and Federal experts to make the New England cottontail a regional priority, and the Service's New England Field Office will provide leadership and technical expertise in making these determinations.

Many organizations, including the MMA, NCF, Roger Williams Park Zoo, MassAudubon, UMass Boston, and Nantucket Islands Land Bank Commistion have been working together for many years, with support from the Service, to recover the American burying beetle *(Nicrophorus americanus* Oliver). This Federally endangered species was reintroduced to Nantucket at Eastern Moors in 1994. Previously, the last known sighting of the burying beetle on Nantucket was in 1926. (Johnson 1930 in LoPresti et al, 2011). Release and provisioning of captive bred beetles continued until 2006. Currently, the reintroduction effort involves provisioning 25 adult breeding pairs each year with carrion to enhance reproduction and ongoing monitoring of the population. Although the population is not yet considered self sustaining, there is evidence that numbers have continued to increase and biologists are cautiously optimistic that the reintroduction effort will result in the successful establishment of a self sustaining population containing 2,500 individuals. The adult population at the beginning of the 2011 summer season was the largest population recorded to date on Nantucket (LoPresti et al. 2011). Success of this effort will ultimately depend upon the size of the population that can be supported by the Island. This capacity will be determined by the amount of suitable carrion that is available, along with

the amount of open habitats with loamy soils that provide suitable conditions for carcass burial.

Another beetle, the Federally threatened Northeastern beach tiger beetle *(Cicindela dorsalis dorsalis),* was historically found on Nantucket. It has since been extirpated primarily due to the use of offroad vehicles along the beaches. Currently there are only two populations of northeastern beach tiger beetle in New England, one on South Monomoy Island and the other on Martha's Vineyard. Providing long-term protection of priority sites and the reintroduction at appropriate locations within the historical range are key objectives for recovery as outlined in the Northeastern Beach Tiger Beetle Recovery Plan (1994 9.3). Beach dependent species such as the Northeastern beach tiger beetle require separate self-sustaining populations to counter inevitable losses from catastrophic events such as storms. Increasing the number of Northeastern beach tiger beetle sites in New England would provide additional protection for this species. Muskeget Island currently has the best potential to support a reintroduction effort if there is suitable habitat since there is no offroad vehicle use. We would be interested in working with partners off-refuge lands to help conserve the Northeastern beach tiger beetle.

The last recorded record of the federally threatened Seabeach amaranth *(Amaranthus pumilus)* anywhere in the state of Massachusetts was from Nantucket in1849 (Seabeach Amaranth Recovery Plan, 1996). The recovery plan focuses restoration efforts in the more southern portion of the historic range and adjacent to currently extant sites. None the less, there have been new populations discovered since the listing of the species in other states and there is the potential that additional sites in the northern part of the historic range would become desirable for establishment of future populations of this species. Muskeget Island in particular, since there is currently no offroad vehicle use, may be a potential site for reestablishing a population of seabeach amaranth. We would like to work with partners to explore this possibility on Nantucket.

Strategies

- Provide assistance to symbolically fence suitable bird nesting habitat on partner lands.
- Provide assistance to conduct inventory and monitoring actions on partner lands.
- Provide assistance in surveying, monitoring, and conducting habitat evaluations for New England cottontail on partner properties. With partners, determine appropriateness and feasibility of a New England cottontail release on suitable sites.
- Participate in Nantucket shorebird meetings.
- Participate in Nantucket Biodiversity Initiative.
- Conduct research to fill data gaps. Potential research includes importance of conservation lands on Nantucket to migratory shorebirds and bats, seals, and impacts of recreational use to nesting and migrating birds. (see objective 1.1)
- Determine impacts of predators (feral cats, rats, gulls, and others) to nesting piping plovers and terns, and implement predator control (lethal and non-lethal) if necessary.

- Discuss a role for Service involvement and support in the conservation of other federally listed species off refuge lands in Nantucket, working in cooperation with and at the invitation of landowners and conservation partners.

Monitoring Elements
- Number of acres protected by string fencing.
- Number of shorebird meetings.
- Number of partnerships resulting in research and management actions for New England cottontail, shorebirds, seabirds, and other federally listed species.

GOAL 2. **Promote awareness and stewardship of our coastal natural resources by providing compatible, wildlife-dependent recreation and education opportunities on the refuge and within the local and visitor community on and around Nantucket Island.**

Objective 2.1. Visitor Access Over the next 15 years, utilize a system of zone management to provide pedestrian and/or OSV access to at least some portions of the refuge while maintaining closures that reduce disturbance to wildlife from visitors. Zones will be used to delineate and protect areas of suitable habitat for breeding and staging birds, as well as hauled-out seals. Flexibility in maintaining zone closures will be incorporated if, after a specified period of time, no species of concern are present; in general, at least some portion of the refuge will be closed between April 1 and September 15, and dates may vary annually depending on the suitability of habitat and/or the presence of protected species. Visitors may participate in any compatible public use on the refuge in areas that are open to the public.

Rationale
We must maintain the values of the refuge for wildlife, and we are committed to providing quality public use, so managing a compatible balance between wildlife and habitat protection and visitor use, which includes pedestrian and OSV access, is of utmost importance. Most refuge visitors use individually owned or rented OSVs to get to the refuge and fish, observe or photograph wildlife, and enjoy the beach. Some visitors are transported to the refuge by TTOR as part of a natural history, lighthouse, or fishing tour. We have observed visitor use and traffic patterns on the refuge and in recent years have been directing OSV traffic and pedestrians to less sensitive areas and around or away from nesting and/or migrating wildlife to avoid and minimize adverse impacts or conflicts. This has been successful from a wildlife management perspective. These closures are established in compliance with plover and tern guidelines, to increase nesting success for plovers and terns, and provide an undisturbed area for staging federally endangered roseate terns and for hauled-out gray seals. Map 4-1 depicts these areas known as "Zones 1-5." Closures would be regularly updated on our refuge Web site.

At times the refuge is open for public use, but TTOR has to close portions of Coskata-Coatue refuge to protect nesting piping plovers. When this happens, the number of visitors to the refuge is markedly decreased. Finding an alternative way for visitors to get to the refuge would increase opportunities for the public to engage in wildlife-dependent activities on the refuge.

We will also pursue opportunities to identify alternative ways that the public can get to the refuge. We will assess alternatives to individually driven vehicles for access to the refuge. We will open a primitive trail from the lighthouse to the east beach so that areas otherwise inaccessible due to closures for wildlife can be visited.

Given the dynamic nature of coastal ecosystems and the variability in wildlife presence, abundance, and distribution on the Coskata-Coatue Peninsula, we will continue to use an adaptive management approach to provide conservation measures and allow public access.

Strategies

Within 1 year:

- Provide up-to-date, accurate information about visitor access opportunities and seasonal closures in an understandable way on the web and through handouts available at the Wauwinet Gatehouse, and other information distribution mechanisms.
- Manage pedestrian and vehicle access as shown in map 4-1 for the purpose of wildlife protection in goal 1.

Within 3 years:

- Establish a pedestrian access trail from the lighthouse to the east beach in Zone 1 to provide pedestrian access to the beach and to protect dune ecosystem integrity.

Within 5 years:

- Apply for alternative transportation study funding to determine feasible access alternatives to the refuge with the goal of reducing the number of individually operated OSVs travelling to the refuge.
- Engage the public in the alternative transportation system process so they can provide suggestions for transportation options and review of draft alternative transportation proposals.

Within 10 years:

- Obtain funds to implement preferred alternative transportation options.

Monitoring Elements

- Number of refuge visitors engaged in priority public uses.
- Number of alternative transportation trips.
- Amount and timing of seasonal closures by zone.
- Size and productivity of bird and seal populations within closed areas.

Objective 2.2. Environmental Education

Over the next 15 years, we will work with partners to develop and implement a quality environmental education program, based on existing curricula, and conduct activities that highlight the benefit of landscape-level management, and to further communicate our knowledge and understanding of Nantucket's coastal ecosystems and the migratory birds, marine mammals, and endangered and threatened species that depend upon them.

Rationale

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

We will support current endeavors provided by our partners and expand all of our visitor services capabilities with the addition of onsite visitor services staff.

This includes environmental education programming in coordination with partners that incorporates education about the refuge, its role in the refuge system, and management actions in the context of local and regional conservation issues. We will work with local schools and the conservation community that is already providing environmental education on Nantucket to assist in the development and delivery of programs that achieve national and State curriculum guidelines. Environmental education incorporates onsite and offsite programs and activities that address the audience's course of study, refuge purposes, physical attributes, ecosystem dynamics, conservation strategies, and the refuge system mission. We will work within this framework to determine how we can assist ongoing efforts throughout the community to provide workshops, field trips, day camps, and other outdoor education opportunities.



Amanda Boyd/USFWS

Refuge visitors observing closed bird nesting area

Strategies

Continue to:

- Coordinate with partners for environmental education opportunities as staffing and funding allow.

Within 1 year:

- Provide resources and information upon request from partners and local organizations who conduct a coordinated environmental education program that highlights a landscape level conservation approach as well as on the refuge.

Within 5 years:

- Coordinate with partners to refine an existing environmental education curriculum that highlights the importance of a landscape-level approach to resource management, to be provided both on and off the refuge, upon request.

Monitoring Elements

- Number of visitors reached by programs.
- Number of programs and materials produced.

Objective 2.3. Interpretation and Public Outreach

Over the next 15 years, provide quality interpretation and outreach programs by providing enhanced tours of the refuge and the Coskata-Coatue peninsula, identify additional opportunities for partnerships within the community that increase awareness of the Service presence on Nantucket and define how the biological resources on Nantucket NWR contribute to the Refuge System.

Rationale

The Improvement Act identifies interpretation as one of the six priority wildlife-dependent recreation uses. Interpretation is one of the most important ways to increase visitor awareness of the refuge, the National Wildlife Refuge System, and why we do the work we do to benefit wildlife and the American public. On Nantucket, our role in the partnership on the Coskata-Coatue Peninsula and the local, regional, and national value of the refuge and how our management enhances the value of the refuge for wildlife, will be better understood with

enhanced interpretation. Helping visitors understand the habitat on the peninsula and in the water, the geological dynamics of the refuge, the importance of protecting and managing lands for endangered and protected species will increase compliance with refuge, State, and Federal regulations. Additionally, interpretative programs can provide visitors with an understanding and appreciation of fish and wildlife ecology and help people understand their own role in the environment.

New Service policy in 605 FW 7 defines interpretive programs as management tools to accomplish the following:

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

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

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

The addition of visitor services staff onsite would allow us to meet Service mandates and comply with public use policies. In addition, it will enable us to provide additional interpretive programs on the refuge to complement and enhance partner programs. Visitor services staff will expanding our interpretive capabilities by designing brochures and rack cards, updating the web site and Facebook page as needed and when possible work with partners to offer quality programs.

Highlighting the partnership on the Coskata-Coatue Peninsula, and increasing our role in that partnership, is important, and to accomplish this we will install a kiosk at the gatehouse, and interpretive panels at the gatehouse and lighthouse. All structural additions to the refuge will be consistent with the intent and purpose of the National Natural Landmark program to maintain aesthetics on the peninsula.

We will work with our partners, including TTOR and NCF to promote conservation and natural resources stewardship on Nantucket. To accomplish this, we will explore additional signage, brochures, and other avenues to promote our conservation partnerships and conservation programs both on- and offsite. We will also work with MMA and other partners to provide offsite interpretive displays for the refuge.

Some examples of important interpretive messages that we will expand upon, if resources are available, are:

- The roles that fishing and coastal beach protection have traditionally played in wildlife conservation over the past centuries.
- The importance of managing for native species and habitats as the best way to benefit fish and wildlife that depend upon healthy, functioning coastal ecosystems.
- Management actions in the context of local and regional conservation issues.

The Service strives to provide opportunities for compatible outdoor recreational opportunities. We hope to contribute to communities around the refuge, both in terms of health and well-being, and economically. We partner with other agencies and organizations to promote connecting adults and children with nature, thereby reducing "nature-deficit disorder." A growing body of research suggests that a lack of direct involvement with the outside world may be contributing to a variety of maladies affecting children in today's society (Louv 2005). By offering places and programs where children and their parents can observe wildlife in natural settings, and learn to appreciate wildlife and fishing, we will contribute to the growing national initiative to reconnect children with nature.

Strategies

Continue to:

- Educate and explain the value of pedestrian and vehicle closures for endangered wildlife and seals.
- Specifically highlight the requirement under the Marine Mammal Protection Act that a 150 foot buffer be maintained for seals so that they are left undisturbed, even when seals are located outside the established, marked closure.
- Encourage partners, especially TTOR, to conduct van tours that deliver the message about wildlife conservation and the value of the refuge and the other conservation lands on the Coskata-Coatue Peninsula and Nantucket, particularly from a regional and national perspective.
- Coordinate with partners for additional interpretation and outreach opportunities as staffing and funding allow.
- Update and improve the refuge Web site and Facebook page.
- Establish and maintain Service-compliant regulatory signs.
- Explore opportunities for offsite interpretive displays and information, including the Maria Mitchell Association, and other locations downtown.

Within 1-3 years:

- Create a general refuge brochure and rack card. Develop primitive access trail through from the lighthouse to the east beach.

- Provide interpretive materials to partners.
- Coordinate with TTOR to install/use webcam at lighthouse to highlight/monitor wildlife and visitor activity.
- Collaborate with local nonprofit organizations to develop an interpretive guide that highlights not only the refuge but our colloboration with TTOR and NCF on the Coskata-Coatue peninsula.
- Develop community partnerships with elected officials, and Tribal, regional, and local governments and agencies to increase support for the refuge, and to strengthen our outreach capabilities.
- Work with partners to develop and install interpretive panels at the lighthouse.
- Develop a wildlife list for all animal and plant taxa.
- Conduct seasonal interpretive walks on the refuge.

Within 5 years:
- Develop quality seasonal interpretative programming in collaboration with partners.
- Install interpretive panels and/or brochures on Steamship Authority ferries and/or at harbor visitor centers.
- Establish an annual tour of the refuge with elected officials.
- Work with partners to install a kiosk at the gatehouse, with interpretive panels (which includes information on partnerships, roles, rules, boundaries, and refuge system/refuge panels).
- Explore the acquisition of an Americans with Disabilities Act (ADA)-compliant Service van on Nantucket Island available to Service staff when on the island, and for partners to use for tours, etc. (magnetic decals).
- Assist conservation partners with interpretation on their properties, particularly when that interpretation helps inform and educate the public about coastal resources and resources that are also specifically found on Nantucket NWR.

Monitoring Elements
- Number of visitors reached by programs on and off site.
- Number of programs and materials produced.
- Number of tours provided.

Objective 2.4. Wildlife Observation and Photography

Over the next 15 years, provide quality, compatible experiences for the public to enjoy and capture the refuge's wildlife and habitat diversity. Within 5 years, we will develop additional opportunities for observation and photography of the wildlife and habitats on the refuge.

Rationale
The Improvement Act identifies wildlife observation and photography as priority wildlife-dependent recreation. These activities promote the understanding and

appreciation of natural resources and their management on all lands and waters in the refuge system. We have been providing daily wildlife observation and photography opportunities on the refuge since its acquisition in 1973. Providing a disturbance free area for wildlife might stabilize or increase populations, providing more opportunities for visitors to see or photograph these species, including Federally listed species.

According to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, wildlife observation and photography was an activity enjoyed by nearly one-third of the U.S. population in 2006. Of all the wildlife in the United States, birds attracted the biggest following. Approximately 19.9 million people took trips away from home to observe wild birds. Anotherr 3.4 million people observed or photographed marine mammals, such as seals, on away-from-home trips. Wildlife watching expenditures nationwide in 2006 were $45,654,960. (U.S. Department of Interior, Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census Bureau, 2006). Wildlife observation and photography are big business, and improving opportunities on the refuge for these activities may have a positive economic business on Nantucket Island and Cape Cod.

Strategies

Continue to:

- Provide daily, sunrise to sunset, access to the refuge as coordinated with and implemented by TTOR when possible.

- Coordinate with TTOR and other partners and volunteers to implement and maintain wildlife observation and photography opportunities, including TTOR van tours.

Within 1-3 years:

- Develop a primitive trail through refuge lands that keeps foot traffic on an established path.



Amanda Boyd/USFWS

Hauled-out seals at Nantucket National Wildlife Refuge

- Work with partners to open the lighthouse at certain hours for photographic opportunities.
- Install a web cam on the Great Point Lighthouse.
- Create a habitat/species checklist brochure.
- Identify and publicize the best locations and seasonal subjects for observation and photography (through brochures, at the kiosk, Web site etc.).

Within 5 years:
- Work with partners to conduct an annual photography contest on Nantucket including a Youth Photo Contest.

Monitoring Elements
- Number of visitors reached by programs on- and off-site.
- Number of programs and materials produced.

Objective 2.5. Fishing

Over the next 15 years, continue to provide quality, compatible experiences for those who come to the refuge for its unique fishing opportunities. In the next 5 years, develop additional programs with the community and partners to provide quality fishing on the Coskata-Coatue Peninsula.

Rationale
The Improvement Act identifies fishing as a priority wildlife-dependent recreation. It states, "Compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System." We recognize fishing as a healthy, traditional outdoor past time. It, too, promotes public understanding and appreciation of natural resources and their management on all lands and waters in the refuge system.

We have provided for recreational fishing access along the beach at the refuge since it was established in 1973. We recognize its importance as a sport fishing destination and we will continue to provide recreational fishing opportunities in coordination with TTOR, as they manage and monitor the area. We will require anglers to comply with State and Federal regulations, which includes obtaining a saltwater fishing license. State law enforcement is located on Nantucket Island and enforces the State and Federal fishing regulations to the extent possible. In addition, a refuge complex law enforcement officer will be available to monitor and enforce refuge guidelines and policies.

TTOR has a strong presence on the Coskata-Coatue Peninsula, and we will continue to work with them to communicate fishing regulations to anglers, and also to provide fishing tours and instruction to the general public. The Service will play a more active role and manage fishing more closely to assure that it is compatible with the other refuge goals and mandates, particularly the protection of overall biodiversity and threatened and endangered species management.

We will endeavor to promote fishing on the refuge by participating in local fishing tournaments, contracting with vendors to provide guided fishing tours for the general public, and by providing distributional materials describing local sport fish of interest and applicable fishing regulations. We will explore partnerships with the Nantucket Anglers Club, and other groups to ensure quality fishing opportunities and experiences on the refuge.

According to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, saltwater fishing was an activity enjoyed by 7.7 million people. Expenditures nationwide in 2006 for saltwater fishing were $8.9 billion.

(U.S. Department of Interior, Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census Bureau, 2006). Providing opportunities on the refuge saltwater fishing will have a positive economic impact on Nantucket Island and Cape Cod.

Strategies
Continue to:
- Provide fishing access in appropriate zones and date closures required by State and Federal law for habitat and species protection (see objective 1.1).

Within 1-3 years:
- Require commercial fishing tours/guides on refuge to operate only under special use permits.
- Post and distribute seasonal harvest and other current fishing information and regulations on the refuge kiosk and Web site.
- Work with partners to become involved with annual tournaments and provide increased Service presence.
- Conduct "Take me Fishing" event for the general public which is focused on children in collaboration with the State and other partners.

Monitoring Elements
- Number of fishermen and/or OSVs.
- Frequency of quality fishing experiences on the refuge.
- Number of programs and/or activities and materials produced for fishing.

GOAL 3. **Perpetuate and enhance long-term conservation and management of wildlife resources on and around Nantucket Island through partnerships and land protection with public and private landowners, Federal, State, and local entities.**

Objective 3.1. Protecting Land

Working with other Federal, State, and local partners, protect important wildlife habitat within Nantucket County by initiating protection of key habitats identified in a larger landscape approach within 3 to 5 years.

Rationale
Nantucket NWR was established for its benefit as a wildlife sanctuary for migratory birds. Migratory birds utilize the refuges in the refuge complex and other adjacent refuges as stepping stones along the Atlantic Flyway. Monomoy, Nomans Land Island, Nantucket, Block Island, and Stewart B. McKinney NWRs work in concert to provide important stopover habitat for shorebirds, wading birds, neotropical migrants, and other birds. As coastal areas change due to erosion, storms, climate change, and sea level rise preserving these and other important wildlife habitat areas become critical for their lifecycles. The ability of the Nantucket NWR to meet its purpose is currently limited by its small area and popularity as a fishing destination. In order to maintain these important wildlife habitat areas for the long-term, we propose to protect and enhance additional habitat outside of the approved NWR boundary that support Federal trust wildlife resources and State-listed or regionally significant wildlife and plant communities on the island of Nantucket. By working with partners, additional land protection on Nantucket allows the Service to fulfill its mission in conserving and protecting outstanding wildlife and habitat to benefit the refuge system and the American people.

Strategies

Continue to:

- Coordinate with the town of Nantucket and other partners to protect the 195-acre Head of the Plains (former FAA property) as a no-cost transfer from the GSA.

- Work with the Coast Guard for the Service for right of first refusal for any Coast Guard properties, including acquiring the former Loran Station in Siasconset, Massachusetts (which includes potential housing and facility options).

Within 1 year:

- Send official letter from the Service to the Coast Guard documenting Service interest in acquiring the Great Point Lighthouse as a no-cost transfer from the Coast Guard.

- Send official letter from the Service to the Coast Guard documenting Service interest in acquiring the Nantucket Loran Station as a no-cost transfer from the Coast Guard.

Within 3 years:

- Work with partners (TTOR and NCF) and the National Park Service to pursue designation of National Natural Landmark Status for the Coskata-Coatue Peninsula.

- Work with partners to enhance the protection of adjacent conservation lands currently owned by the NCF and The Trustees of the Reservations through conservation easements and management agreements.

- Work with the town of Nantucket, the Nantucket Land Bank, the Nantucket Land Council, and private landowners to protect the 175-acre Muskeget Island and to cooperatively manage the wildlife resources on the island.

Within 5 years:

- Work with the town to acquire portions of the town owned property at Lower Beach Road through possible land exchange with the town of Nantucket.

Within 10 years:

- Work with the owners of the current Lohmann and Jellamie properties for long-term protection of these properties through fee title, land exchange, or conservation easement or develop a management agreement.

- Work with partners to explore options along bus/bike route to acquire property for a joint visitor contact station on or off the refuge.

Monitoring Elements

- Number of acres protected through easement or acquisition.

- Number of new sites protected.

- Number of new Management Agreements for lands owned by partners.

Chapter 5



Karen Terwilliger/TCI

Site visit with TTOR

Consultation and Coordination with Others

- Introduction
- Planning to Protect Land and Resources
- Partners Involved in Refuge Planning
- Contact Information
- Planning Team
- Other Service Program Involvement
- Assistance from Others
- List of Preparers

Introduction

This chapter describes how we engaged others in developing this CCP. In chronological order, it details our efforts to encourage the involvement of the public and conservation partners, including other Federal and State agencies, county officials, civic groups, non-government conservation, and education organizations, and user groups. It also identifies who contributed in writing the plan or significantly contributed to its contents.

It does not detail the dozens of informal discussions refuge staff have had over the last 10 years where the CCP was a topic of conversation. Those involved a wide range of audiences, including congressional representatives or their staffs, local community leaders and other residents, refuge neighbors, refuge visitors, and other interested individuals. During those discussions, the refuge manager and staff often would provide an update on our progress and encourage comments and other participation.

According to Service policy, we must review and update our final CCP at least once every 15 years, or sooner in response to important new information that would markedly change management direction, or our Director or Regional Director deem it necessary. If so, we will once again announce our revised planning and encourage your participation.

Planning to Protect Land and Resources

Our refuge planning began in 1999 when we initiated a CCP that would encompass all of the refuges in the Eastern Massachusetts NWR Complex. We published a Notice of Intent in the *Federal Register*, and began public scoping. By 2001, we determined that writing a plan for eight refuges was too cumbersome, and to focus on CCPs for the three northernmost refuges in the complex. The efforts for Nantucket NWR were halted at that time.

In 2008, we resumed our refuge planning for Nantucket NWR. A Notice of Intent was published in the *Federal Register* on April 7, 2008 and the planning process began informally in August 2008 at an initial strategy meeting between the refuge staff and regional office staff. One major outcome of that first meeting was a timetable for accomplishing the major steps in the planning process and determining when and how we should involve others.

August 13, 2008: Letters were sent out to invite representatives from the Wampanoag Tribe of Gay Head (Aquinnah), Mashpee Wampanoag Tribe, and Massachusetts Department of Fish and Game to participate on the planning team. Invitations to participate in the planning team are also extended to Service staff from the Division of Migratory Birds and Ecological Services.

September 2, 2008: The core planning team, consisting of refuge and regional staff from Ecological Services and a representative from MA DFG, met at the complex headquarters in Sudbury, MA. We drafted a vision statement, goals, and objectives, identified preliminary issues, determined what additional resource information we needed to collect and summarize, and discussed what other experts we should consult to help us address planning issues. We also scheduled our partner and public scoping meetings.

September 2008: We distributed a 1-page newsletter to approximately 40 people, organizations, and agencies to formally announce the beginning of the planning process and the upcoming public meeting in October, and sent out press releases to the Nantucket Independent and the Nantucket Inquirer and Mirror to announce the public meeting. Invitation letters were sent out to 17 people representing 15 local, State, and national agencies and organizations of potential interest to the upcoming partner meeting in October.

October 15, 2008: We hosted both the partner and public meetings at the Nantucket Town Annex Building, having published notices about the public meeting in two local newspapers, the newsletter, and via TTOR Web site. Nineteen people representing 9 organizations were in attendance at the partner meeting, and 28 people signed in at the public meeting.

At each meeting the draft vision, goals, and objectives were posted around the room, as well as the preliminary issues identified by the core planning team. A summary of the planning process was presented, and attendees were encouraged to provide feedback on any of the presented items, or general concerns or issues they had about the refuge. Comment forms were provided, and staff recorded comments on flip charts. Members of the public were notified that there was a 1-month comment period, that closed on November 17, 2008.

December 9, 2008: The core planning team met again at the refuge complex headquarters in Sudbury, MA, to identify key issues and develop the strategies and alternatives for the document.

January 2009 to June 2010: We wrote the first five chapters, acronyms/glossary, bibliography, and eight appendices of the CCP and prepared them for internal review.

January 2011: The draft CCP/EA was approved by the regional solicitor.

August 2, 2011: The Notice of Availability (NOA) published in the *Federal Register*.

August 2–October 1, 2011: Public review period for the draft CCP/EA.

Partners Involved in Refuge Planning

Many refuge programs enjoy a great deal of support and receive assistance from outside the Service, including conducting biological surveys, enhancing public use and refuge programs, restoring habitat, and protecting land. Our partnerships will continue to expand with the increasing interest in conserving refuge resources. During the past few years, we contacted the following organizations to apprise them of the planning process and encourage their involvement.

- Wampanoag Tribe of Gay Head (Aquinnah): Bettina Washington, Jonathon Perry, Elizabeth Perry, Mark Andrews
- Mashpee Wampanoag Tribe: Chuckie Green, Quan Tobey
- U.S. Coast Guard
- Massachusetts Department of Fish and Game, Division of Fisheries and Wildlife (MassWildlife): Jason Zimmer, Steve Hurley

- The Trustees of Reservations: Chris Kennedy, Steve Nicolle, Diane Lang, Scott White, Franz Inglefinger
- Nantucket Conservation Foundation: Jim Lentowski
- Town of Nantucket: Dirk Roggeveen
- Maria Mitchell Association: Janet Schulte, Bob Kennedy
- Nantucket Anglers Club: Quint Waters, Doug Seholm, Jr., Josh Eldridge
- Massachusetts Audubon Society: Ernie Steinauer, Becky Harris, Ellen Jedrey
- Nantucket Civic League: Pamela Lohmann
- Nantucket Land Council, Inc.: Emily McKinnon
- Nantucket Hunting Association
- Massachusetts Historical Commission
- National Marine Fisheries Service
- Nantucket Land Bank
- Egan Maritime Foundation

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	D.J. Monette	*Native American Liaison,* USFWS Refuge System
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	Chuckie Green	*Mashpee Wampanoag Tribe*
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The refuge and Nantucket Sound

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Acronyms and Glossary

Acronyms

Acronym	Full Name
ACJV	Atlantic Coast Joint Venture
AHWP	Annual Habitat Work Plan
ARPA	Archaeological Resources Protection Act
BBS	Breeding Bird Survey
BCR	Bird Conservation Region
BMP	best management practice
BP	before present
CCP	Comprehensive Conservation Plan
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	Finding of No Significant Impact
HMP	Habitat Management Plan
IMP	Inventory and Monitoring Plan
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
LCC	Landscape Conservation Cooperative
LGM	last glacial maximum
LIDAR	Light Detection and Ranging
MA	Massachusetts
MA CWCS	Massachusetts Comprehensive Wildlife Conservation Strategy
MA DEP	Massachusetts Department of Environmental Protection
MA DFG	Massachusetts Department of Fish and Game
MA DFW	Massachusetts Division of Fisheries and Wildlife
MA SHPO	Massachusetts State Historical Preservation Office

Acronym	Full Name
MANEM	Mid-Atlantic / New England / Maritimes
MassWildlife	Massachusetts Division of Fisheries and Wildlife
MHC	Massachusetts Historical Commission
MMA	Maria Mitchell Association
MOU	Memorandum of Understanding
NAAQS	National Ambient Air Quality Standards
NABCI	North American Bird Conservation Initiative
NAC	North Atlantic Coast
NAWCP	North American Waterbird Conservation Plan
NAWMP	North American Waterfowl Management Plan
NCF	Nantucket Conservation Foundation
NECIA	Northeast Climate Impacts Assessment
NED	National Elevation Data
NEPA	National Environmental Policy Act
NHRC	National State Agency Herpetological Conservation Report
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NWPS	National Wilderness Preservation System
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
PARC	Partners in Amphibian and Reptile Conservation
PIF	Partners in Flight
PL	Public Law
QA/QC	quality assurance / quality control
RONS	Refuge Operating Needs
SAV	submerged aquatic vegetation
SEANET	Seabird Ecological Assessment Network
SHC	Strategic Habitat Conservation
SGCN	species of greatest conservation need
SLAMM	Sea Level Affecting Marshes Model

Acronym	Full Name
SWG	State Wildlife Grant Program
THPO	Tribal Historic Preservation Officer
TMDL	total maximum daily load
TNC	The Nature Conservancy
TTOR	The Trustees of Reservations
TWS	The Wildlife Society
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WIA	Wilderness Inventory Area
WSA	Wilderness Study Area

Glossary

accessibility — the state or quality of being easily approached or entered, particularly as it relates to complying with the Americans With Disabilities Act

adaptive resource management — A process in which projects are implemented within a framework of scientifically driven experiments to test predictions and assumptions outlined within the comprehensive conservation plan. The analysis of the outcome of project implementation helps managers determine whether current management should continue as is, or whether they should modify it to achieve the desired conditions.

agricultural land — nonforested land that is now or recently in orchards, pastures, crops, or other farm products

alternative — a reasonable way to fix an identified problem or satisfy a stated need (40 CFR 1500.2)

anadromous fish — from the Greek, literally "up-running"; fish that spend a large portion of their life cycle in the ocean and return to freshwater to breed

appropriate use — a proposed or existing use on a refuge that meets at least one of the following three conditions:

1. The use is a wildlife-dependent one.
2. The use contributes to fulfilling the refuge purpose(s), the System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the National Wildlife Refuge System Improvement Act was signed into law.
3. the use has been determined to be appropriate as specified in section 1.11 of the act.

aquatic — growing in, living in, or dependent upon water

barrens — a colloquial name given to habitats with sparse vegetation or low agricultural productivity

basin — the land surrounding and draining into a water body

benthic — living at, in, or associated with structures on the bottom of a body of water

best management practices — land management practices that produce desired results; usually describing forestry or agricultural practices effective in reducing non-point source pollution, like reseeding skidder trails or not storing manure in a flood plain

biological diversity or biodiversity — the variety of life and its processes and includes the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur

biological integrity — biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities

bird conservation region — regions that encompass landscapes having similar bird communities, habitats, and resource issues; used as an administrative tool to aid in the conservation of birds and their habitats

bog — a poorly drained area rich in plant residues, usually surrounded by an area of open water, and having characteristic flora; a type of peatland

breeding habitat — habitat used by migratory birds or other animals during the breeding season

candidate species — species for which we have sufficient information on file about their biological vulnerability and threats to propose listing them as threatened or endangered

categorical exclusion — pursuant to the National Environmental Policy Act (NEPA), a category of Federal agency actions that do not individually or cumulatively have a significant effect on the human environment (40 CFR 1508.4); also known as CE, CX, CATEX, or CATX.

community — the locality in which a group of people resides and shares the same government

community type — a particular assemblage of plants and animals, named for its dominant characteristic

compatible use — "The term 'compatible use' means a wildlife-dependent, recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge."—National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57; 111 Stat. 1253)

compatibility determination — a required determination for wildlife-dependent, recreational uses or any other public uses of a refuge

Comprehensive Conservation Plan — (CCP) mandated by the Improvement Act, a document that provides a description of the desired future conditions and long-range guidance for the project leader to accomplish purposes of the refuge system and the refuge. CCPs establish management direction to achieve refuge purposes. (P.L. 105-57; FWS Manual 602 FW 1.4)

conifer — a tree or shrub in the phylum Gymnospermae whose seeds are borne in woody cones. There are 500–600 species of living conifers

conservation — managing natural resources to prevent loss or degradation; includes preservation, restoration, and enhancement

critical habitat — according to U.S. Federal law, the ecosystems upon which endangered and threatened species depend

database — a collection of data arranged for ease and speed of analysis and retrieval, usually computerized

degradation — the loss of native species and processes due to human activities such that only certain components of the original biodiversity persist, often including significantly altered natural communities

disturbance any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment

division an administrative unit of the refuge defined by a geographic feature, usually a river or other body of water see biological integrity

early successional species, assemblages, structures, and processes associated with pioneering natural communities that have recently experienced significant disturbance

ecological integrity see biological integrity

ecological processes a complex mix of interactions among animals, plants, and their environment that ensures maintenance of an ecosystem's full range of biodiversity. Examples include population and predator-prey dynamics, pollination, and seed dispersal, nutrient cycling, migration, and dispersal

ecoregion a territory defined by a combination of biological, social, and geographic criteria, rather than geopolitical considerations; generally, a system of related, interconnected ecosystems

ecosystem a natural community of organisms interacting with its physical environment, regarded as a unit

emergent wetland wetlands dominated by erect, rooted, herbaceous plants

endangered species a federally listed or State-listed protected species in danger of extinction throughout all or a significant portion of its range

endemic a species or race native to a particular place and found only there

Environmental Assessment (EA) a public document that discusses the purpose and need for an action, its alternatives, and provides sufficient evidence and analysis of its impacts to determine whether to prepare an environmental impact statement or a finding of no significant impact (40 CFR 1508.9)

environmental education curriculum-based education aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to help solve those problems, and motivated to work toward solving them

environmental health the composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment

Environmental Impact Statement (EIS) a detailed, written analysis of the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11)

estuaries deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from land

extinction	the termination of any lineage of organisms, from subspecies to species and higher taxonomic categories from genera to phyla. Extinction can be local, in which one or more populations of a species or other unit vanish but others survive elsewhere, or total (global), in which all the populations vanish
exotic species	a species that is not native to an area and has been introduced intentionally or unintentionally by humans; not all exotics become successfully established
extirpated	status of a species or population that has completely vanished from a given area but that continues to exist in some other location
Federal land	public land owned by the Federal Government, including national forests, national parks, and national wildlife refuges
federally listed species	a species listed either as endangered, threatened, or a species at risk (formerly, a "candidate species") under the Endangered Species Act of 1973, as amended
Federal-recognized Native American Tribe	A group of Native American Indians recognized by the United States as an Indian Tribe. This recognition establishes a Tribe as an entity with the capacity to engage in government-to-government relations with the United States, or individual states, and also as one eligible to receive Federal services. Federal recognition is established as a result of historical and continued existence of a Tribal government; by Executive Order or Legislation; and through the Federal recognition process established by Congress.
Finding of No Significant Impact	(FONSI) supported by an environmental assessment, a document that briefly presents why a Federal action will have no significant effect on the human environment, and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13)
fire regime	the characteristic frequency, intensity, and spatial distribution of natural fires within a given ecoregion or habitat
floodplain	flat or nearly flat land that may be submerged by floodwaters; a plain built up or in the process of being built up by stream deposition
forbs	flowering plants (excluding grasses, sedges, and rushes) that do not have a woody stem and die back to the ground at the end of the growing season
forest	land dominated by trees
fragmentation	the disruption of extensive habitats into isolated and small patches. Fragmentation has two negative components for biota: the loss of total habitat area; and, the creation of smaller, more isolated patches of habitat remaining.
glacial till	unsorted sediments directly deposited by a glacier, typically containing a mixture of clay, sand, gravel, and boulders
grassland	a habitat type with landscapes dominated by grasses
groundwater	water in the ground that is in the zone of saturation, from which wells and springs and groundwater runoff are supplied

habitat fragmentation the breaking up of a specific habitat into smaller, unconnected areas. A habitat area that is too small may not provide enough space to maintain a breeding population of the species in question.

habitat conservation protecting an animal or plant habitat to ensure that the use of that habitat by the animal or plant is not altered or reduced

habitat the place where a particular type of plant or animal lives. An organism's habitat must provide all of the basic requirements for life, and should be free of harmful contaminants.

herpetofauna/herpetological reptiles and amphibians; relating to reptiles and/or amphibians

historic conditions the composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human-related changes to the landscape

hydrology the science of waters of the earth: their occurrences, distributions, and circulations; their physical and chemical properties; and their reactions with the environment, including living beings

impoundment a body of water, such as a pond, confined by a dam, dike, floodgate, or other barrier, that is used to collect and store water for future use

indigenous native to an area

indigenous species a species that, other than as a result of an introduction, historically occurred or currently occurs in a particular ecosystem

integrated pest management (IPM) sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks.

interpretive facilities structures that provide information about an event, place, or thing by a variety of means, including printed, audiovisual, or multimedia materials (e.g., kiosks that offer printed materials and audiovisuals, signs, and trail heads.)

interpretive materials any tool used to provide or clarify information, explain events or things, or increase awareness and understanding of the events or things (e.g., printed materials like brochures, maps or curriculum materials; audio/visual materials like video and audio tapes, films, or slides; and, interactive multimedia materials, CD-ROM or other computer technology.)

intertidal the area of land along a shoreline that is exposed to air during low tide but covered by water during high tide

invasive species an alien species whose introduction causes or is likely to cause economic or environmental harm or harm to human health

invertebrate any animal lacking a backbone or bony segment that encloses the central nerve cord

issue any unsettled matter that requires a management decision (e.g., a Service initiative, an opportunity, a management problem, a threat to the resources of the unit, a conflict in uses, a public concern, or the presence of an undesirable resource condition). A CCP should document, describe, and analyze issues even if they cannot be resolved during the planning process (FWS Manual 602 FW 1.4).

kettle hole a generally circular hollow or depression in an outwash plain or moraine, believed to have formed where a large block of subsurface ice has melted

LD-50 The amount of chemical required to provide a lethal dose to 50 percent of the test population

landform the physical shape of the land reflecting geologic structure and processes of geomorphology that have sculpted the structure

landscape an aggregate of landforms, together with its biological communities

local agencies generally, municipal governments, regional planning commissions, or conservation groups

management alternative a set of objectives and the strategies needed to accomplish each objective (FWS Manual 602 FW 1.4)

management plan a plan that guides future land management practices on a tract

management strategy a general approach to meeting unit objectives. A strategy may be broad, or it may be detailed enough to guide implementation through specific actions, tasks, and projects (FWS Manual 602 FW 1.4).

maritime relating to the ocean

Memorandum of Understanding (MOU) a document that describes an agreement between partners where a set of expectations, actions or commitments are agreed upon

migratory birds species that generally migrate south each fall from breeding grounds to their wintering grounds and vice versa in the spring

mission statement a succinct statement of the purpose for which the unit was established; its reason for being

mitigation actions to compensate for the negative effects of a particular project (e.g., wetland mitigation usually restores or enhances a previously damaged wetland or creates a new wetland.)

monitoring the process of collecting information to track changes of selected parameters over time

moraine a mass or ridge of earth scraped up by ice and deposited at the edge or end of a glacier

National Environmental Policy Act of 1969 (NEPA) requires all Federal agencies to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in planning and implementing environmental actions (Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (40 CFR 1500).)

National Wildlife Refuge Complex (refuge complex) an internal Service administrative linking of refuge units closely related by their purposes, goals, ecosystem, or geopolitical boundaries

National Wildlife Refuge System (refuge system) all lands and waters and interests therein administered by the Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish and wildlife, including those that are threatened with extinction

native a species that, other than as a result of an introduction, historically occurred or currently occurs in a particular ecosystem

native plant a plant that has grown in the region since the last glaciation, and occurred before European settlement

natural disturbance event any natural event that significantly alters the structure, composition, or dynamics of a natural community: e.g., floods, fires, and storms

non-native species see exotic species

Notice of Intent (NOI) an announcement we publish in the Federal Register that we will prepare and review an environmental impact statement (40 CFR 1508.22)

objective A concise, quantitative (where possible) target statement of what a plan will achieve. The planners derive objectives from goals and they provide the basis for determining management strategies. Objectives should be attainable and time-specific.

outwash plain the plain formed by deposits from a stream or river originating from the melting of glacial ice that are distributed over a considerable area; generally coarser, heavier material is deposited nearer the ice and finer material carried further away

palustrine wetlands includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts less than 0.5 ppt (parts per thousand)

partnership a contract or agreement among two or more individuals, groups of individuals, organizations, or agencies, in which each agrees to furnish a part of the capital or some service in kind (e.g., labor) for a mutually beneficial enterprise

payment in lieu of taxes see Revenue Sharing Act of 1935, Chapter One, Legal Context

plant community a distinct assemblage of plants that develops on sites characterized by particular climates and soils

preferred alternative — The alternative determined by the decision-maker that best achieves the refuge's purpose, vision, and goals; contributes to the Refuge System mission; addresses the significant issues; and is consistent with principles of sound fish and wildlife management.

prescribed fire or burns — the application of fire to wildland fuels, either by natural or intentional ignition, to achieve identified land use objectives (FWS Manual 621 FW 1.7)

protection — mechanisms that ensure land use and land management practices will remain compatible with maintaining species populations at a site

public — individuals, organizations, and non-government groups; officials of Federal, State, and local government agencies; Native American Tribes, and foreign nations

public involvement — offering an opportunity to interested individuals and organizations whom our actions or policies may affect to become informed; soliciting their opinions. We thoroughly study public input, and give it thoughtful consideration in shaping decisions about managing refuges.

public land — land owned by the local, State, or Federal Government

rare species — species identified for special management emphasis because of their uncommon occurrence

Record of Decision — (ROD) a concise public record of a decision by a Federal agency pursuant to NEPA. A ROD includes:

- The decision.
- All the alternatives considered.
- The environmentally preferable alternative.
- A summary of monitoring and enforcement, where applicable, for any
- Mitigation.
- Whether all practical means have been adopted to avoid or minimize environmental harm from the alternative selected (or if not, why not).

refuge goals — "…descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose but do not define measurable units."—Writing Refuge Management Goals and Objectives: A Handbook

refuge lands — lands in which the Service holds full interest in fee title or partial interest like an easement

Refuge Operating Needs System — (RONS) a national database which contains the unfunded operational needs of each refuge. We include projects required to implement approved plans, and meet goals, objectives, and legal mandates.

refuge purposes — "The terms 'purposes of the refuge' and 'purposes of each refuge' mean the purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit."—National Wildlife Refuge System Improvement Act of 1997

relatively intact — the conservation status category indicating the least possible disruption of ecosystem processes. Natural communities are largely intact, with species and ecosystem processes occurring within their natural ranges of variation.

relatively stable — the conservation status category between vulnerable and relatively intact in which extensive areas of intact habitat remain, but local species declines and disruptions of ecological processes have occurred

riparian — referring to the interface between freshwater habitats and the terrestrial landscape

riparian habitat — habitat along the banks of a stream or river

runoff — water from rain, melted snow, or agricultural or landscape irrigation that flows over a land surface into a water body

scale — the magnitude of a region or process. Refers to both spatial size—for example, a (relatively small-scale) patch or a (relatively large-scale) landscape; and a temporal rate—for example, (relatively rapid) ecological succession or (relatively slow) evolutionary speciation

Service presence — Service programs and facilities that it directs or shares with other organizations; public awareness of the Service as a sole or cooperative provider of programs and facilities

shrublands — habitats dominated by various species of shrubs

socioeconomic — social and economic conditions and their interplay

species of concern — species not Federal-listed as threatened or endangered, but about which we or our partners are concerned

species richness — a simple measure of species diversity calculated as the total number of species in a habitat or community

staging area — habitat used during bird migration for rest, feeding, and congregating

stakeholder — individuals, groups, organizations or agencies representing a broad spectrum of interests offering business, tourism, conservation, recreation, and historical perspectives.

State agencies — natural resource agencies of State governments

State-listed species — see “Federal-listed species”

status assessment — a compilation of biological data and a description of past, present, and likely future threats to a species

step-down management plan — a plan for dealing with specific refuge management subjects, strategies, and schedules, e.g., cropland, wilderness, and fire (FWS Manual 602 FW 1.4)

strategy — a specific action, tool, technique, or combination of actions, tools, and techniques for meeting unit objectives

submerged aquatic vegetation — (SAV) plants that live under water, such as seagrasses like eelgrass

succession — the natural, sequential change of species composition of a community in a given area

surface water — all waters whose surface is naturally exposed to the atmosphere, or wells or other collectors directly influenced by surface water

terrestrial — living on land

threatened species — a federally listed, protected species that is likely to become an endangered species in all or a significant portion of its range

trust resource — a resource that the Government holds in trust for the people through law or administrative act. A Federal trust resource is one for which responsibility is given wholly or in part to the Federal Government by law or administrative act. Generally, Federal trust resources are nationally or internationally important no matter where they occur, like endangered species or migratory birds and fish that regularly move across state lines. They also include cultural resources protected by Federal historic preservation laws, and nationally important or threatened habitats, notably wetlands, navigable waters, and public lands like state parks and national wildlife refuges.

upland — dry ground (i.e., other than wetlands)

vision statement — a concise statement of what the unit could achieve in the next 10 to 15 years

watershed — the geographic area within which water drains into a particular river, stream, or body of water. A watershed includes both the land and the body of water into which the land drains.

wet meadows — meadows located in moist, low-lying areas, often dominated by large colonies of reeds or grasses. Saltmarsh meadows are subject to daily coastal tides.

wetlands — lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. These areas are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted to life in saturated soil conditions.

wilderness study areas lands and waters identified by inventory as meeting the definition of wilderness and being evaluated for a recommendation they be included in the Wilderness System. A wilderness study area must meet these criteria:

1. Generally appears to have been affected primarily by the forces of nature, with the imprint of human substantially unnoticeable.
2. Has outstanding opportunities for solitude or a primitive and unconfined type of recreation.
3. Has at least 5,000 contiguous, roadless acres, or sufficient size to make practicable its preservation and use in an unimpaired condition (FWS Manual 610 FW 1.5 (draft)).

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

wildlife-dependent, recreational use a use of a national wildlife refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation (National Wildlife Refuge System Administration Act of 1966).

wildlife management manipulating wildlife populations, either directly by regulating the numbers, ages, and sex ratios harvested, or indirectly by providing favorable habitat conditions and alleviating limiting factors.

Appendix A



Karen Terwilliger/TCI

Refuge shorebird nesting area

Species of Conservation Concern at Nantucket National Wildlife Refuge

Table A.1. Bird Species of Conservation Concern Known or Suspected on the Refuge.

Species	Federal Legal Status[1]	MA Legal Status[1]	MA CWCS[2]	MA Rarity Rank[3]	BCC 2008[4]	BCC National[5]	BCR 30[6]	PIF[7]	NAWCP[8]	NAWMP ACJV[9]	MANEM[10]	US SCP[11]	Status[12]	LCC Representative Species[13]
American oystercatcher			X	S2	X	X	Highest	IA				4	B	X
Black tern				S2N					Moderate		High		M	
Canada goose (Atlantic)							Highest			High			W	
Canada goose (North Atlantic)							High			Moderately high				
Common eider			X				High			High			W	X
Common tern		SC	X	S3			Moderate				Highest *		B, M	X
Dunlin						X	High						M	
Herring gull				S3S4B							High *		B	
Least sandpiper							Moderate						M	
Least tern		SC	X	S3	X	X	High		High		Highest *		B, M	
Northern harrier		T	X	S1									B	
Piping plover	T	T	X	S2			Highest	IA					B	X
Roseate tern	E	E	X	S2			Highest	IV	High		Highest *		HB, M	
Sanderling			X				Highest						M	
Semipalmated plover							Moderate						M	
Semipalmated sandpiper					X	X	High						M	X
Short-billed dowitcher			X	SNA	X	X	High						M	

[1] Federal and State Legal Status Codes (under Federal & State Endangered Species Acts)

E = Federal or State Endangered T= Federal or State Threatened SC= State species of Special Concern (Administrative category without legal standing) PT = Proposed Threatened PE= Proposed Endangered PN= Proposed None PTB= Proposed threatened (breeding only) PEB= Proposed Endangered (breeding only)

[2] Massachusetts Comprehensive Wildlife Conservation Strategy (CWCS): Species of greatest conservation concern (SGCN) (MA DFW 2006)

[3] Massachusetts Natural Heritage Inventory Rarity Ranks (MA DFW 2006, NatureServe 2009)

S1 = Critically imperiled

S2 = Imperiled

S3 = Either very rare or uncommon, vulnerable

S4 = Widespread, abundant, apparently secure

S5 = Secure

SH = Historical

SX = Presumed extirpated

B = Breeding

N = Non-breeding

Species included in table only if Srank less than S3

[4] Birds of Conservation Concern (BCC) 2008 (Bird Conservation Region 14 List) (USFWS 2008)

[5] Birds of Conservation Concern (BCC) National List (USFWS 2008)

[6] BCR 30: New England / Mid-Atlantic Coast Conservation Priority Category (Steinkamp 2006)

Highest Priority: High BCR Concern and High BCR Responsibility and (High or Moderate Continental Concern)

High Priority: High Continental Concern and Moderate BCR Responsibility OR Moderate BCR Concern and High BCR Responsibility

Moderate Priority: Moderate BCR Concern and Moderate BCR Responsibility OR High Continental Concern and Low BCR Responsibility OR High BCR Responsibility and Low BCR Concern

[7] Partner's in Flight (PIF) Bird Conservation Plan for Southern New England: Physiographic Area 09 (Dettmers and Rosenberg 2000)

IA = High continental concern & high regional responsibility

IB = High continental concern & low regional responsibility

IIA = High regional concern

IIB = High regional responsibility

III = Additional Federal-listed

IV = Additional State-listed

[8] North American Waterbird Conservation Plan (NAWCP) Categories of Conservation Concern (Kushlan et al. 2002)

Highly Imperiled: includes all species with significant population declines and either low populations or some other high risk factor.

High Concern: Species that are not Highly Imperiled. Populations of these species are known or thought to be declining, and have some other known or potential threat as well.

Moderate Concern: Species that are not Highly Imperiled or High Concern. Populations of these species are either a) declining with moderate threats or distributions; b) stable with known or potential threats and moderate to restricted distributions; or c) relatively small with relatively restricted distributions.

Species included in table only if greater than moderate

[9] North American Waterfowl Management Plan (NAWMP), Atlantic Coast Joint Venture (ACJV) (ACJV 2008)

Conservation Tier Priorities = Highest, High, Moderately High, Moderate, Moderately Low, Low

Species included in table only if priority moderate or higher

[10] Mid-Atlantic / New England / Maritimes (MANEM) Regional Waterbird Conservation Plan Priorities (MANEM 2006a, 2006b)

* = MANEM Focal Species for Southern New England

Highly Imperiled: includes all species with significant population declines and either low populations or some other high risk factor.

High Concern: Species that are not Highly Imperiled. Populations of these species are known or thought to be declining, and have some other known or potential threat as well.

Moderate Concern: Species that are not Highly Imperiled or High Concern. Populations of these species are either a) declining with moderate threats or distributions; b) stable with known or potential threats and moderate to restricted distributions; or c) relatively small with relatively restricted distributions.

Species included in table only if greater than moderate

[11] U.S. Shorebird Conservation Plan (US SCP) Codes (Brown et al. 2001, Clark and Niles 2000)

5 = Highly imperiled

4 = Species of high concern

3 = Species of moderate concern

2 = Species of low concern

1 = Species not at risk

Species included in table only if greater than 3

[12] Status

B = Breeds on refuge or adjacent peninsula

HB = Historically bred on refuge

UB = Suspected but unconfirmed breeding on refuge

M = Uses refuge or adjacent peninsula during migration

W = Uses refuge, adjacent peninsula or waters during winter

[13] Representative Species for the North Atlantic Landscape Conservation Cooperative, USFWS 2012

Table A.2. Mammal Species of Conservation Concern Known or Suspected on the Refuge.

Species	Federal Legal Status[1]	MA Legal Status[1]	MA CWCS[2]	MA Rarity Rank[3]	MMPA[4]
Gray seal					X
Harbor seal					X

[1] Federal and State Legal Status Codes (under Federal & State Endangered Species Acts)

E = Federal or State Endangered T= Federal or State Threatened SC= Federal or State species of Special Concern (Administrative category without legal standing) PT = Proposed Threatened PE= Proposed Endangered PN= Proposed None PTB= Proposed threatened (breeding only) PEB= Proposed Endangered (breeding only)

[2] Massachusetts Comprehensive Wildlife Conservation Strategy: Species of greatest conservation concern

[3] Massachusetts Natural Heritage Inventory Rarity Ranks

S1 = Critically imperiled

S2 = Imperiled

S3 = Either very rare or uncommon, vulnerable

S4 = Widespread, abundant, apparently secure

S5 = Secure

SH = Historical

B = Breeding

N = Non-breeding

Species included in table only if Srank less than S3

[4] Marine Mammal Protection Act Protection

X = Species protected under the Federal Marine Mammal Protection Act

D = Marine mammals designated as depleted under the MMPA

Table A.3. Fish Species of Conservation Concern Known or Suspected on the Refuge.

Species	Federal Legal Status[1]	MA Legal Status[1]	MA CWCS[2]	MA Rarity Rank[3]	AFS Status[4]	Fishery Protection[5]
Snowy grouper					V	
Thorny skate	SC				V	
Alewife			X	S3S4		MSFMCA
American eel			X	S3S4		MSFMCA, AFCA, ACFMA
American shad			X	S3S4		MSFMCA, AFCA, ACFMA
Atlantic salmon	E		X	S1	E	MSFMCA, AFCA
Blueback herring			X	S3S4		MSFMCA, AFCA
Bluefish						MSFMCA
Rainbow smelt	SC			S3		MSFMCA, AFCA
Shortnose sturgeon	E	E	X	S1	E, T, CD	MSFMCA, AFCA
Striped bass						MSFMCA, AFCA, ACFMA
White perch						AFCA
Winter flounder						MSFMCA

[1] Federal and State Legal Status Codes (under Federal & State Endangered Species Acts)
E = Federal or State Endangered T= Federal or State Threatened SC= Federal or State species of Special Concern (Administrative category without legal standing) PT = Proposed Threatened PE= Proposed Endangered PN= Proposed None
PTB= Proposed threatened (breeding only) PEB= Proposed Endangered (breeding only)

[2] Massachusetts Comprehensive Wildlife Conservation Strategy: Species of greatest conservation concern

[3] Massachusetts Natural Heritage Inventory Rarity Ranks
S1 = Critically imperiled
S2 = Imperiled
S3 = Either very rare or uncommon, vulnerable
S4 = Widespread, abundant, apparently secure
S5 = Secure
SH = Historical
B = Breeding
N = Non-breeding
Species included in table only if Srank less than S3

[4] American Fisheries Society (AFS) Marine, Estuarine and Diadromous Fish Stocks at Risk of Extinction (Musick et al. 2000)
E = Endangered
T = Threatened
V = Vulnerable
CD = Conservation Dependent
Species with more than one status listed reflect different rankings for distinct population segments

[5] Protection under Federal fishery management laws
MSFMCA = Species protected under the Federal Magnuson-Stevens Fishery Management Conservation Act
AFCA = Species protected under the Federal Anadromous Fish Conservation Act
ACFMA = Atlantic Coastal Fisheries Cooperative Management Act

Table A.4. Plant Species of Conservation Concern Known or Suspected on the Refuge.

Species	Federal Legal Status[1]	MA Legal Status[1]	MA Rarity Rank[2]
Seabeach knotweed		SC	S3

[1] Federal and State Legal Status Codes (under Federal & State Endangered Species Acts)

E = Federal or State Endangered T= Federal or State Threatened SC= State species of Special Concern (Administrative category without legal standing) PT = Proposed Threatened PE= Proposed Endangered PN= Proposed None
PTB= Proposed threatened (breeding only) PEB= Proposed Endangered (breeding only)

[2] Massachusetts Natural Heritage Inventory Rarity Ranks

S1 = Critically imperiled

S2 = Imperiled

S3 = Either very rare or uncommon, vulnerable

S4 = Widespread, abundant, apparently secure

S5 = Secure

SH = Historical

B = Breeding

N = Non-breeding

Species included in table only if rank less than S3

Table A.5. Plant Communities of Conservation Concern Known or Suspected on the Refuge.

Massachusetts Community Type	MA CWCS[1]	MA Natural Heritage Inventory State Rarity Rank[2]
Maritime Beach Strand	Coastal Dunes, Beaches and Small Islands	S3
Maritime Dune	Coastal Dunes, Beaches and Small Islands	S2

[1] Massachusetts Comprehensive Wildlife Conservation Strategy: Habitats of greatest conservation concern

[2] Massachusetts Natural Heritage Inventory Rarity Ranks

S1 = Critically imperiled

S2 = Imperiled

S3 = Either very rare or uncommon, vulnerable

S4 = Widespread, abundant, apparently secure

S5 = Secure

SH = Historical

Communities included in table only if Srank less than S3

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Appendix B



Karen Terwilliger/TCI

Refuge recreation

Findings of Appropriateness and Compatibility Determinations

- Environmental Education and Interpretation
- Wildlife Observation and Photography
- Recreational Fishing
- Research Conducted by Non-Service Personnel
- Commercial Guides, Tours, and Outfitting
- Outdoor Events and Ceremonies
- Non-Motorized Boat Landing and Launching
- Beachcombing
- Sunbathing and Swimming
- Organized Picnicking
- Beach Sports and Kite Flying
- Bicycling
- Camping
- Fires
- Fireworks
- Pets

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COMPATIBILITY DETERMINATION

USE:

Environmental Education and Interpretation

REFUGE NAME:

Nantucket National Wildlife Refuge

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

Nantucket NWR was established in 1973 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes [16 U.S.C. § 667b].

REFUGE PURPOSE(S):

Nantucket NWR's purpose is its ". . . particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b-d, as amended)

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

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.

DESCRIPTION OF USE:

(a) What is the use?
Environmental education includes activities which seek to increase public knowledge and understanding of wildlife and the importance of habitat protection and management. Typical activities include teacher or staff-guided onsite field trips, offsite programs in classrooms, and nature study, such as teacher and student workshops and curriculum-structured instruction. Interpretation includes activities and supporting infrastructure that explain management activities, fish, and wildlife resources, ecological processes, and cultural history among other topics to public users.

Access to Nantucket NWR for these activities can be achieved by boat, over-sand vehicle (OSV), or foot. The Trustees of Reservations (TTOR) currently conducts interpretation on Nantucket NWR through seasonal natural and cultural history guided tours. They also conduct interpretation through staff at a regulated gate house and roving rangers which engage in frequent public interactions both on- and offsite. Additional opportunities exist for expanded environmental education (perhaps through local school systems or environmental organizations) and interpretation (improved signage or kiosk installment on the refuge).

This use can be conducted onsite or offsite. When on site, the use is primarily facilitated by operation of over-sand vehicles, which consists of driving 4-wheel drive vehicles on designated areas of the refuge beach and inland sand roads. Over-sand vehicle use is currently the most common means of access for visitors to Nantucket NWR. However, visitors can (and some do) park on adjacent property owned by the Trustees

of Reservations (TTOR) and walk to the refuge. The distance can range from 5 miles (if one parks at the Wauwinet Gatehouse) to mere steps (if one parks close to the property boundary). It is approximately 300 meters from the south boundary to the north boundary of Nantucket NWR. Access to Nantucket NWR can also occur by boat, but boat landings are not common. Over-sand vehicles are also used by Service staff and TTOR when conducting biological surveys, roving interpretation, and natural and cultural history tours.

TTOR requires OSV permits and regulates passage through the Wauwinet Road Gatehouse which provides the only OSV access to Nantucket NWR, Coskata-Coatue Wildlife Refuge (owned by TTOR) and Coatue Wildlife Refuge (owned by Nantucket Conservation Foundation).

(b) Is the use a priority public use?
Environmental education and interpretation are both identified as priority public uses in the National Wildlife Refuge System Improvement Act of 1997.

(c) Where would the use be conducted?
Environmental education and interpretation could occur on any areas of Nantucket NWR that are open to public access. Public access is dictated by wildlife use and presence of sensitive vegetation. In general, much of the intertidal area and established vehicle trails through the dune system are open (at least to pedestrian traffic) for most of the year. Some areas of beach berm are closed seasonally to protect nesting shorebirds and seabirds. Public access is restricted from dune habitat to minimize trampling of American beach grass (*Ammophila breviligulata*), although the refuge staff may construct one trail from the lighthouse to the Atlantic Ocean beach that would provide access for interpretive activities, environmental education, and other wildlife-dependent recreation. Visitors should contact Eastern Massachusetts NWR Complex staff for up-to-date information on seasonal closures. Information about closures will also be available on the refuge Web site or through TTOR.

Over-sand vehicles use is generally permitted on the beach berm from the high tide line to the base of the foredunes, as well as on established, officially designated OSV roads that bisect dunes in natural sand valleys. Over-sand vehicle users are not allowed to drive on dune habitat (Zone 1) or in the wrack line, and are often prohibited from the very northern tip of the refuge to protect seals (Zone 3). Specific OSV traffic routes in other zones have varied annually and seasonally depending on wildlife use and public safety. For instance, Federal and State regulations require minimum buffer areas for various nesting species of shorebirds and seabirds. Depending on where birds nest and the shifting geomorphology of the dunes and intertidal habitat, it may be impossible to safely allow OSV access along a beach if the berm is narrow and the buffer required by nesting birds effectively extends below the high water line. Buffer distances may differ during the incubation period (when birds are tending to eggs and may require less area) and the chick rearing period (when some species are mobile foragers and may need a larger buffer of undisturbed habitat), resulting in changes in access within a season. Generally, Zone 4 will be closed to OSV access seasonally to protect nesting birds, and Zone 5 will be closed to OSV access seasonally to minimize disturbance to staging birds. However, locations of these closures may shift annually or within a season.

Additionally, sometimes nesting birds on Coskata-Coatue Wildlife Refuge (directly south of Nantucket NWR) will result in OSV closures and essentially limit OSV access to all northerly areas as well. Over-sand vehicle users will be informed at the Wauwinet Gatehouse of areas open to OSV travel, but because the location of nesting birds and changes in geomorphology cannot always be predicted, sudden changes in access may occur.

(d) When would the use be conducted?
Nantucket NWR is open to the public for environmental education and interpretation from ½ hour before sunrise to ½ hour after sunset. Environmental education and interpretation could occur on site any time of the year in any areas open to public access. Use for these activities is likely to be highest in late spring, summer, and early fall.

(e) How would the use be conducted?
Environmental education and interpretation must be conducted in accordance with refuge regulations (including seasonal closures). Onsite environmental education and other organized tours require a special use permit if not conducted by refuge staff. These activities would be conducted by visitors walking on the refuge, and/or driving to and on the refuge by personal OSV or an OSV operated by refuge partners or permittees. Walking would take place on open sections of the refuge beach, the sand road from the adjacent Coskata-

Coatue Wildlife Refuge owned by The Trustees of Reservations (TTOR), and on a new, to be established trail from the lighthouse to the beach.

Refuge visitors would primarily access the refuge by personal OSV, although some visitors engaged in interpretation and education will access the refuge by four-wheeled drive vans operated by refuge partners or permittees. A TTOR OSV permit is required for passage through the Wauwinet Gatehouse. While on Nantucket NWR, OSV use will generally be restricted to the area between the high tide line to the base of the foredunes, as well as established OSV roads that bisect dunes in natural sand valleys (for instance just south of the Great Point Lighthouse where the public restrooms are seasonally located). Over-sand vehicle users are not allowed to drive on dune habitat (Zone 1). Typically, OSVs may park anywhere the berm or crossroads are wide enough so as not to obstruct traffic. Additionally, OSV users are required to deflate tires to 12 pounds per square inch before passing through Wauwinet Gatehouse, and speed restrictions are well posted. Information on annual, seasonal, and daily closures (as well as a guide to safe OSV use) will be disseminated at the Wauwinet Gatehouse and closures will be well marked with informative signage. While on Nantucket NWR, all OSV users are expected to stay apprised of, and respect all closures and regulations. For instance, the current prohibition of dogs on Nantucket NWR also applies to dogs inside OSVs. Refuge staff will carefully monitor OSV use to ensure buffers and boundaries of zones for nesting and staging birds is sufficient to prevent disturbance. Closure areas may be increased if OSV access along the zone boundaries disrupts birds. If persistent violations or disturbance to natural resources occur, OSV access may be eliminated.

(f) Why is the use being proposed?
Environmental education and interpretation are both identified as priority public uses in the National Wildlife Refuge System Improvement Act of 1997. Although small, Nantucket NWR serves as a great example of dynamic barrier beach habitat that is constantly impacted by wind and tidal energy. Seals and a variety of bird species use Nantucket NWR and surrounding waters year round. Affording opportunities for public learning will increase visitor appreciation and foster a greater awareness of the importance of this site to the National Wildlife Refuge System.

AVAILABILITY OF RESOURCES:

Environmental education and interpretation occur through the use of existing staff and resources, and a successful partnership with TTOR. Nantucket NWR is small, but the quality of these opportunities will be a direct reflection of the refuge's staff and funding levels and continued collaboration with TTOR and new relationships with other conservation partners. Updated, friendly signage is necessary to clarify refuge boundaries, seasonal closures, and permitted activities. Additionally, self interpretation would be greatly enhanced by a pamphlet and educational placards or kiosks that address barrier beach ecology. The estimated costs of allowing these uses is still minimal considering the benefits, because there is little infrastructure required beyond that already in place. A regular on site presence by seasonal refuge staff and TTOR provides a consistent message and increases voluntary compliance, and administration of these uses is done collectively in conjunction with other uses.

Design and print a pamphlet 1 staff		80 hours + cost	$6,000
Purchase new signage and placards/kiosk			$15,000
Install and maintain new signage	2 staff	40 hours each	$3,200
Total Initial Cost of Program:			**$24,200**
Prepare, deliver, and coordinate EE/interp	1 staff	400 hours	$10,000
Occasional law enforcement presence	1 staff	40 hours	$2,000
Fuel and vehicle Costs			$1,000
Brochure reprints			$1,000
Total Annual Cost of Program:			**$14,850**

Over-sand vehicle permits are currently administered by TTOR. Refuge staff time and resources are needed to ensure delineation of bird nesting and staging areas and seal haul-out areas (and otherwise closed areas) are accomplished on time, and sufficiently maintained to provide maximum protection for biological resources. Similarly, refuge staff presence will allow monitoring of biological resources and more timely reinstated access,

when appropriate. The Service does not estimate additional costs associated with OSV or pedestrian use, as permitting infrastructure is already in place by TTOR, and TTOR staff provide regular presence at the Wauwinet Gatehouse and on Nantucket NWR.

ANTICIPATED IMPACTS OF THE USE:

Because this activity will be supervised by Service or partner staff, impacts of environmental education and interpretation will likely be minimal if conducted in accordance with refuge regulations. Possible impacts include disturbing wildlife, removing or trampling of plants, littering, vandalism, and entrance into closed areas. In the event of persistent disturbance to habitat or wildlife, the activity will be further restricted or discontinued. Schoolchildren or participants in natural history tours conducted by partners may cause some disturbance to refuge visitors, but the amount of disturbance is expected to be minimal as the total number of interpretative tours (conducted by non-profit and/or commercial tour guides) that will occur on the refuge will not exceed more than two a day, and will not occur on a daily basis.

Placement of kiosks and interpretive panels may impact small areas of vegetation. Kiosks will be placed where minimal disturbance will occur both from the structures and visitors viewing the information provided on the structures.

Providing additional interpretive and educational brochures and materials may result in increased knowledge of the refuge and its resources. This awareness and knowledge may improve the willingness of the public to support refuge programs, resources, and compliance with regulations.

There are impacts to refuge wildlife, vegetation, and soils from pedestrian and OSV access for visitors engaged in environmental education and/or interpretation. These are described below.

Potential Pedestrian Travel Impacts

Potential Direct Impacts

Pedestrian travel has the potential of impacting shorebird, waterfowl, and other migratory bird populations feeding and resting near the trails and on beaches during certain times of the year. Pedestrians can also impact seals resting on the beach if they get too close. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). Response of wildlife to human activities includes: departure from site (Owen 1973, Burger 1981, Kaiser and Fritzell 1984, Korschgen et al.1985, Henson and Grant 1991, Kahl 1991, Klein 1993), use of sub-optimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Korschgen et al. 1985, Morton et al. 1989, Ward and Stehn 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990).

Numerous studies have documented that migratory birds are disturbed by human activity on beaches. Erwin (1989) documented disturbance of common terns and skimmers and recommended that human activity be restricted a distance of 100 meters around nesting sites. Klein (1993) in studying waterbird response to human disturbance found that as intensity of disturbance increased, avoidance response by the birds increased and found that out of vehicle activity to be more disruptive than vehicular traffic. Pfister et al. (1992) found that the impact of disturbance was greater on species using the heavily disturbed front side of the beach, with the abundance of the impacted species being reduced by as much as 50 percent. Roberton et al. (1980) discovered, in studying the effects of recreational use of shorelines on nesting birds, that disturbance negatively impacted species composition. Piping plovers which use the refuge heavily are also impacted negatively by human activity. Pedestrians on beaches may crush eggs (Burger 1987, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Dogs may chase plovers (McConnaughey et al. 1990), destroy nests (Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980). Other studies have shown that if pedestrians cause incubating plovers to leave their nest, the eggs can overheat (Bergstrom 1991) or the eggs can cool to the point of embryo death (Welty 1982). Pedestrians have been found to displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993).

The Delaware Natural Heritage Program, Division of Fish & Wildlife and the Department of Natural Resources and Environmental Control prepared a document on the "The Effects of Recreation on Birds: A

literature Review" which was completed in April of 1999. The following information was referenced from this document:

Several studies have examined the effects of recreation on birds using shallow water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger 1981; Burger 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1995, 1997; Burger & Gochfeld 1998). Overall, the existing research clearly demonstrates that disturbance from recreation activities always have at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger 1981, 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1997; Burger & Gochfeld 1998). The findings that were reported in these studies are summarized as follows in terms of visitor activity and avian response to disturbance.

Presence: Birds avoided places where people were present and when visitor activity was high (Burger 1981; Klein et al. 1995; Burger & Gochfeld 1998).

Distance: Disturbance increased with decreased distance between visitors and birds (Burger 1986), though exact measurements were not reported.

Approach Angle: Visitors directly approaching birds on foot caused more disturbance than visitors driving by in vehicles, stopping vehicles near birds, and stopping vehicles and getting out without approaching birds (Klein 1993). Direct approaches may also cause greater disturbance than tangential approaches to birds (Burger & Gochfeld 1981; Burger et al. 1995; Knight & Cole 1995a; Rodgers & Smith 1995, 1997).

Noise: Noise caused by visitors resulted in increased levels of disturbance (Burger 1986; Klein 1993; Burger & Gochfeld 1998), though noise was not correlated with visitor group size (Burger & Gochfeld 1998).

The proposed use has the potential of intermittently interrupting the feeding habits of a variety of shorebirds, gulls, and terns, but encounters between pedestrians and migratory birds will be temporary. Refuge staff will manage visitor access via seasonal closures to minimize disturbance to nesting, resting, and foraging waterbirds on the refuge.

Pedestrian use also has the potential to disturb loafing seals. Gray and harbor seals haul-out on the refuge year round. A 150-foot buffer around all seals is required by the National Oceanic Atmospheric Administration to ensure compliance with the Marine Mammals Protection Act.

Pedestrian Indirect Impacts

Heavy beach use can dry out the sand and contribute to beach erosion. Trash left on the beach, particularly food or wrappers can attract predators that prey on nesting piping plovers and least terns or roosting shorebirds. Impacts of walking are likely to be minimal if conducted in accordance with refuge regulations. The new trail we propose to establish is on an existing unauthorized trail. The remaining unauthorized trails will be shut down, reducing the amount of disturbance from walkers through the dune habitat. We will manage refuge closures which restrict pedestrian access to minimize disturbance to priority avian species during critical times of the year. Closures can be expanded or contracted as needed depending on bird activity and results of further disturbance studies.

Potential OSV Impacts

Although a specific study on the effects of OSV use has not been conducted on Nantucket NWR, studies have been done on beaches with similar ecological characteristics. Studies show that OSVs affect the physical and biological processes that take place within the beach ecosystem. Specifically, OSV use on the beach may result in the following negative impacts.

Foredune Profile

Over the long term, OSV use can have a negative effect on foredune growth. Long term OSV use can lead to an abrupt rather than sloping dune base, leaving the dune more susceptible to wave energy and erosion (Anders and Leatherman 1987a). The tracks created by OSV use can also affect the geomorphology of the beach through sand displacement and compaction (Schlacher and Thompson 2008). The amount of sand displaced

increases as the number of vehicles (traffic flow) increases. Sand displacement is most pronounced with the first few vehicles (up to 10), and is most crucial near the foredune, where the highest sand displacement occurs, leading to steeper slopes. The use of wide tires with low pressure can reduce some of these impacts (Anders and Leatherman 1987b).

Wrack Habitat and Macroinvertebrates

Living organisms concentrate in the wrack lines that wash up during high tide. For example, bacteria, which play a vital role in breaking down organic matter, are 1,000 times more abundant in the wrack than on bare sand. If OSVs drive over wrack habitat, they may break it up and/or dry it out. Godfrey and Godfrey (1980) found that OSV use reduced the amount of bacteria present by 50 percent and the amount of diatoms in the sand by 90 percent. Steinback (2004, 2005) found that while different species of invertebrates respond differently to OSV use (some populations increase while others decrease), the overall abundance of invertebrates is significantly lower in beaches with OSV use. Steinback et al. also found less wrack on beaches with OSV use. Organisms found in the wrack are an important food source for nesting and migrating shorebirds including piping plovers. Over-sand vehicle use has also been shown to directly reduce macroinvertebrate density and diversity (Wolcott and Wolcott 2003, Schlacher et al. 2008), which reduces biological integrity and also may impact birds which forage on these species.

Vegetation

Over-sand vehicle use reduces vegetative cover (Anders and Leatherman 1987a) and species diversity through trampling, and can also result in a slower rate of plant recolonization (Godfrey and Godfrey 1980). Off-road vehicle (ORV) use can cause soil compaction for ORV use and thus limit moisture and oxygen available for geminating seeds (Gehlhausen and Harper 1998). Plant seeds in trampled and dried out wrack lines may not reproduce. Reduced vegetation likely contributes to increased susceptibility to wave- and wind-driven erosion.

Nesting Birds

The Service's 2009 Five-year Status Review cites disturbance by humans as a continuing widespread and severe threat to Atlantic Coast piping plovers (USFWS 2009). Threats from human beach-users are cited in the final listing rule (USFWS 1985) and described in detail in the revised Atlantic Coast recovery plan (USFWS 1996). Threats to breeding piping plovers from both motorized and non-motorized beach recreation activities are relatively well understood, and recommended management options are described in the *Guidelines for Managing Recreation* (USFWS 1994).

Studies have shown that beach use including use of OSVs negatively impacts productivity of beach-nesting birds, particularly piping plovers. Vehicles have been shown to crush eggs, adults, and chicks (Wilcox 1959, Tull 1984, Burger 1987, Patterson et al. 1991, Shaffer and Laporte 1992). Cairns (1977) found reproductive success of piping plovers was 1.3 to 2.1 fledged young per pair on remote beaches but only 0.7 to 1.1 fledged young per pair on beaches used for recreation in Nova Scotia. Fleming (1984) calculated that fledgling success per nest attempt on beaches in Nova Scotia was significantly reduced from 1.8 to 0.5 young per pair for birds exposed to low and high recreational activity, respectively. He defined low activity as 0-20 visits per week and high activity as 30 or more visits per week by people and their vehicles. Fleming also found that piping plover chick survivorship was significantly decreased by higher levels of recreational activity. His results showed that most chick loss occurred between the ages of 10-17 days; he speculated that high levels of recreational activity caused mortality of chicks by interfering with feeding during a critical period of energy demand. MacIvor et al. (1987) observed piping plovers on North Beach in Chatham, Massachusetts. Following separation from the mainland during a 1987 storm, this area, which had received extensive OSV use, became inaccessible to vehicles. In 1987, 50 percent of plover pairs shifted their nest sites to areas that were not available for nesting in 1985 or 1986 due to OSV traffic. Further, all three least tern colonies were also in locations that were formerly unavailable due to OSV use. Six years of data collected by Strauss et al. (1986) in Barnstable, Massachusetts show that in their study area, the number of fledglings per nesting pair of plovers in an area with only light pedestrian use was 0.67, compared with 0.32 in an adjacent area with heavy OSV use. Their study also shows that while adult plovers will often move their chicks to feeding habitat with lower levels of disturbance, chicks moved more than 200 meters have half the probability of fledging than those moved less than 200 meters.

It has been documented that piping plover chicks will tend to run along ruts caused by vehicles and remain motionless as vehicles approach (USFWS 1996). Piping plover chicks may also have difficulty crossing deep

ruts and moving quickly enough out of a vehicles path. Additionally, piping plovers tend not to reach their full habitat carrying capacity on beaches where vehicles are allowed during the nesting and brood rearing periods (USFWS 1996).

Migrating Birds

Many species of shorebirds (*Charadriiformes*) that breed in North America migrate up to 30,000 kilometers annually, traveling from non-breeding grounds as far south as Argentina to breeding grounds as far north as the Arctic Ocean (Brown 2001, Morrison 1984, Myers 1987). During these long distance migrations, shorebirds rely on strategically located stopover sites which provide abundant food and adjacent resting habitat (Helmers 1992, Myers et al. 1987, Senner & Howe 1984). Coastal stopover sites in particular are increasingly being subjected to development and human disturbance, and loss of suitable stopover habitat may contribute to declines in local abundance and overall populations of shorebirds in North America (Brown et al. 2001, Myers et al. 1987, Pfister et al. 1992).

Studies have shown reduced numbers of migrating shorebirds in response to vehicle traffic on beaches. For example, Pfister et al. (1992) documented long term declines in abundance of red knots (*Calidris canutus*) and short-billed dowitchers (*Limnodromus griseus*) on Plymouth Beach, Massachusetts, that exceeded declines at comparable, less disturbed sites, as well as the overall eastern North American population. Vehicle presence also caused semipalmated sandpipers (*Calidris pusilla*) and sanderlings (*Calidris alba*) to alter their distribution on the beach. A study at Parker River NWR in Newburyport, Massachusetts found that vehicle use on beaches disturbed roosting shorebirds more than pedestrian use (Harrington and Drilling 1996). Off road vehicle use reduces food resources and increases disturbance, contributing to lower weight shorebirds. Lower weight individuals are less likely to successfully complete their long-distance migrations (Harrington and Drilling 1996). The North Atlantic Shorebird Plan identified protection of food resources and minimizing human disturbance as high priority management objectives (Clark and Niles 2003). We have not quantified migrating shorebird use of Nantucket NWR, but data on species use, and potential disturbance, may be collected in future years.

While we acknowledge the potential impacts of OSV on the physical and biological characteristics of a beach ecosystem, Nantucket NWR is only about 21 acres, and most impacts from OSV on this small area are not likely to detract significantly from the larger landscape. However, we are committed to reducing direct disturbance on nesting, staging, and migrating birds (and seals), as well as protecting the integrity of the dune system and wrack line as much as possible. Seasonal closures for bird and seals, and prohibitions on OSV access in the dune system and along the wrack line will minimize the overall impact of OSV use on Nantucket NWR. The Trustees of Reservations has produced and distributes a guide to OSV use which likely increases voluntary compliance and user safety, and may further lessen disturbance to natural resources. The guide is available at: *http://www.thetrustees.org/pages/293_coskata_coatue_wildlife_refuge.cfm* (accessed March 2011).

PUBLIC REVIEW AND COMMENT:

As part of the comprehensive conservation planning process for Nantucket NWR, this compatibility determination underwent extensive public review, including a comment period of 30 days that followed the release of the draft Comprehensive Conservation Plan and Environmental Assessment.

DETERMINATION (CHECK ONE BELOW):

____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Occasional law enforcement patrol and regular staff and conservation partner presence should minimize potential violations. The current "refuge open ½ hour before sunrise to ½ hour after sunset" regulation restricts entry after daylight hours and will be maintained. Refuge regulations will be posted and enforced.

Periodic evaluations will be done to insure that visitors and programs are not causing unacceptable adverse impacts. Areas open to these uses will be evaluated on an ongoing basis to ensure visitor safety, compliance with State and Federal tern and plover guidelines, and to minimize impacts on vegetation and wildlife.

Special use permits are required for organizations conducting environmental education activities on Nantucket NWR. A fee may be charged for the special use permit. The areas used by such tours will be monitored to evaluate the impacts on the resource; if adverse impacts appear, the activity may be prohibited. Specific conditions may apply depending upon the requested activity and will be addressed through the special use permit. Regulations to ensure the safety of all participants will also be included.

Continued permitting through TTOR at the Wauwinet Gatehouse will assist the dissemination of information about closures and other public use regulations on Nantucket NWR and also provide a means of tracking the number of annual OSV users.

Refuge staff will carefully monitor OSV use to ensure buffers and boundaries of zones for nesting and staging birds are sufficient to prevent disturbance. Closure areas may be increased if OSV access along the zone boundaries disrupts birds or seals. Areas where OSV use are allowed will be evaluated on an annual, seasonal, and sometimes daily basis and will be influenced by beach geomorphology as well as wildlife use. Updates on closures will be disseminated at the Wauwinet Gatehouse and on the refuge Web site.

Occasional law enforcement patrols and regular refuge and TTOR presence should minimize potential violations of refuge closures and other regulations (speed limits, tire deflation requirements, prohibition of dogs). If persistent violations or disturbance to natural resources occur, OSV access will be eliminated.

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. Littering, dumping, and abandoning property are prohibited by Federal regulation at 50 C.F.R. 27.93.94.

JUSTIFICATION:

Environmental education activities generally support refuge purposes and impacts can largely be minimized. The minor resource impacts attributed to these activities are generally outweighed by the benefits gained by educating present and future generations about refuge resources. Environmental education is a public use management tool used to develop a resource protection ethic within society. While it targets school age children, it is not limited to this group. This tool allows us to educate visitors about endangered and threatened species management, wildlife management and ecological principles and communities. A secondary benefit of environmental education is that it can instill stewardship in visitors and most likely reduces vandalism, littering, and poaching. Environmental education also strengthens Service visibility in the local community.

We do not expect pedestrian access to materially interfere with or detract from the mission of the National Wildlife Refuge System, nor diminish the purpose for which the refuge was established. It will not pose significant adverse effects on refuge resources, nor interfere with public use of the refuge, nor cause an undue administrative burden. These uses facilitate wildlife observation and photography, and will provide compatible recreational opportunities for visitors to observe and learn about wildlife and habitats firsthand.

Over-sand vehicle use facilitates five priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997. Allowing controlled OSV access will facilitate visitation, fostering a greater awareness and appreciation of the importance of this site to the National Wildlife Refuge System. Occasional law enforcement patrol and regular Service and TTOR presence should minimize potential violations of refuge regulations and closures, as previously described.

The vehicle limitations outlined in this determination provide maximum protection to prime nesting habitat for piping plovers and terns, as well as minimize disturbance to staging terns and resting seals. With proper monitoring, this use is not likely to materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose of Nantucket NWR. Therefore, it is the determination of the Service that OSV use, at the discretion of the refuge manager, conducted as described including with stipulations, is sufficient.

Costs associated with administering environmental education and interpretation and resultant likely visitor impacts are minimal, although a staff person will be needed to deliver these programs to residents of Nantucket and refuge visitors. These uses will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose of Nantucket NWR. Therefore, it is the determination of the Service that these uses, at the discretion of the refuge manager, are compatible uses and contribute to the purposes for which Nantucket NWR was established.

SIGNATURE:

Refuge Manager: _____ _____
(Signature) (Date)

7/29/2012.

CONCURRENCE:

Regional Chief: _____ _____
(Signature) (Date)

9/11/2012

MANDATORY 15 YEAR RE-EVALUATION DATE: 9/11/2027

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COMPATIBILITY DETERMINATION

USE:

Wildlife Observation and Photography

REFUGE NAME:

Nantucket National Wildlife Refuge

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

Nantucket NWR was established in 1973 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes [U.S.C. § 667b].

REFUGE PURPOSE(S):

Nantucket NWR's purpose is its ". . . particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b-d, as amended)

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

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.

DESCRIPTION OF USE:

(a) What is the use?
Wildlife observation and photography activities include walking on open and established trails to observe and/or photograph the natural environment. Access to Nantucket NWR for these activities can be achieved by boat, over-sand vehicle, or foot. In addition, The Trustees of Reservations (TTOR) conducts natural history tours that include Nantucket NWR which also provide opportunities for wildlife photography and observation.

The use is primarily facilitated by operation of over-sand vehicles, which consists of driving 4-wheel drive vehicles on designated areas of the refuge beach and inland sand roads. Over-sand vehicle use is currently the most common means of access for visitors to Nantucket NWR. However, visitors can (and some do) park on adjacent property owned by the Trustees of Reservations (TTOR) and walk to the refuge. The distance can range from 5 miles (if one parks at the Wauwinet Gatehouse) to mere steps (if one parks close to the property boundary). It is approximately 300 meters from the south boundary to the north boundary of Nantucket NWR. Access to Nantucket NWR can also occur by boat, but boat landings are not common. Over-sand vehicles are also used by Service staff and TTOR when conducting biological surveys, roving interpretation, and natural and cultural history tours.

TTOR requires OSV permits and regulates passage through the Wauwinet Road Gatehouse which provides the only OSV access to Nantucket NWR, Coskata-Coatue Wildlife Refuge (owned by TTOR) and Coatue Wildlife Refuge (owned by Nantucket Conservation Foundation).

(b) Is the use a priority public use?
Wildlife observation and photography are both identified as priority public uses in the National Wildlife Refuge System Improvement Act of 1997.

(c) Where would the use be conducted?
Wildlife observation and photography could occur on any areas of Nantucket NWR that are open to public access. Public access is dictated by wildlife use and presence of sensitive vegetation. In general, much of the intertidal area and established vehicle trails through the dune system are open (at least to pedestrian traffic) for much of the year. Some areas of intertidal areas and beach berm are closed seasonally to protect seals, nesting shorebirds, and seabirds. Public access is restricted from dune habitat to minimize trampling of American beach grass (*Ammophila breviligulata*). An authorized trail will be established by the Service from the lighthouse to the beach on the Atlantic Ocean side of the refuge, and the public will be able to view wildlife and take photographs anywhere along this trail. Visitors should contact Eastern Massachusetts NWR Complex staff for up-to-date information on seasonal closures, visit the refuge Web site, or obtain information about closures and refuge activities from The Trustees of Reservations (TTOR) staff at the Wauwinet Gatehouse.

Over-sand vehicle use is generally permitted on the beach berm from the high tide line to the base of the foredunes, as well as on established, officially designated OSV roads that bisect dunes in natural sand valleys. Over-sand vehicle users are not allowed to drive on dune habitat (Zone 1) or in the wrack line, and are often prohibited from the very northern tip of the refuge to protect seals (Zone 3). Specific OSV traffic routes in other zones have varied annually and seasonally depending on wildlife use and public safety. For instance, Federal and State regulations require minimum buffer areas for various nesting species of shorebirds and seabirds. Depending on where birds nest and the shifting geomorphology of the dunes and intertidal habitat, it may be impossible to safely allow OSV access along a beach if the berm is narrow and the buffer required by nesting birds effectively extends below the high water line. Buffer distances may differ during the incubation period (when birds are tending to eggs and may require less area) and the chick rearing period (when some species are mobile foragers and may need a larger buffer of undisturbed habitat), resulting in changes in access within a season. Generally, Zone 4 will be closed to OSV access seasonally to protect nesting birds, and Zone 5 will be closed to OSV access seasonally to minimize disturbance to staging birds. However, locations of these closures may shift annually or within a season.

Additionally, sometimes nesting birds on Coskata-Coatue Wildlife Refuge (directly south of Nantucket NWR) will result in OSV closures and essentially limit OSV access to all northerly areas as well. Over-sand vehicle users will be informed at the Wauwinet Gatehouse of areas open to OSV travel, but because the location of nesting birds and changes in geomorphology cannot always be predicted, sudden changes in access may occur.

(d) When would the use be conducted?
Nantucket NWR is open to the public for wildlife observation and photography from ½ hour before sunrise to ½ hour after sunset. Wildlife observation and photography could occur any time of the year in any areas open to public access. Use for these activities is likely to be highest in late spring, summer, and early fall.

(e) How would the use be conducted?
Wildlife observation and photography must be conducted in accordance with refuge regulations (including seasonal closures). Photography blinds are not permitted on the refuge, even in areas generally open to the public, without a special use permit. Commercial photography on Nantucket NWR also requires a special use permit.

Refuge visitors would primarily access the refuge by personal OSV, although some visitors engaged in wildlife photography and observation as part of a tour group will access the refuge by four-wheeled drive vans operated by refuge partners. A TTOR OSV permit is required for passage through the Wauwinet Gatehouse. While on Nantucket NWR, OSV use will generally be restricted to the area between the high tide line to the base of the foredunes, as well as established OSV roads that bisect dunes in natural sand valleys (for instance just south of the Great Point Lighthouse where the public restrooms are seasonally located). Over-sand vehicle users are not allowed to drive on dune habitat (Zone 1). Typically, OSVs may park anywhere the berm or crossroads are wide enough so as not to obstruct traffic. Additionally, OSV users are required to deflate tires to 12 pounds per square inch before passing through Wauwinet Gatehouse, and speed restrictions are well posted. Information on annual, seasonal, and daily closures (as well as a guide to safe OSV use) will be disseminated

at the Wauwinet Gatehouse and closures will be well marked with informative signage. While on Nantucket NWR, all OSV users are expected to stay apprised of, and respect all closures and regulations. For instance, the current prohibition of dogs on Nantucket NWR also applies to dogs inside OSVs. Refuge staff will carefully monitor OSV use to ensure buffers and boundaries of zones for nesting and staging birds is sufficient to prevent disturbance. Closure areas may be increased if OSV access along the zone boundaries disrupts birds. If persistent violations or disturbance to natural resources occur, OSV access may be eliminated.

(f) Why is the use being proposed?
Wildlife observation and photography are both identified as priority public uses in the National Wildlife Refuge System Improvement Act of 1997. Although small, Nantucket NWR serves as a great example of dynamic barrier beach habitat that is constantly impacted by wind and tidal energy. A variety of bird species use Nantucket NWR and surrounding waters year round. The refuge also hosts a sizeable seal population much of the year. Affording opportunities for public enjoyment will increase visitor appreciation and foster a greater awareness of the importance of this site to the National Wildlife Refuge System.

AVAILABILITY OF RESOURCES:

Wildlife observation and photography occur through the use of existing staff and resources, which is largely enhanced through our partnership with TTOR. Nantucket NWR is small, but the quality of these opportunities will be a direct reflection of the refuge's staff and funding levels and continued successful collaboration with TTOR. Updated, friendly signage is necessary to clarify refuge boundaries, seasonal closures, and permitted activities. The estimated costs of allowing these uses is reasonable because there is little infrastructure involved, and existing staff and TTOR staff are often onsite, providing a regular presence which increases voluntary compliance. Administration of these uses is done collectively in conjunction with other uses.

Purchase new signage			$5,000
Install and maintain new signage	2 staff	40 hours each	$1,000
Total Initial Cost of Program:			**$6,000**
Maintain signage and information			$1,000
Seasonal onsite staff	1 staff	200 hours	$5,000
Occasional law enforcement presence	1 staff	40 hours	$2,000
Fuel and Vehicle Costs			$1,000
Total Annual Cost of Program:			**$9,000**

Over-sand vehicle permits are currently administered by TTOR. Refuge staff time and resources are needed to ensure delineation of bird nesting and staging areas and seal haul-out areas (and otherwise closed areas) are accomplished on time, and sufficiently maintained to provide maximum protection for biological resources. Similarly, refuge staff presence will allow monitoring of biological resources and more timely reinstated access, when appropriate. The Service does not estimate additional costs associated with OSV or pedestrian use, as permitting infrastructure is already in place by TTOR, and TTOR staff provide regular presence at the Wauwinet Gatehouse and on Nantucket NWR.

ANTICIPATED IMPACTS OF THE USE:

Because this activity will be supervised by Service or partner staff, impacts of wildlife observation and photography will likely be minimal if conducted in accordance with refuge regulations. Possible impacts include disturbing wildlife, removing or trampling of plants, littering, vandalism, and entrance into closed areas. In the event of persistent disturbance to habitat or wildlife, the activity will be further restricted or discontinued. Participants in natural history tours conducted by partners may cause some disturbance to refuge visitors, but the amount of disturbance is expected to be minimal as the number of tours that will occur on the refuge will not exceed more than two a day, and do not occur on a daily basis.

There are impacts to refuge wildlife, vegetation, and soils from pedestrian and OSV access for visitors engaged in wildlife observation and photography. These are described below.

Pedestrian Travel Direct Impacts

Potential Direct Impacts

Pedestrian travel has the potential of impacting shorebird, waterfowl, and other migratory bird populations feeding and resting near the trails and on beaches during certain times of the year. Pedestrians can also impact seals resting on the beach if they get too close. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). Response of wildlife to human activities includes: departure from site (Owen 1973, Burger 1981, Kaiser and Fritzell 1984, Korschgen et al. 1985, Henson and Grant 1991, Kahl 1991, Klein 1993), use of sub-optimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Korschgen et al. 1985, Morton et al. 1989, Ward and Stehn 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990).

Numerous studies have documented that migratory birds are disturbed by human activity on beaches. Erwin (1989) documented disturbance of common terns and skimmers and recommended that human activity be restricted a distance of 100 meters around nesting sites. Klein (1993) in studying waterbird response to human disturbance found that as intensity of disturbance increased, avoidance response by the birds increased and found that out of vehicle activity to be more disruptive than vehicular traffic. Pfister et al. (1992) found that the impact of disturbance was greater on species using the heavily disturbed front side of the beach, with the abundance of the impacted species being reduced by as much as 50 percent. Roberton et al. (1980) discovered, in studying the effects of recreational use of shorelines on nesting birds, that disturbance negatively impacted species composition. Piping plovers which use the refuge heavily are also impacted negatively by human activity. Pedestrians on beaches may crush eggs (Burger 1987, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Dogs may chase plovers (McConnaughey et al. 1990), destroy nests (Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980). Other studies have shown that if pedestrians cause incubating plovers to leave their nest, the eggs can overheat (Bergstrom 1991) or the eggs can cool to the point of embryo death (Welty 1982). Pedestrians have been found to displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993).

The Delaware Natural Heritage Program, Division of Fish & Wildlife and the Department of Natural Resources and Environmental Control prepared a document on the "The Effects of Recreation on Birds: A literature Review" which was completed in April of 1999. The following information was referenced from this document:

Several studies have examined the effects of recreation on birds using shallow-water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger 1981; Burger 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1995, 1997; Burger & Gochfeld 1998). Overall, the existing research clearly demonstrates that disturbance from recreation activities always have at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger 1981, 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1997; Burger & Gochfeld 1998). The findings that were reported in these studies are summarized as follows in terms of visitor activity and avian response to disturbance.

Presence: Birds avoided places where people were present and when visitor activity was high (Burger 1981; Klein et al. 1995; Burger & Gochfeld 1998). Distance: Disturbance increased with decreased distance between visitors and birds (Burger 1986), though exact measurements were not reported.

Approach Angle: Visitors directly approaching birds on foot caused more disturbance than visitors driving by in vehicles, stopping vehicles near birds, and stopping vehicles and getting out without approaching birds (Klein 1993). Direct approaches may also cause greater disturbance than tangential approaches to birds (Burger & Gochfeld 1981; Burger et al. 1995; Knight & Cole 1995a; Rodgers & Smith 1995, 1997).

Noise: Noise caused by visitors resulted in increased levels of disturbance (Burger 1986; Klein 1993; Burger & Gochfeld 1998), though noise was not correlated with visitor group size (Burger & Gochfeld 1998).

The proposed use has the potential of intermittently interrupting the feeding habits of a variety of shorebirds, gulls, and terns, but encounters between pedestrians and migratory birds will be temporary. Refuge staff will manage visitor access via seasonal closures to minimize disturbance to nesting, resting, and foraging waterbirds on the refuge.

Pedestrian use also has the potential to disturb loafing seals. Gray and harbor seals haul-out on the refuge year round. A 150-foot buffer around all seals is required by the National Oceanic Atmospheric Administration to ensure compliance with the Marine Mammals Protection Act.

Pedestrian Indirect Impacts

Heavy beach use can dry out the sand and contribute to beach erosion. Trash left on the beach, particularly food or wrappers can attract predators that prey on nesting piping plovers and least terns or roosting shorebirds. Impacts of walking are likely to be minimal if conducted in accordance with refuge regulations. The new trail we propose to establish is on an existing unauthorized trail. The remaining unauthorized trails will be shut down, reducing the amount of disturbance from walkers through the dune habitat. We will manage refuge closures which restrict pedestrian access to minimize disturbance to priority avian species during critical times of the year. Closures can be expanded or contracted as needed depending on bird activity and results of further disturbance studies.

Potential OSV Impacts

Although a specific study on the effects of OSV use has not been conducted on Nantucket NWR, studies have been done on beaches with similar ecological characteristics. Studies show that OSVs affect the physical and biological processes that take place within the beach ecosystem. Specifically, OSV use on the beach may result in the following negative impacts.

Foredune Profile

Over the long term, OSV use can have a negative effect on foredune growth. Long term OSV use can lead to an abrupt rather than sloping dune base, leaving the dune more susceptible to wave energy and erosion (Anders and Leatherman 1987a). The tracks created by OSV use can also affect the geomorphology of the beach through sand displacement and compaction (Schlacher and Thompson 2008). The amount of sand displaced increases as the number of vehicles (traffic flow) increases. Sand displacement is most pronounced with the first few vehicles (up to 10), and is most crucial near the foredune, where the highest sand displacement occurs, leading to steeper slopes. The use of wide tires with low pressure can reduce some of these impacts (Anders and Leatherman 1987b).

Wrack Habitat and Macroinvertebrates

Living organisms concentrate in the wrack lines that wash up during high tide. For example, bacteria, which play a vital role in breaking down organic matter, are 1,000 times more abundant in the wrack than on bare sand. If OSVs drive over wrack habitat, they may break it up and/or dry it out. Godfrey and Godfrey (1980) found that OSV use reduced the amount of bacteria present by 50 percent and the amount of diatoms in the sand by 90 percent. Steinback et al. (2004/2005) found that while different species of invertebrates respond differently to OSV use (some populations increase while others decrease), the overall abundance of invertebrates is significantly lower in beaches with OSV use. Steinback et al. also found less wrack on beaches with OSV use. Organisms found in the wrack are an important food source for nesting and migrating shorebirds including piping plovers. Over-sand vehicle use has also been shown to directly reduce macroinvertebrate density and diversity (Wolcott and Wolcott 2003, Schlacher et al. 2008), which reduces biological integrity and also may impact birds which forage on these species.

Vegetation

Over-sand vehicle use reduces vegetative cover (Anders and Leatherman 1987a) and species diversity through trampling, and can also result in a slower rate of plant recolonization (Godfrey and Godfrey 1980). Off-road vehicle use can cause soil compaction for ORV use and thus limit moisture and oxygen available for geminating seeds (Gehlhausen and Harper 1998). Plant seeds in trampled and dried out wrack lines may not reproduce. Reduced vegetation likely contributes to increased susceptibility to wave- and wind-driven erosion.

Nesting Birds

Studies have shown that beach use including use of OSVs negatively impacts productivity of beach-nesting birds, particularly piping plovers. Vehicles have been shown to crush eggs, adults, and chicks (Wilcox 1959, Tull 1984, Burger 1987, Patterson et al. 1991, Shaffer and Laporte 1992). Cairns (1977) found reproductive success of piping plovers was 1.3 to 2.1 fledged young per pair on remote beaches but only 0.7 to 1.1 fledged young per pair on beaches used for recreation in Nova Scotia. Fleming (1984) calculated that fledgling success per nest attempt on beaches in Nova Scotia was significantly reduced from 1.8 to 0.5 young per pair for birds exposed to low and high recreational activity, respectively. He defined low activity as 0-20 visits per week and high activity as 30 or more visits per week by people and their vehicles. Fleming also found that piping plover chick survivorship was significantly decreased by higher levels of recreational activity. His results showed that most chick loss occurred between the ages of 10-17 days; he speculated that high levels of recreational activity caused mortality of chicks by interfering with feeding during a critical period of energy demand. MacIvor et al. (1987) observed piping plovers on North Beach in Chatham, Massachusetts. Following separation from the mainland during a 1987 storm, this area, which had received extensive OSV use, became inaccessible to vehicles. In 1987, 50 percent of plover pairs shifted their nest sites to areas that were not available for nesting in 1985 or 1986 due to OSV traffic. Further, all three least tern colonies were also in locations that were formerly unavailable due to OSV use. Six years of data collected by Strauss et al. (1986) in Barnstable, Massachusetts show that in their study area, the number of fledglings per nesting pair of plovers in an area with only light pedestrian use was 0.67, compared with 0.32 in an adjacent area with heavy OSV use. Their study also shows that while adult plovers will often move their chicks to feeding habitat with lower levels of disturbance, chicks moved more than 200 meters have half the probability of fledging than those moved less than 200 meters.

It has been documented that piping plover chicks will tend to run along ruts caused by vehicles and remain motionless as vehicles approach (USFWS 1996). Piping plover chicks may also have difficulty crossing deep ruts and moving quickly enough out of a vehicles path. Additionally, piping plovers tend not to reach their full habitat carrying capacity on beaches where vehicles are allowed during the nesting and brood rearing periods (USFWS 1996).

Migrating Birds

Many species of shorebirds (*Charadriiformes*) that breed in North America migrate up to 30,000 kilometers annually, traveling from non-breeding grounds as far south as Argentina to breeding grounds as far north as the Arctic Ocean (Brown et al. 2001, Morrison 1984, Myers et al. 1987). During these long distance migrations, shorebirds rely on strategically located stopover sites which provide abundant food and adjacent resting habitat (Helmers 1992, Myers et al. 1987, Senner & Howe 1984). Coastal stopover sites in particular are increasingly being subjected to development and human disturbance, and loss of suitable stopover habitat may contribute to declines in local abundance and overall populations of shorebirds in North America (Brown et al. 2001, Myers et al. 1987, Pfister et al. 1992).

Studies have shown reduced numbers of migrating shorebirds in response to vehicle traffic on beaches. For example, Pfister et al. (1992) documented long term declines in abundance of red knots (*Calidris canutus*) and short-billed dowitchers (*Limnodromus griseus*) on Plymouth Beach, Massachusetts, that exceeded declines at comparable, less disturbed sites, as well as the overall eastern North American population. Vehicle presence also caused semipalmated sandpipers (*Calidris pusilla*) and sanderlings (*Calidris alba*) to alter their distribution on the beach. A study at Parker River NWR in Newburyport, Massachusetts found that vehicle use on beaches disturbed roosting shorebirds more than pedestrian use (Harrington and Drilling 1996). Off road vehicle use reduces food resources and increases disturbance, contributing to lower weight shorebirds. Lower weight individuals are less likely to successfully complete their long-distance migrations (Harrington and Drilling 1996). The North Atlantic Shorebird Plan identified protection of food resources and minimizing human disturbance as high priority management objectives (Clark and Niles 2003). We have not quantified migrating shorebird use of Nantucket NWR, but data on species use, and potential disturbance, may be collected in future years.

While we acknowledge the potential impacts of OSV on the physical and biological characteristics of a beach ecosystem, Nantucket NWR is only about 21 acres, and most impacts from OSV on this small area are not likely to detract significantly from the larger landscape. However, we are committed to reducing direct disturbance on nesting, staging, and migrating birds (and seals), as well as protecting the integrity of the dune system and wrack line as much as possible. Seasonal closures for bird and seals, and prohibitions on OSV

access in the dune system and along the wrack line will minimize the overall impact of OSV use on Nantucket NWR. The Trustees of Reservations has produced and distributes a guide to OSV use which likely increases voluntary compliance and user safety, and may further lessen disturbance to natural resources. The guide is available at: *http://www.thetrustees.org/pages/293_coskata_coatue_wildlife_refuge.cfm* (accessed March 2011).

PUBLIC REVIEW AND COMMENT:

As part of the comprehensive conservation planning process for Nantucket NWR, this compatibility determination underwent extensive public review, including a comment period of 30 days that followed the release of the draft Comprehensive Conservation Plan and Environmental Assessment.

DETERMINATION (CHECK ONE BELOW):

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Seasonal closures to the beach berm and intertidal area will be made to protect birds and seals. Visitors will be restricted to authorized trails, including the OSV trail and the proposed foot trail from the lighthouse to the beach.

Occasional law enforcement patrol and regular staff and partner presence should minimize potential violations. The refuge is open ½ hour before sunrise to ½ hour after sunset for wildlife observation and photography. These restrictions will be maintained. Refuge regulations will be posted and enforced.

Periodic evaluations will be done to insure that visitors are not causing unacceptable adverse impacts. Areas open to these uses will be evaluated on an annual basis depending on geomorphology and wildlife use.

Special use permits are required for organizations conducting wildlife observation and photography activities on the refuge. A fee may be charged for the special use permit. The areas used by such tours will be closely monitored to evaluate the impacts on the resource; if adverse impacts appear, the activity may be prohibited. Specific conditions may apply depending upon the requested activity and will be addressed through the special use permit.

Commercial photography is subject to a special use permit and commercial photographers will be charged a fee. The fee is dependent on size, scope, and impact of the proposed activity.

All photographers must follow refuge regulations. Photographers in closed areas must follow the conditions outlined in the special use permit which normally include notification of refuge personnel each time any activities occur in closed areas. Use of a closed area will be restricted appropriately to reduce disturbance to wildlife.

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. Littering, dumping, and abandoning property are prohibited by Federal regulation at 50 C.F.R. 27.93.94.

JUSTIFICATION:

The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: wildlife observation and wildlife photography, environmental education, interpretation, hunting, and fishing. 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. Many visitors to Nantucket NWR engage in wildlife observation and photography.

We do not expect pedestrian access to materially interfere with or detract from the mission of the National Wildlife Refuge System, nor diminish the purpose for which the refuge was established. It will not pose significant adverse effects on refuge resources, nor interfere with public use of the refuge, nor cause an undue administrative burden. These uses facilitate wildlife observation and photography, and will provide compatible recreational opportunities for visitors to observe and learn about wildlife and habitats firsthand.

Over-sand vehicle use facilitates five priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997. Allowing controlled OSV access will facilitate visitation, fostering a greater awareness and appreciation of the importance of this site to the National Wildlife Refuge System. Occasional law enforcement patrol and regular Service and TTOR presence should minimize potential violations of refuge regulations and closures, as previously described.

The vehicle limitations outlined in this determination provide maximum protection to prime nesting habitat for piping plovers and terns, as well as minimize disturbance to staging terns and resting seals. With proper monitoring, this use is not likely to materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose of Nantucket NWR. Therefore, it is the determination of the Service that OSV use, at the discretion of the refuge manager, conducted as described including with stipulations, is sufficient.

Costs associated with administering these uses and likely visitor impacts are both minimal. These uses will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose of Nantucket NWR. Therefore, it is the determination of the Service that wildlife observation and photography, at the discretion of the refuge manager, are compatible uses and contribute to the purposes for which Nantucket NWR was established.

SIGNATURE:

Refuge Manager: _____ 7/25/2012
(Signature) (Date)

CONCURRENCE:

Regional Chief: _____ 9/13/2012
(Signature) (Date)

MANDATORY 15 YEAR RE-EVALUATION DATE:

9/11/2027

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COMPATIBILITY DETERMINATION

USE:

Recreational Fishing

REFUGE NAME:

Nantucket National Wildlife Refuge

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

Nantucket NWR was established in 1973 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes [U.S.C. § 667b].

REFUGE PURPOSE(S):

Nantucket NWR's purpose is its ". . . particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b-d, as amended)

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

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.

DESCRIPTION OF USE:

(a) What is the use?
Recreational fishing on Nantucket NWR is saltwater surf fishing. Target species for anglers are striped bass, bluefish, and false albacore. Fishing may be done by individuals or small groups of friends and family members. In conjunction with refuge staff, special events such as fishing tournaments or "take me fishing" events may be held on the refuge.

The use is primarily facilitated by operation of over-sand vehicles, which consists of driving 4-wheel drive vehicles on designated areas of the refuge beach and inland sand roads. Over-sand vehicle use is currently the most common means of access for visitors to Nantucket NWR. However, visitors can (and some do) park on adjacent property owned by the Trustees of Reservations (TTOR) and walk to the refuge. The distance can range from 5 miles (if one parks at the Wauwinet Gatehouse) to mere steps (if one parks close to the property boundary). It is approximately 300 meters from the south boundary to the north boundary of Nantucket NWR. Access to Nantucket NWR can also occur by boat, but boat landings are not common.

TTOR requires OSV permits and regulates passage through the Wauwinet Road Gatehouse which provides the only OSV access to Nantucket NWR, Coskata-Coatue Wildlife Refuge (owned by TTOR) and Coatue Wildlife Refuge (owned by Nantucket Conservation Foundation).

(b) Is it a priority public use?
Recreational fishing is a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

(c) Where would the use be conducted?
Recreational fishing could occur on any stretch of beachfront on Nantucket NWR that is open to public access. Public access for fishing is dictated by wildlife use. In general, much of the intertidal area is open (at least to pedestrian traffic) for most of the year. Some areas of beach berm are closed seasonally to protect nesting shorebirds and seabirds and some intertidal areas are closed for resting seals. Visitors should contact Eastern Massachusetts NWR Complex staff for up-to-date information on seasonal closures, visit the refuge Web site, or obtain information from The Trustees of Reservations (TTOR) at the Wauwinet Gatehouse.

Over-sand vehicle use is generally permitted on the beach berm from the high tide line to the base of the foredunes, as well as on established, officially designated OSV roads that bisect dunes in natural sand valleys. Over-sand vehicle users are not allowed to drive on dune habitat (Zone 1) or in the wrack line, and are often prohibited from the very northern tip of the refuge to protect seals (Zone 3). Specific OSV traffic routes in other zones have varied annually and seasonally depending on wildlife use and public safety. For instance, Federal and State regulations require minimum buffer areas for various nesting species of shorebirds and seabirds. Depending on where birds nest and the shifting geomorphology of the dunes and intertidal habitat, it may be impossible to safely allow OSV access along a beach if the berm is narrow and the buffer required by nesting birds effectively extends below the high water line. Buffer distances may differ during the incubation period (when birds are tending to eggs and may require less area) and the chick rearing period (when some species are mobile foragers and may need a larger buffer of undisturbed habitat), resulting in changes in access within a season. Generally, Zone 4 will be closed to OSV access seasonally to protect nesting birds, and Zone 5 will be closed to OSV access seasonally to minimize disturbance to staging birds. However, locations of these closures may shift annually or within a season.

Additionally, sometimes nesting birds on Coskata-Coatue Wildlife Refuge (directly south of Nantucket NWR) will result in OSV closures and essentially limit OSV access to all northerly areas as well. Over-sand vehicle users will be informed at the Wauwinet Gatehouse of areas open to OSV travel, but because the location of nesting birds and changes in geomorphology cannot always be predicted, sudden changes in access may occur.

(d) When would the use be conducted?
Nantucket NWR is open to the public from ½ hour before sunrise to ½ hour after sunset. Surf fishing is permitted 24 hours a day. This is the only activity allowed at night on Nantucket NWR. Onsite fishing events would be held at times and on parts of the refuge that minimize impact to seals, terns, plovers, and other shorebirds and seabirds.

(e) How would the use be conducted?
Recreational fishing must be conducted in accordance with Federal and State regulations and refuge-specific policies, including seasonal closures and restrictions on over-sand vehicle (OSV) use. Over-sand vehicles are the most common means of access for fishermen using Nantucket NWR. Recreational fishermen may also fish from a boat on areas just offshore of Nantucket NWR. Refuge staff may partner with organizations such as the Nantucket Anglers Club to sponsor a fishing tournament, designed to introduce more people to the joys of fishing on the refuge.

Refuge visitors would primarily access the refuge by personal OSV, although some visitors engaged in fishing tours will access the refuge by four-wheeled drive vans operated by refuge partners. A TTOR OSV permit is required for passage through the Wauwinet Gatehouse. While on Nantucket NWR, OSV use will generally be restricted to the area between the high tide line to the base of the foredunes, as well as established OSV roads that bisect dunes in natural sand valleys (for instance just south of the Great Point Lighthouse where the public restrooms are seasonally located). Over-sand vehicle users are not allowed to drive on dune habitat (Zone 1). Typically, OSVs may park anywhere the berm or crossroads are wide enough so as not to obstruct traffic. Additionally, OSV users are required to deflate tires to 12 pounds per square inch before passing through Wauwinet Gatehouse, and speed restrictions are well posted. Information on annual, seasonal, and daily closures (as well as a guide to safe OSV use) will be disseminated at the Wauwinet Gatehouse and closures will be well marked with informative signage. While on Nantucket NWR, all OSV users are expected to stay apprised of, and respect all closures and regulations. For instance, the current prohibition of dogs on Nantucket NWR also applies to dogs inside OSVs. Refuge staff will carefully monitor OSV use to ensure buffers and boundaries of zones for nesting and staging birds is sufficient to prevent disturbance. Closure areas may be

increased if OSV access along the zone boundaries disrupts birds. If persistent violations or disturbance to natural resources occur, OSV access may be eliminated.

(f) Why is the use being proposed?
Recreational fishing is identified as a priority public use in the National Wildlife Refuge System Improvement Act of 1997. Nantucket NWR is a premier destination for fishing and attracts visitors from all over the country. The refuge is located on the tip of Great Point, and is well known for the rip currents that make for excellent fishing. This area, though, also has a fairly consistent seal population which is drawn to the point because of the fish populations. Offering opportunities to fishermen at Nantucket NWR will increase visitor appreciation and awareness of the importance of this site to the National Wildlife Refuge System. Working with partners to hold fishing events will also increase the number of people participating in this priority public use on the refuge.

AVAILABILITY OF RESOURCES:

Recreational fishing is one of the primary reasons people visit the refuge. It occurs on the refuge with little involvement of refuge staff. Updated, friendly signage and current information is necessary to clarify refuge boundaries, seasonal closures, and permitted activities. The estimated costs of allowing this use is fairly small because there is little infrastructure involved and the presence of seasonal refuge and TTOR staff increases voluntary compliance. Other than working with partners to plan and conduct special fishing events, the administration of this use is done collectively in conjunction with other uses.

Purchase new signage			$5,000
Install new signage			$1,000
Total Initial Cost of Program:			**$6,000**
Maintain signage and Web site communication			$1,000
Occasional law enforcement presence	1 staff	40 hours	$2,000
Seasonal staff presence	1 staff	200 hours	$5,000
Fuel and Vehicle Costs			$1,000
Total Annual Cost of Program:			**$9,000**

ANTICIPATED IMPACTS OF THE USE:

Potential impacts of the use include erosion and soil compaction if access is by OSV, wildlife disturbance, and littering. Some disturbance of roosting and feeding shorebirds probably occurs (Burger 1981) but this will be minimized if closed areas are respected and OSV speed limits are obeyed. Discarded fishing line and other fishing litter can entangle migratory birds and marine mammals and cause injury and death (Gregory 1991). Litter also impacts the visual experience of visitors (Marion and Lime 1986). Conflicts with seals over fish have occurred in the past and seem to be becoming more frequent. Closures to reduce conflict between angles and seals will be established and maintained. Information about seal behavior will be provided to anglers to reduce conflict and protect visitors who comply with refuge regulations. Several enforcement issues may result from the use, including trampling of vegetation following trespass into closed areas, illegal taking of fish (undersized, over limit), illegal fires, and disorderly conduct.

There are impacts to refuge wildlife, vegetation, and soils from pedestrian and OSV access for visitors engaged in fishing. These are described below.

Potential Pedestrian Travel Impacts

Potential Direct Impacts
Pedestrian travel has the potential of impacting shorebird, waterfowl, and other migratory bird populations feeding and resting near the trails and on beaches during certain times of the year. Pedestrians can also impact seals resting on the beach if they get too close. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). Response of wildlife to human activities includes: departure from site

(Owen 1973, Burger 1981, Kaiser and Fritzell 1984, Korschgen et al.1985, Henson and Grant 1991, Kahl 1991, Klein 1993), use of sub-optimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Korschgen et al. 1985, Morton et al. 1989, Ward and Stehn 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990).

Numerous studies have documented that migratory birds are disturbed by human activity on beaches. Erwin (1989) documented disturbance of common terns and skimmers and recommended that human activity be restricted a distance of 100 meters around nesting sites. Klein (1993) in studying waterbird response to human disturbance found that as intensity of disturbance increased, avoidance response by the birds increased and found that out of vehicle activity to be more disruptive than vehicular traffic. Pfister et al. (1992) found that the impact of disturbance was greater on species using the heavily disturbed front side of the beach, with the abundance of the impacted species being reduced by as much as 50 percent. Roberton et al. (1980) discovered, in studying the effects of recreational use of shorelines on nesting birds, that disturbance negatively impacted species composition. Piping plovers which use the refuge heavily are also impacted negatively by human activity. Pedestrians on beaches may crush eggs (Burger 1987, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Dogs may chase plovers (McConnaughey et al. 1990), destroy nests (Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980). Other studies have shown that if pedestrians cause incubating plovers to leave their nest, the eggs can overheat (Bergstrom 1991) or the eggs can cool to the point of embryo death (Welty 1982). Pedestrians have been found to displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993).

The Delaware Natural Heritage Program, Division of Fish & Wildlife and the Department of Natural Resources and Environmental Control prepared a document on the "The Effects of Recreation on Birds: A literature Review" which was completed in April of 1999. The following information was referenced from this document:

Several studies have examined the effects of recreation on birds using shallow-water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger 1981; Burger 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1995, 1997; Burger & Gochfeld 1998). Overall, the existing research clearly demonstrates that disturbance from recreation activities always have at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger 1981, 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1997; Burger & Gochfeld 1998). The findings that were reported in these studies are summarized as follows in terms of visitor activity and avian response to disturbance.

Presence: Birds avoided places where people were present and when visitor activity was high (Burger 1981; Klein et al. 1995; Burger & Gochfeld 1998).

Distance: Disturbance increased with decreased distance between visitors and birds (Burger 1986), though exact measurements were not reported.

Approach Angle: Visitors directly approaching birds on foot caused more disturbance than visitors driving by in vehicles, stopping vehicles near birds, and stopping vehicles and getting out without approaching birds (Klein 1993). Direct approaches may also cause greater disturbance than tangential approaches to birds (Burger & Gochfeld 1981; Burger et al. 1995; Knight & Cole 1995a; Rodgers & Smith 1995, 1997).

Noise: Noise caused by visitors resulted in increased levels of disturbance (Burger 1986; Klein 1993; Burger & Gochfeld 1998), though noise was not correlated with visitor group size (Burger & Gochfeld 1998).

The proposed use has the potential of intermittently interrupting the feeding habits of a variety of shorebirds, gulls, and terns, but encounters between pedestrians and migratory birds will be temporary. Refuge staff will manage visitor access via seasonal closures to minimize disturbance to nesting, resting, and foraging waterbirds on the refuge.

Pedestrian use also has the potential to disturb loafing seals. Gray and harbor seals haul-out on the refuge year round. A 150-foot buffer around all seals is required by the National Oceanic Atmospheric Administration to ensure compliance with the Marine Mammals Protection Act.

Pedestrian Indirect Impacts

Heavy beach use can dry out the sand and contribute to beach erosion. Trash left on the beach, particularly food or wrappers can attract predators that prey on nesting piping plovers and least terns or roosting shorebirds. Impacts of walking are likely to be minimal if conducted in accordance with refuge regulations. The new trail we propose to establish is on an existing unauthorized trail. The remaining unauthorized trails will be shut down, reducing the amount of disturbance from walkers through the dune habitat. We will manage refuge closures which restrict pedestrian access to minimize disturbance to priority avian species during critical times of the year. Closures can be expanded or contracted as needed depending on bird activity and results of further disturbance studies.

Potential OSV Impacts

Although a specific study on the effects of OSV use has not been conducted on Nantucket NWR, studies have been done on beaches with similar ecological characteristics. Studies show that OSVs affect the physical and biological processes that take place within the beach ecosystem. Specifically, OSV use on the beach may result in the following negative impacts.

Foredune Profile

Over the long term, OSV use can have a negative effect on foredune growth. Long term OSV use can lead to an abrupt rather than sloping dune base, leaving the dune more susceptible to wave energy and erosion (Anders and Leatherman 1987a). The tracks created by OSV use can also affect the geomorphology of the beach through sand displacement and compaction (Schlacher and Thompson 2008). The amount of sand displaced increases as the number of vehicles (traffic flow) increases. Sand displacement is most pronounced with the first few vehicles (up to 10), and is most crucial near the foredune, where the highest sand displacement occurs, leading to steeper slopes. The use of wide tires with low pressure can reduce some of these impacts (Anders and Leatherman 1987b).

Wrack Habitat and Macroinvertebrates

Living organisms concentrate in the wrack lines that wash up during high tide. For example, bacteria, which play a vital role in breaking down organic matter, are 1,000 times more abundant in the wrack than on bare sand. If OSVs drive over wrack habitat, they may break it up and/or dry it out. Godfrey and Godfrey (1980) found that OSV use reduced the amount of bacteria present by 50 percent and the amount of diatoms in the sand by 90 percent. Steinback et al. (2004/2005) found that while different species of invertebrates respond differently to OSV use (some populations increase while others decrease), the overall abundance of invertebrates is significantly lower in beaches with OSV use. Steinback et al. also found less wrack on beaches with OSV use. Organisms found in the wrack are an important food source for nesting and migrating shorebirds including piping plovers. Over-sand vehicle use has also been shown to directly reduce macroinvertebrate density and diversity (Wolcott and Wolcott 2003, Schlacher et al. 2008), which reduces biological integrity and also may impact birds which forage on these species.

Vegetation

Over-sand vehicle use reduces vegetative cover (Anders and Leatherman 1987a) and species diversity through trampling, and can also result in a slower rate of plant recolonization (Godfrey and Godfrey 1980). Off-road vehicle use can cause soil compaction for ORV use and thus limit moisture and oxygen available for geminating seeds (Gehlhausen and Harper 1998). Plant seeds in trampled and dried out wrack lines may not reproduce. Reduced vegetation likely contributes to increased susceptibility to wave- and wind-driven erosion.

Nesting Birds

The Service's 2009 Five-year Status Review cites disturbance by humans as a continuing widespread and severe threat to Atlantic Coast piping plovers (USFWS 2009). Threats from human beach-users are cited in the final listing rule (USFWS 1985) and described in detail in the revised Atlantic Coast recovery plan (USFWS 1996). Threats to breeding piping plovers from both motorized and non-motorized beach recreation activities are relatively well understood, and recommended management options are described in the *Guidelines for Managing Recreation* (USFWS 1994).

Studies have shown that beach use including use of OSVs negatively impacts productivity of beach-nesting birds, particularly piping plovers. Vehicles have been shown to crush eggs, adults, and chicks (Wilcox 1959, Tull 1984, Burger 1987, Patterson et al. 1991, Shaffer and Laporte 1992). Cairns (1977) found reproductive success of piping plovers was 1.3 to 2.1 fledged young per pair on remote beaches but only 0.7 to 1.1 fledged young per pair on beaches used for recreation in Nova Scotia. Fleming (1984) calculated that fledgling success per nest attempt on beaches in Nova Scotia was significantly reduced from 1.8 to 0.5 young per pair for birds exposed to low and high recreational activity, respectively. He defined low activity as 0-20 visits per week and high activity as 30 or more visits per week by people and their vehicles. Fleming also found that piping plover chick survivorship was significantly decreased by higher levels of recreational activity. His results showed that most chick loss occurred between the ages of 10-17 days; he speculated that high levels of recreational activity caused mortality of chicks by interfering with feeding during a critical period of energy demand. MacIvor et al. (1987) observed piping plovers on North Beach in Chatham, Massachusetts. Following separation from the mainland during a 1987 storm, this area, which had received extensive OSV use, became inaccessible to vehicles. In 1987, 50 percent of plover pairs shifted their nest sites to areas that were not available for nesting in 1985 or 1986 due to OSV traffic. Further, all three least tern colonies were also in locations that were formerly unavailable due to OSV use. Six years of data collected by Strauss et al. (1986) in Barnstable, Massachusetts show that in their study area, the number of fledglings per nesting pair of plovers in an area with only light pedestrian use was 0.67, compared with 0.32 in an adjacent area with heavy OSV use. Their study also shows that while adult plovers will often move their chicks to feeding habitat with lower levels of disturbance, chicks moved more than 200 meters have half the probability of fledging than those moved less than 200 meters.

It has been documented that piping plover chicks will tend to run along ruts caused by vehicles and remain motionless as vehicles approach (USFWS 1996). Piping plover chicks may also have difficulty crossing deep ruts and moving quickly enough out of a vehicles path. Additionally, piping plovers tend not to reach their full habitat carrying capacity on beaches where vehicles are allowed during the nesting and brood rearing periods (USFWS 1996).

Migrating Birds

Many species of shorebirds (*Charadriiformes*) that breed in North America migrate up to 30,000 kilometers annually, traveling from non-breeding grounds as far south as Argentina to breeding grounds as far north as the Arctic Ocean (Brown et al. 2001, Morrison 1984, Myers et al. 1987). During these long distance migrations, shorebirds rely on strategically located stopover sites which provide abundant food and adjacent resting habitat (Helmers 1992, Myers et al. 1987, Senner & Howe 1984). Coastal stopover sites in particular are increasingly being subjected to development and human disturbance, and loss of suitable stopover habitat may contribute to declines in local abundance and overall populations of shorebirds in North America (Brown et al. 2001, Myers et al. 1987, Pfister et al. 1992).

Studies have shown reduced numbers of migrating shorebirds in response to vehicle traffic on beaches. For example, Pfister et al. (1992) documented long term declines in abundance of red knots (*Calidris canutus*) and short-billed dowitchers (*Limnodromus griseus*) on Plymouth Beach, Massachusetts, that exceeded declines at comparable, less disturbed sites, as well as the overall eastern North American population. Vehicle presence also caused semipalmated sandpipers (*Calidris pusilla*) and sanderlings (*Calidris alba*) to alter their distribution on the beach. A study at Parker River NWR in Newburyport, Massachusetts found that vehicle use on beaches disturbed roosting shorebirds more than pedestrian use (Harrington and Drilling 1996). Off road vehicle use reduces food resources and increases disturbance, contributing to lower weight shorebirds. Lower weight individuals are less likely to successfully complete their long-distance migrations (Harrington and Drilling 1996). The North Atlantic Shorebird Plan identified protection of food resources and minimizing human disturbance as high priority management objectives (Clark and Niles 2003). We have not quantified migrating shorebird use of Nantucket NWR, but data on species use, and potential disturbance, may be collected in future years.

While we acknowledge the potential impacts of OSV on the physical and biological characteristics of a beach ecosystem, Nantucket NWR is only about 21 acres, and most impacts from OSV on this small area are not likely to detract significantly from the larger landscape. However, we are committed to reducing direct disturbance on nesting, staging, and migrating birds (and seals), as well as protecting the integrity of the dune system and wrack line as much as possible. Seasonal closures for bird and seals, and prohibitions on OSV access in the dune system and along the wrack line will minimize the overall impact of OSV use on Nantucket NWR. The Trustees of Reservations has produced and distributes a guide to OSV use which likely increases voluntary compliance and user safety, and may further lessen disturbance to natural resources. The guide is available at: *http://www.thetrustees.org/pages/293_coskata_coatue_wildlife_refuge.cfm* (accessed March 2011).

PUBLIC REVIEW AND COMMENT:

As part of the comprehensive conservation planning process for Nantucket NWR, this compatibility determination underwent extensive public review, including a comment period of 30 days that followed the release of the draft Comprehensive Conservation Plan and Environmental Assessment.

DETERMINATION (CHECK ONE BELOW):

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Areas that are open to this use (and to OSV, which is the primary means of access for recreational fishermen) will be evaluated on an annual, seasonal, and sometimes daily basis and will be influenced by beach geomorphology and wildlife use. Anglers will be expected to comply with these closures. Updates on closures will be disseminated at the Wauwinet Gatehouse and on the refuge Web site.

Occasional law enforcement patrol and regular staff and partner presence should minimize potential violations of refuge closures and curtail illegal fires, littering, and disorderly conduct. Periodic evaluations will be done to insure that activities associated with the use are not causing unacceptable adverse impacts to the natural resources. Unacceptable levels of violations or disturbance may result in eliminating or restricting public fishing. Occasional law enforcement patrols and regular refuge and TTOR presence should minimize potential violations of refuge closures and other regulations (speed limits, tire deflation requirements, prohibition of dogs). If persistent violations or disturbance to natural resources occur, OSV access will be eliminated.

Public meetings with local fishing clubs and interested parties will facilitate voluntary compliance of regulations. Recreational fishing events will be held only with the sponsorship of the Service and at times, in places, and with methods deemed to be in compliance with State and Federal wildlife regulations and other refuge regulations.

Continued permitting through TTOR at the Wauwinet Gatehouse will assist the dissemination of information about closures and other public use regulations on Nantucket NWR and also provide a means of tracking the number of annual OSV users.

Refuge staff will carefully monitor OSV use to ensure buffers and boundaries of zones for nesting and staging birds are sufficient to prevent disturbance. Closure areas may be increased if OSV access along the zone boundaries disrupts birds or seals. Areas where OSV use are allowed will be evaluated on an annual, seasonal, and sometimes daily basis and will be influenced by beach geomorphology as well as wildlife use. Updates on closures will be disseminated at the Wauwinet Gatehouse and on the refuge Web site.

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. Littering, dumping, and abandoning property are prohibited by Federal regulation at 50 C.F.R. 27.93.94.

JUSTIFICATION:

Recreational fishing is a priority public use identified in the National Wildlife Refuge System Improvement Act of 1997. Nantucket NWR is world renowned for its offshore fish resources and allowing this use will foster a greater awareness and appreciation of the importance of this site to the National Wildlife Refuge System. Costs associated with administering public fishing and likely visitor impacts are both minimal. This use will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose of Nantucket NWR. Therefore, it is the determination of the Service that recreational fishing, at the discretion

of the refuge manager, is a compatible use and contributes to the purposes for which Nantucket NWR was established.

We do not expect pedestrian access to materially interfere with or detract from the mission of the National Wildlife Refuge System, nor diminish the purpose for which the refuge was established. It will not pose significant adverse effects on refuge resources, nor interfere with public use of the refuge, nor cause an undue administrative burden. These uses facilitate wildlife observation and photography, and will provide compatible recreational opportunities for visitors to observe and learn about wildlife and habitats firsthand.

Over-sand vehicle use facilitates five priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997. Allowing controlled OSV access will facilitate visitation, fostering a greater awareness and appreciation of the importance of this site to the National Wildlife Refuge System. Occasional law enforcement patrol and regular Service and TTOR presence should minimize potential violations of refuge regulations and closures, as previously described.

The vehicle limitations outlined in this determination provide maximum protection to prime nesting habitat for piping plovers and terns, as well as minimize disturbance to staging terns and resting seals. With proper monitoring, this use is not likely to materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose of Nantucket NWR. Therefore, it is the determination of the Service that OSV use, at the discretion of the refuge manager, conducted as described including with stipulations, is sufficient.

Costs associated with administering fishing and resultant likely visitor impacts are minimal, although a staff person will be needed to deliver these programs to residents of Nantucket and refuge visitors. These uses will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose of Nantucket NWR. Therefore, it is the determination of the Service that these uses, at the discretion of the refuge manager, are compatible uses and contribute to the purposes for which Nantucket NWR was established.

SIGNATURE:

Refuge Manager: _____ (Signature) 7/25/2012 (Date)

CONCURRENCE:

Regional Chief: _____ (Signature) 9/11/2012 (Date)

MANDATORY 15 YEAR RE-EVALUATION DATE: 9/11/2027

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FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Research Conducted by Non-Service Personnel

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

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

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

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✔ No _____

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

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

Not Appropriate _____ **Appropriate** ✔

Refuge Manager: Elizabeth A. Herland Date: 7/25/2012

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: Marvin F. Moore Date: 8/12/2012

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Research Conducted by Non-refuge Personnel

NARRATIVE:

The Service encourages and supports research and management studies on refuge lands that will improve and strengthen decisions on managing natural resources. The refuge manager encourages and seeks research that clearly relates to approved refuge objectives, improves habitat management, and promotes adaptive management. Priority research addresses information on better managing the Nation's biological resources that generally are important to agencies of the Department of Interior, the National Wildlife Refuge System, and State Fish and Game Agencies that address important management issues, or demonstrate techniques for managing species or habitats.

Researchers will submit a final report to the refuge on completing their work. For long-term studies, we may also require interim progress reports. We expect researchers to publish in peer-reviewed publications. All reports, presentations, posters, articles, or other publications will acknowledge the refuge system and the Nantucket NWR as partners in the research. All posters will adhere to Service graphics standards. We will insert this requirement to ensure that the research community, partners, and the public understand that the research could not have been conducted without the refuge having been established, its operational support, and that of the refuge system.

COMPATIBILITY DETERMINATION

USE:

Research Conducted by Non-Service Personnel

REFUGE NAME:

Nantucket National Wildlife Refuge

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

Nantucket NWR was established in 1973 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes [U.S.C. § 667b].

REFUGE PURPOSE(S):

Nantucket NWR's purpose is its ". . . particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b-d, as amended)

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

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.

DESCRIPTION OF USE:

(a) What is the use?
The use is the conduct of scientific research on the refuge by non-Service personnel.

(b) Is the proposed use a priority public use?
Research conducted by non-Service personnel is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

(c) Where will the use be conducted?
The location of the research will vary depending on the individual research project that is being conducted. The entire refuge is open and available for scientific research. 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, or may span more than one refuge or include lands outside the refuge. The research location will be limited to those areas of the refuge that are necessary to conduct the research project. Because of the need to close parts of the refuge spatially or temporally to protect refuge wildlife, some research may not be able to be conducted on the refuge.

(d) When will the use be conducted?
The timing of the research will depend entirely on the individual research project's approved design. Scientific research will be allowed to occur on the refuge throughout the year, unless it conflicts with the protection of seals, terns, plovers, and other shorebirds and seabirds of management priority. An individual research project

could be short-term in design, requiring one or two visits over the course of a few days. Other research projects could be multiple year studies that require daily visits to the study site. The timing of each individual research project will be limited to the minimum required to complete the project.

(e) How will the use be conducted?
The methods of the research will depend entirely on the individual research project that is conducted. The methods and study design of each research project will be reviewed and scrutinized before it will be allowed to occur on the refuge. No research project will be allowed if it does not have an approved scientific method, if it negatively affects endangered species, marine mammals, or migratory birds, or if it compromises public health and safety.

The use is primarily facilitated by pedestrian walking access or by operation of over-sand vehicles, which consists of driving 4-wheel drive vehicles on designated areas of the refuge beach and inland sand roads. Over-sand vehicle use is currently the most common means of access for visitors to Nantucket NWR. However, visitors can (and some do) park on adjacent property owned by the Trustees of Reservations (TTOR) and walk to the refuge. The distance can range from 5 miles (if one parks at the Wauwinet Gatehouse) to mere steps (if one parks close to the property boundary). It is approximately 300 meters from the south boundary to the north boundary of Nantucket NWR. Access to Nantucket NWR can also occur by boat, but boat landings are not common. Over-sand vehicles are also used by Service staff and TTOR when conducting biological surveys, roving interpretation, and natural and cultural history tours.

TTOR requires OSV permits and regulates passage through the Wauwinet Road Gatehouse which provides the only OSV access to Nantucket NWR, Coskata-Coatue Wildlife Refuge (owned by TTOR) and Coatue Wildlife Refuge (owned by Nantucket Conservation Foundation).

(f) Why is this use being proposed?
Research by non-Service personnel is conducted by colleges, universities, Federal, State, local agencies, non-governmental organizations, and qualified members of the public to further the understanding of the natural environment and to improve the management of the refuge's natural resources. Much of the information generated by the research is applicable to management on and near the refuge.

The Service will encourage and support research and management studies on refuge lands that will improve and strengthen natural resource management decisions. The refuge manager will encourage and seek research relative to approved refuge objectives that clearly improves land management and promotes adaptive management. Priority research addresses information that is important to agencies of the Department of Interior, the U.S. Fish and Wildlife Service, the National Wildlife Refuge System, State Fish and Game agencies and other agencies that are responsible for managing natural resources.

The refuge will also consider research for other purposes that may not be directly related to refuge-specific objectives, but contribute to the broader enhancement, protection, use, preservation, and management of native populations of fish, wildlife, and plants, and their natural diversity within the region or flyway. These proposals must comply with the Service's governing laws, regulations, and policies.

The refuge will maintain a list of research needs that will be provided to prospective researchers or organizations upon request. Refuge support of research directly related to refuge objectives may take the form of funding, in-kind services such as housing or use of other facilities, direct staff assistance with the project in the form of data collection, provision of historical records, conducting management treatments, or other assistance as appropriate.

AVAILABILITY OF RESOURCES:

The bulk of the cost for research is incurred in staff time to review research proposals, coordinate with researchers and write Special Use Permits. In some cases, a research project may only require one day of staff time to write a Special Use Permit. In other cases, a research project may take an accumulation of weeks, as the refuge biologist must coordinate with students and advisors and accompany researchers on site visits.

Annual costs associated with the administration of outside research on the refuge are estimated below:

Research program administration	1 staff	40 hours	$2,000
Total Annual Cost of Program:			**$2,000**

ANTICIPATED IMPACTS OF THE USE:

The Service encourages approved research to further the understanding of the natural resources. Research by other than Service personnel adds greatly to the information base for refuge managers to make proper decisions. Disturbance to wildlife and vegetation by researchers could occur through observation, mist-netting, banding, and accessing the study area by foot, boat, or vehicle. These impacts could be exacerbated by multiple concurrent research projects. It is possible that direct mortality could result as a by-product of research activities. Mist-netting, for example, can cause stress, especially when birds are captured, banded, and weighed. There have been occasional mortalities to these birds, namely when predators such as raccoons and cats reach the netted birds before researchers do.

Minimal impact will occur when research projects that are previously approved are carried out according to the stipulations stated in the Special Use Permit issued for each project. Overall, however, allowing well designed and properly reviewed research to be conducted by non-Service personnel is likely to have very little impact on refuge wildlife populations. If the research project is conducted with professionalism and integrity, potential adverse impacts are likely to be outweighed by the knowledge gained about an entire species, habitat, or public use.

Because this activity will be supervised by Service or partner staff, impacts of research will likely be minimal if conducted in accordance with refuge regulations. In the event of persistent disturbance to habitat or wildlife, the activity will be further restricted or discontinued.

Potential Pedestrian Travel Impacts

Potential Direct Impacts

Pedestrian travel has the potential of impacting shorebird, waterfowl, and other migratory bird populations feeding and resting near the trails and on beaches during certain times of the year. Pedestrians can also impact seals resting on the beach if they get too close. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). Response of wildlife to human activities includes: departure from site (Owen 1973, Burger 1981, Kaiser and Fritzell 1984, Korschgen et al.1985, Henson and Grant 1991, Kahl 1991, Klein 1993), use of sub-optimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Korschgen et al. 1985, Morton et al. 1989, Ward and Stehn 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990).

Numerous studies have documented that migratory birds are disturbed by human activity on beaches. Erwin (1989) documented disturbance of common terns and skimmers and recommended that human activity be restricted a distance of 100 meters around nesting sites. Klein (1993) in studying waterbird response to human disturbance found that as intensity of disturbance increased, avoidance response by the birds increased and found that out of vehicle activity to be more disruptive than vehicular traffic. Pfister et al. (1992) found that the impact of disturbance was greater on species using the heavily disturbed front side of the beach, with the abundance of the impacted species being reduced by as much as 50 percent. Roberton et al. (1980) discovered, in studying the effects of recreational use of shorelines on nesting birds, that disturbance negatively impacted species composition. Piping plovers which use the refuge heavily are also impacted negatively by human activity. Pedestrians on beaches may crush eggs (Burger 1987, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Dogs may chase plovers (McConnaughey et al. 1990), destroy nests (Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980). Other studies have shown that if pedestrians cause incubating plovers to leave their nest, the eggs can overheat (Bergstrom 1991) or the eggs can cool to the point of embryo death (Welty 1982). Pedestrians have been found to displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993).

The Delaware Natural Heritage Program, Division of Fish & Wildlife and the Department of Natural Resources and Environmental Control prepared a document on the "The Effects of Recreation on Birds: A literature Review" which was completed in April of 1999. The following information was referenced from this document:

Several studies have examined the effects of recreation on birds using shallow water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger 1981; Burger 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1995, 1997; Burger & Gochfeld 1998). Overall, the existing research clearly demonstrates that disturbance from recreation activities always have at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger 1981, 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1997; Burger & Gochfeld 1998). The findings that were reported in these studies are summarized as follows in terms of visitor activity and avian response to disturbance.

Presence: Birds avoided places where people were present and when visitor activity was high (Burger 1981; Klein et al. 1995; Burger & Gochfeld 1998).

Distance: Disturbance increased with decreased distance between visitors and birds (Burger 1986), though exact measurements were not reported.

Approach Angle: Visitors directly approaching birds on foot caused more disturbance than visitors driving by in vehicles, stopping vehicles near birds, and stopping vehicles and getting out without approaching birds (Klein 1993). Direct approaches may also cause greater disturbance than tangential approaches to birds (Burger & Gochfeld 1981; Burger et al. 1995; Knight & Cole 1995a; Rodgers & Smith 1995, 1997).

Noise: Noise caused by visitors resulted in increased levels of disturbance (Burger 1986; Klein 1993; Burger & Gochfeld 1998), though noise was not correlated with visitor group size (Burger & Gochfeld 1998).

The proposed use has the potential of intermittently interrupting the feeding habits of a variety of shorebirds, gulls, and terns, but encounters between pedestrians and migratory birds will be temporary. Refuge staff will manage visitor access via seasonal closures to minimize disturbance to nesting, resting, and foraging waterbirds on the refuge.

Pedestrian use also has the potential to disturb loafing seals. Gray and harbor seals haul-out on the refuge year round. A 150-foot buffer around all seals is required by the National Oceanic Atmospheric Administration to ensure compliance with the Marine Mammals Protection Act.

Pedestrian Indirect Impacts

Heavy beach use can dry out the sand and contribute to beach erosion. Trash left on the beach, particularly food or wrappers can attract predators that prey on nesting piping plovers and least terns or roosting shorebirds. Impacts of walking are likely to be minimal if conducted in accordance with refuge regulations. The new trail we propose to establish is on an existing unauthorized trail. The remaining unauthorized trails will be shut down, reducing the amount of disturbance from walkers through the dune habitat. We will manage refuge closures which restrict pedestrian access to minimize disturbance to priority avian species during critical times of the year. Closures can be expanded or contracted as needed depending on bird activity and results of further disturbance studies

Potential OSV Impacts

Although a specific study on the effects of OSV use has not been conducted on Nantucket NWR, studies have been done on beaches with similar ecological characteristics. Studies show that OSVs affect the physical and biological processes that take place within the beach ecosystem. Specifically, OSV use on the beach may result in the following negative impacts.

Foredune Profile

Over the long term, OSV use can have a negative effect on foredune growth. Long term OSV use can lead to an abrupt rather than sloping dune base, leaving the dune more susceptible to wave energy and erosion (Anders

and Leatherman 1987a). The tracks created by OSV use can also affect the geomorphology of the beach through sand displacement and compaction (Schlacher and Thompson 2008). The amount of sand displaced increases as the number of vehicles (traffic flow) increases. Sand displacement is most pronounced with the first few vehicles (up to 10), and is most crucial near the foredune, where the highest sand displacement occurs, leading to steeper slopes. The use of wide tires with low pressure can reduce some of these impacts (Anders and Leatherman 1987b).

Wrack Habitat and Macroinvertebrates

Living organisms concentrate in the wrack lines that wash up during high tide. For example, bacteria, which play a vital role in breaking down organic matter, are 1,000 times more abundant in the wrack than on bare sand. If OSVs drive over wrack habitat, they may break it up and/or dry it out. Godfrey and Godfrey (1980) found that OSV use reduced the amount of bacteria present by 50 percent and the amount of diatoms in the sand by 90 percent. Steinback et al. (2004, 2005) found that while different species of invertebrates respond differently to OSV use (some populations increase while others decrease), the overall abundance of invertebrates is significantly lower in beaches with OSV use. Steinback et al. also found less wrack on beaches with OSV use. Organisms found in the wrack are an important food source for nesting and migrating shorebirds including piping plovers. Over-sand vehicle use has also been shown to directly reduce macroinvertebrate density and diversity (Wolcott and Wolcott 2003, Schlacher et al. 2008), which reduces biological integrity and also may impact birds which forage on these species.

Vegetation

Over-sand vehicle use reduces vegetative cover (Anders and Leatherman 1987a) and species diversity through trampling, and can also result in a slower rate of plant recolonization (Godfrey and Godfrey 1980). Off-road vehicle use can cause soil compaction for ORV use and thus limit moisture and oxygen available for geminating seeds (Gehlhausen and Harper 1998). Plant seeds in trampled and dried out wrack lines may not reproduce. Reduced vegetation likely contributes to increased susceptibility to wave- and wind-driven erosion.

Nesting Birds

The Service's 2009 Five-year Status Review cites disturbance by humans as a continuing widespread and severe threat to Atlantic Coast piping plovers (USFWS 2009). Threats from human beach-users are cited in the final listing rule (USFWS 1985) and described in detail in the revised Atlantic Coast recovery plan (USFWS 1996). Threats to breeding piping plovers from both motorized and non-motorized beach recreation activities are relatively well understood, and recommended management options are described in the *Guidelines for Managing Recreation* (USFWS 1994).

Studies have shown that beach use including use of OSVs negatively impacts productivity of beach-nesting birds, particularly piping plovers. Vehicles have been shown to crush eggs, adults, and chicks (Wilcox 1959, Tull 1984, Burger 1987, Patterson et al. 1991, Shaffer and Laporte 1992). Cairns (1977) found reproductive success of piping plovers was 1.3 to 2.1 fledged young per pair on remote beaches but only 0.7 to 1.1 fledged young per pair on beaches used for recreation in Nova Scotia. Fleming (1984) calculated that fledgling success per nest attempt on beaches in Nova Scotia was significantly reduced from 1.8 to 0.5 young per pair for birds exposed to low and high recreational activity, respectively. He defined low activity as 0-20 visits per week and high activity as 30 or more visits per week by people and their vehicles. Fleming also found that piping plover chick survivorship was significantly decreased by higher levels of recreational activity. His results showed that most chick loss occurred between the ages of 10-17 days; he speculated that high levels of recreational activity caused mortality of chicks by interfering with feeding during a critical period of energy demand. MacIvor et al. (1987) observed piping plovers on North Beach in Chatham, Massachusetts. Following separation from the mainland during a 1987 storm, this area, which had received extensive OSV use, became inaccessible to vehicles. In 1987, 50 percent of plover pairs shifted their nest sites to areas that were not available for nesting in 1985 or 1986 due to OSV traffic. Further, all three least tern colonies were also in locations that were formerly unavailable due to OSV use. Six years of data collected by Strauss et al. (1986) in Barnstable, Massachusetts show that in their study area, the number of fledglings per nesting pair of plovers in an area with only light pedestrian use was 0.67, compared with 0.32 in an adjacent area with heavy OSV use. Their study also shows that while adult plovers will often move their chicks to feeding habitat with lower levels of disturbance, chicks moved more than 200 meters have half the probability of fledging than those moved less than 200 meters.

It has been documented that piping plover chicks will tend to run along ruts caused by vehicles and remain motionless as vehicles approach (USFWS 1996). Piping plover chicks may also have difficulty crossing deep ruts and moving quickly enough out of a vehicles path. Additionally, piping plovers tend not to reach their full habitat carrying capacity on beaches where vehicles are allowed during the nesting and brood rearing periods (USFWS 1996).

Migrating Birds

Many species of shorebirds (*Charadriiformes*) that breed in North America migrate up to 30,000 kilometers annually, traveling from non-breeding grounds as far south as Argentina to breeding grounds as far north as the Arctic Ocean (Brown et al. 2001, Morrison 1984, Myers et al. 1987). During these long distance migrations, shorebirds rely on strategically located stopover sites which provide abundant food and adjacent resting habitat (Helmers 1992, Myers et al. 1987, Senner & Howe 1984). Coastal stopover sites in particular are increasingly being subjected to development and human disturbance, and loss of suitable stopover habitat may contribute to declines in local abundance and overall populations of shorebirds in North America (Brown et al. 2001, Myers et al. 1987, Pfister et al. 1992).

Studies have shown reduced numbers of migrating shorebirds in response to vehicle traffic on beaches. For example, Pfister et al. (1992) documented long term declines in abundance of red knots (*Calidris canutus*) and short-billed dowitchers (*Limnodromus griseus*) on Plymouth Beach, Massachusetts, that exceeded declines at comparable, less disturbed sites, as well as the overall eastern North American population. Vehicle presence also caused semipalmated sandpipers (*Calidris pusilla*) and sanderlings (*Calidris alba*) to alter their distribution on the beach. A study at Parker River NWR in Newburyport, Massachusetts found that vehicle use on beaches disturbed roosting shorebirds more than pedestrian use (Harrington and Drilling 1996). Off road vehicle use reduces food resources and increases disturbance, contributing to lower weight shorebirds. Lower weight individuals are less likely to successfully complete their long-distance migrations (Harrington and Drilling 1996). The North Atlantic Shorebird Plan identified protection of food resources and minimizing human disturbance as high priority management objectives (Clark and Niles 2003). We have not quantified migrating shorebird use of Nantucket NWR, but data on species use, and potential disturbance, may be collected in future years.

While we acknowledge the potential impacts of OSV on the physical and biological characteristics of a beach ecosystem, Nantucket NWR is only about 21 acres, and most impacts from OSV on this small area are not likely to detract significantly from the larger landscape. However, we are committed to reducing direct disturbance on nesting, staging, and migrating birds (and seals), as well as protecting the integrity of the dune system and wrack line as much as possible. Seasonal closures for bird and seals, and prohibitions on OSV access in the dune system and along the wrack line will minimize the overall impact of OSV use on Nantucket NWR. The Trustees of Reservations has produced and distributes a guide to OSV use which likely increases voluntary compliance and user safety, and may further lessen disturbance to natural resources. The guide is available at: *http://www.thetrustees.org/pages/293_coskata_coatue_wildlife_refuge.cfm* (accessed March 2011).

PUBLIC REVIEW AND COMMENT:

As part of the comprehensive conservation planning process for Nantucket NWR, this compatibility determination underwent extensive public review, including a comment period of 30 days that followed the release of the draft Comprehensive Conservation Plan and Environmental Assessment.

DETERMINATION (CHECK ONE BELOW):

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

All researchers will be required to submit a detailed research proposal following Service Policy (FWS Refuge Manual Chapter 4 Section 6). The refuge must be given at least 45 days to review and decide whether to approve proposals before initiation of research. If collection of wildlife is involved, the refuge must be given 60 days to review and decide whether to approve the proposal. The Service cannot guarantee that it will review or approve proposals not submitted within these timeframes. Proposals will be prioritized and approved based on need, benefit, compatibility, and funding required.

Special Use Permits (SUP) will be issued for all research conducted by non-Service personnel. The SUP will list all conditions that are necessary to ensure compatibility. The Special Use Permits will also identify a schedule for periodic progress reports and the submittal of a final report or scientific paper. The regional refuge biologists, other Service Divisions, and State agencies will be asked to review and comment on proposals.

All researchers will be required to obtain appropriate State and Federal permits.

Any research project may be terminated at any time for non-compliance with the conditions of the SUP, or modified, redesigned, relocated, or terminated upon determination by the refuge manager that the project is causing unanticipated adverse impacts to wildlife, wildlife habitat, approved priority public uses, or other refuge management activities.

All work with endangered species will require the proper permits from Federal or State government.

JUSTIFICATION:

The Service encourages approved research to further understanding of refuge natural resources. Research by non-Service personnel, guided by the stipulations listed above, adds greatly to the information base for refuge managers to make proper decisions. This use will potentially contribute to the refuge's purpose in carrying out migratory bird management. While some research activities may cause minimal disturbance to wildlife or result in the loss of specific individuals, this impact will be more than offset by the value of the research to managers and future generations. Research conducted by non-Service personnel will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

SIGNATURE:

Refuge Manager: Elizabeth Dr Harland (Signature) 7/25/2012 (Date)

CONCURRENCE:

Regional Chief: Scott B. Kahan (Signature) 9/11/2012 (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE:

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FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Commercial Guides, Tours, and Outfitting

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

Decision criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✔	
(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: Elizabeth A. Herland Date: 7/25/2012

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: Marvin E. Moriarty Date: 8/1/2012

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Commercial Guides, Tours, and Outfitting

NARRATIVE

Service policy allows appropriate commercial uses of a refuge if they are a refuge management economic activity (see 50 CFR 25.12), if they directly support a priority general public use, or if they are specifically authorized by statute (50 CFR 29.1). Commercial guides and guided tours are not a priority public use themselves, but help facilitate wildlife observation, photography, fishing, and interpretation, which are four of the six public uses given priority by the Refuge System Improvement Act of 1997.

The Trustees of Reservations (TTOR), a non-profit conservation organization, have been operating natural history, cultural history, and fishing tours from their adjacent property in partnership with the refuge for many years. As part of a long-standing partnership, TTOR provides wildlife and habitat management assistance to the refuge, including establishing beach closures for seals and piping plovers. Their staff presence on the refuge has resulted in greater awareness and understanding of refuge policies and compliance with those policies. The Trustees of Reservation's commercial use of the refuge has been beneficial to the refuge's management goals and has also enhanced the refuge's ability to provide opportunities for quality, wildlife-dependent recreation to visitors. In the future, TTOR, other conservation organizations, concessionaires, and/or permittees could provide guided tours of the refuge, including the access to the refuge through the lands of Nantucket Conservation Foundation and TTOR or by boat. Commercial guides, concessionaires or permittees providing fishing or photography lessons and guidance would also support the public's use of the refuge for wildlife-dependent public use. All commercial guides and all organizations providing tours to the public must first obtain a Special Use Permit from the refuge manager or be selected by the refuge manager as a concessionaire. All activities will be monitored for potential impacts to wildlife and habitat and adjustments made as necessary.

COMPATIBILITY DETERMINATION

USE:

Commercial Guides, Tours, and Outfitting

REFUGE NAME:

Nantucket National Wildlife Refuge

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

Nantucket NWR was established in 1973 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes [U.S.C. § 667b].

REFUGE PURPOSE(S):

Nantucket NWR's purpose is its ". . . particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b-d, as amended)

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

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.

DESCRIPTION OF USE:

(a) What is the use?
The use is formal, guided natural history or cultural history tours on refuge lands that are conducted by a conservation partner, concessionaire, or private company for profit. It also includes commercial guiding and outfitting, primarily for but not limited to fishing, and also conducted for profit, where the expertise of the leader enhances the experience of the individual or party. In all cases, the participants pay a fee to participate in the individual guide or to the company/organization leading the tour.

The use is primarily facilitated by operation of over-sand vehicles, which consists of driving 4-wheel drive vehicles on designated areas of the refuge beach and inland sand roads. Over-sand vehicle use is currently the most common means of access for visitors to Nantucket NWR. However, visitors can (and some do) park on adjacent property owned by the Trustees of Reservations (TTOR) and walk to the refuge The distance can range from 5 miles (if one parks at the Wauwinet Gatehouse) to mere steps (if one parks close to the property boundary). It is approximately 300 meters from the south boundary to the north boundary of Nantucket NWR. Access to Nantucket NWR can also occur by boat, but boat landings are not common. Over-sand vehicles are also used by Service staff and TTOR when conducting biological surveys, roving interpretation, and natural and cultural history tours.

TTOR requires OSV permits and regulates passage through the Wauwinet Road Gatehouse which provides the only OSV access to Nantucket NWR, Coskata-Coatue Wildlife Refuge (owned by TTOR) and Coatue Wildlife Refuge (owned by Nantucket Conservation Foundation).

(b) Is the use a priority public use?
Commercially guided tours are not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). While the use is not a priority use, it does support several wildlife-dependent priority uses, particularly fishing, wildlife observation, interpretation, and photography.

(c) Where would the use be conducted?
Guided tours and outfitting could occur on any areas of the refuge that are open to public access. Public access is dictated by wildlife use and presence of sensitive vegetation. In general, much of the intertidal area and established vehicle trails through the dune system are open (at least to pedestrian traffic) for much of the year. Some areas of beach berm are closed seasonally to protect seals, nesting shorebirds, and seabirds. Public access is restricted from dune habitat to minimize trampling of American beach grass (*Ammophila breviligulata*), although the refuge plans to establish an authorized trail from the lighthouse to the beach on the Atlantic Ocean. Visitors should contact Eastern Massachusetts NWR Complex staff for up-to-date information on seasonal closures. Information about closures will also be available on the refuge Web site or through TTOR, who operates the gatehouse at the entrance to the Coskata-Coatue Peninsula and through whose property all refuge visitors must pass if traveling to the refuge by over-sand vehicle or on foot.

Over-sand vehicle use is generally permitted on the beach berm from the high tide line to the base of the foredunes, as well as on established, officially designated OSV roads that bisect dunes in natural sand valleys. Over-sand vehicle users are not allowed to drive on dune habitat (Zone 1) or in the wrack line, and are often prohibited from the very northern tip of the refuge to protect seals (Zone 3). Specific OSV traffic routes in other zones have varied annually and seasonally depending on wildlife use and public safety. For instance, Federal and State regulations require minimum buffer areas for various nesting species of shorebirds and seabirds. Depending on where birds nest and the shifting geomorphology of the dunes and intertidal habitat, it may be impossible to safely allow OSV access along a beach if the berm is narrow and the buffer required by nesting birds effectively extends below the high water line. Buffer distances may differ during the incubation period (when birds are tending to eggs and may require less area) and the chick rearing period (when some species are mobile foragers and may need a larger buffer of undisturbed habitat), resulting in changes in access within a season. Generally, Zone 4 will be closed to OSV access seasonally to protect nesting birds, and Zone 5 will be closed to OSV access seasonally to minimize disturbance to staging birds. However, locations of these closures may shift annually or within a season.

Additionally, sometimes nesting birds on Coskata-Coatue Wildlife Refuge (directly south of Nantucket NWR) will result in OSV closures and essentially limit OSV access to all northerly areas as well. Over-sand vehicle users will be informed at the Wauwinet Gatehouse of areas open to OSV travel, but because the location of nesting birds and changes in geomorphology cannot always be predicted, sudden changes in access may occur.

(d) When would the use be conducted?
The refuge is open to approved commercial guiding, touring, and outfitting from ½ hour before sunrise to ½ hour after sunset. The refuge is open to surf fishing 24 hours a day. The majority of the guided tours would take place from Memorial Day to Labor Day. Commercial fishing guides and outfitters would most likely be assisting anglers April through October. The Service may limit the number of daily tours and/or guided visits to ensure a high quality experience is achieved by refuge visitors.

(e) How would the use be conducted?
This use can be conducted in a number of ways. Guided tours consist of a group of people with a leader or guide walking on established trails learning about plant and wildlife species, natural processes and wetlands, and/or cultural history. TTOR currently conducts interpretation on Nantucket NWR through seasonal natural and cultural history guided tours. They also conduct tours of the Great Point Lighthouse, which is an inholding on the refuge. They have also conducted fishing tours, which are designed in part to teach people how to fish. Guiding can also be conducted by commercial guides and outfitters who provide intensive, individual guidance

to refuge visitors. The primary type of guiding/outfitting would be saltwater fishing, as the refuge is a well-known recreational fishing location. Commercial guides could also be used by individuals to enhance individual experiences for other priority public uses, including photography or bird watching. In all cases, these guides are paid a fee for their professional expertise, and they transport their customers to the refuge in an over-sand vehicle or by boat or kayak. Tours which are not currently being conducted but which could in the future would include seal tours and kayaking/boat tours. All these guides and tour operators will be required to obtain a Special Use Permit, comply with refuge regulations and comply with State and Federal guidelines for terns and piping plover protection.

Refuge visitors of such tours would primarily access the refuge by four-wheeled drive vans operated by refuge partners or those granted a special use permit. All OSV users must have a TTOR permit (required for passage through the Wauwinet Gatehouse). While on Nantucket NWR, OSV use will generally be restricted to the area between the high tide line to the base of the foredunes, as well as established OSV roads that bisect dunes in natural sand valleys (for instance just south of the Great Point Lighthouse where the public restrooms are seasonally located). Over-sand vehicle users are not allowed to drive on dune habitat (Zone 1). Typically, OSVs may park anywhere the berm or crossroads are wide enough so as not to obstruct traffic. Additionally, OSV users are required to deflate tires to 12 pounds per square inch before passing through Wauwinet Gatehouse, and speed restrictions are well posted. Information on annual, seasonal, and daily closures (as well as a guide to safe OSV use) will be disseminated at the Wauwinet Gatehouse and closures will be well marked with informative signage. While on Nantucket NWR, all OSV users are expected to stay apprised of, and respect all closures and regulations. For instance, the current prohibition of dogs on Nantucket NWR also applies to dogs inside OSVs. Refuge staff will carefully monitor OSV use to ensure buffers and boundaries of zones for nesting and staging birds is sufficient to prevent disturbance. Closure areas may be increased if OSV access along the zone boundaries disrupts birds. If persistent violations or disturbance to natural resources occur, OSV access may be eliminated.

(f) Why is this use being proposed?
Access to the refuge is limited to individuals who have over-sand vehicles and obtain either a daily or annual permit from TTOR through whose property (as well as that of the Nantucket Conservation Foundation), all visitors must pass. The tours and individual guided sessions will increase understanding and appreciation of the refuge, its resources, and will increase compliance with refuge regulations.

AVAILABILITY OF RESOURCES:

Administer SUPs and provide oversight	1 staff	150 hours	$6,000
Occasional law enforcement presence	1 staff	40 hours	$2,000
Fuel and Vehicle Costs			$1,000
Total Annual Cost of Program:			**$9,000**

ANTICIPATED IMPACTS OF THE USE:

The proposed use is anticipated to have the same level of impacts than those under the primary public uses, because the access and activities are very similar. Because this activity will be supervised by Service or partner staff, impacts of tours will likely be minimal if conducted in accordance with refuge regulations. Possible impacts include disturbing wildlife, removing or trampling of plants, littering, vandalism, and entrance into closed areas. In the event of persistent disturbance to habitat or wildlife, the activity will be further restricted or discontinued. Schoolchildren or participants in natural history tours conducted by partners may cause some disturbance to refuge visitors, but the amount of disturbance is expected to be minimal as the number of tours that will occur on the refuge will not exceed more than two a day, and do not occur on a daily basis.

Potential Pedestrian Travel Impacts

Potential Direct Impacts

Pedestrian travel has the potential of impacting shorebird, waterfowl, and other migratory bird populations feeding and resting near the trails and on beaches during certain times of the year. Pedestrians can also impact seals resting on the beach if they get too close. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). Response of wildlife to human activities includes: departure from site (Owen 1973, Burger 1981, Kaiser and Fritzell 1984, Korschgen et al.1985, Henson and Grant 1991, Kahl 1991, Klein 1993), use of sub-optimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Korschgen et al. 1985, Morton et al. 1989, Ward and Stehn 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990).

Numerous studies have documented that migratory birds are disturbed by human activity on beaches. Erwin (1989) documented disturbance of common terns and skimmers and recommended that human activity be restricted a distance of 100 meters around nesting sites. Klein (1993) in studying waterbird response to human disturbance found that as intensity of disturbance increased, avoidance response by the birds increased and found that out of vehicle activity to be more disruptive than vehicular traffic. Pfister et al. (1992) found that the impact of disturbance was greater on species using the heavily disturbed front side of the beach, with the abundance of the impacted species being reduced by as much as 50 percent. Roberton et al. (1980) discovered, in studying the effects of recreational use of shorelines on nesting birds, that disturbance negatively impacted species composition. Piping plovers which use the refuge heavily are also impacted negatively by human activity. Pedestrians on beaches may crush eggs (Burger 1987, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Dogs may chase plovers (McConnaughey et al. 1990), destroy nests (Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980). Other studies have shown that if pedestrians cause incubating plovers to leave their nest, the eggs can overheat (Bergstrom 1991) or the eggs can cool to the point of embryo death (Welty 1982). Pedestrians have been found to displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993).

The Delaware Natural Heritage Program, Division of Fish & Wildlife and the Department of Natural Resources and Environmental Control prepared a document on the "The Effects of Recreation on Birds: A literature Review" which was completed in April of 1999. The following information was reference from this document:

Several studies have examined the effects of recreation on birds using shallow-water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger 1981; Burger 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1995, 1997; Burger & Gochfeld 1998). Overall, the existing research clearly demonstrates that disturbance from recreation activities always have at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger 1981, 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1997; Burger & Gochfeld 1998). The findings that were reported in these studies are summarized as follows in terms of visitor activity and avian response to disturbance.

Presence: Birds avoided places where people were present and when visitor activity was high (Burger 1981; Klein et al. 1995; Burger & Gochfeld 1998).

Distance: Disturbance increased with decreased distance between visitors and birds (Burger 1986), though exact measurements were not reported.

Approach Angle: Visitors directly approaching birds on foot caused more disturbance than visitors driving by in vehicles, stopping vehicles near birds, and stopping vehicles and getting out without approaching birds (Klein 1993). Direct approaches may also cause greater disturbance than tangential approaches to birds (Burger & Gochfeld 1981; Burger et al. 1995; Knight & Cole 1995a; Rodgers & Smith 1995, 1997).

Noise: Noise caused by visitors resulted in increased levels of disturbance (Burger 1986; Klein 1993; Burger & Gochfeld 1998), though noise was not correlated with visitor group size (Burger & Gochfeld 1998).

The proposed use has the potential of intermittently interrupting the feeding habits of a variety of shorebirds, gulls, and terns, but encounters between pedestrians and migratory birds will be temporary. Refuge staff will manage visitor access via seasonal closures to minimize disturbance to nesting, resting, and foraging waterbirds on the refuge.

Pedestrian use also has the potential to disturb loafing seals. Gray and harbor seals haul-out on the refuge year round. A 150-foot buffer around all seals is required by the National Oceanic Atmospheric Administration to ensure compliance with the Marine Mammals Protection Act.

Pedestrian Indirect Impacts

Heavy beach use can dry out the sand and contribute to beach erosion. Trash left on the beach, particularly food or wrappers can attract predators that prey on nesting piping plovers and least terns or roosting shorebirds. Impacts of walking are likely to be minimal if conducted in accordance with refuge regulations. The new trail we propose to establish is on an existing unauthorized trail. The remaining unauthorized trails will be shut down, reducing the amount of disturbance from walkers through the dune habitat. We will manage refuge closures which restrict pedestrian access to minimize disturbance to priority avian species during critical times of the year. Closures can be expanded or contracted as needed depending on bird activity and results of further disturbance studies.

Potential OSV Impacts

Although a specific study on the effects of OSV use has not been conducted on Nantucket NWR, studies have been done on beaches with similar ecological characteristics. Studies show that OSVs affect the physical and biological processes that take place within the beach ecosystem. Specifically, OSV use on the beach may result in the following negative impacts.

Foredune Profile

Over the long term, OSV use can have a negative effect on foredune growth. Long term OSV use can lead to an abrupt rather than sloping dune base, leaving the dune more susceptible to wave energy and erosion (Anders and Leatherman 1987a). The tracks created by OSV use can also affect the geomorphology of the beach through sand displacement and compaction (Schlacher and Thompson 2008). The amount of sand displaced increases as the number of vehicles (traffic flow) increases. Sand displacement is most pronounced with the first few vehicles (up to 10), and is most crucial near the foredune, where the highest sand displacement occurs, leading to steeper slopes. The use of wide tires with low pressure can reduce some of these impacts (Anders and Leatherman 1987b).

Wrack Habitat and Macroinvertebrates

Living organisms concentrate in the wrack lines that wash up during high tide. For example, bacteria, which play a vital role in breaking down organic matter, are 1,000 times more abundant in the wrack than on bare sand. If OSVs drive over wrack habitat, they may break it up and/or dry it out. Godfrey and Godfrey (1980) found that OSV use reduced the amount of bacteria present by 50 percent and the amount of diatoms in the sand by 90 percent. Steinback et al. (2004/2005) found that while different species of invertebrates respond differently to OSV use (some populations increase while others decrease), the overall abundance of invertebrates is significantly lower in beaches with OSV use. Steinback et al. also found less wrack on beaches with OSV use. Organisms found in the wrack are an important food source for nesting and migrating shorebirds including piping plovers. Over-sand vehicle use has also been shown to directly reduce macroinvertebrate density and diversity (Wolcott and Wolcott 2003, Schlacher et al. 2008), which reduces biological integrity and also may impact birds which forage on these species.

Vegetation

Over-sand vehicle use reduces vegetative cover (Anders and Leatherman 1987a) and species diversity through trampling, and can also result in a slower rate of plant recolonization (Godfrey and Godfrey 1980). Off-road vehicle use can cause soil compaction for ORV use and thus limit moisture and oxygen available for geminating seeds (Gehlhausen and Harper 1998). Plant seeds in trampled and dried out wrack lines may not reproduce. Reduced vegetation likely contributes to increased susceptibility to wave- and wind-driven erosion.

Nesting Birds

The Service's 2009 Five-year Status Review cites disturbance by humans as a continuing widespread and severe threat to Atlantic Coast piping plovers (USFWS 2009). Threats from human beach-users are cited in the final listing rule (USFWS 1985) and described in detail in the revised Atlantic Coast recovery plan (USFWS 1996). Threats to breeding piping plovers from both motorized and non-motorized beach recreation activities are relatively well understood, and recommended management options are described in the *Guidelines for Managing Recreation* (USFWS 1994).

Studies have shown that beach use including use of OSVs negatively impacts productivity of beach-nesting birds, particularly piping plovers. Vehicles have been shown to crush eggs, adults, and chicks (Wilcox 1959, Tull 1984, Burger 1987, Patterson et al. 1991, Shaffer and Laporte 1992). Cairns (1977) found reproductive success of piping plovers was 1.3 to 2.1 fledged young per pair on remote beaches but only 0.7 to 1.1 fledged young per pair on beaches used for recreation in Nova Scotia. Fleming (1984) calculated that fledgling success per nest attempt on beaches in Nova Scotia was significantly reduced from 1.8 to 0.5 young per pair for birds exposed to low and high recreational activity, respectively. He defined low activity as 0-20 visits per week and high activity as 30 or more visits per week by people and their vehicles. Fleming also found that piping plover chick survivorship was significantly decreased by higher levels of recreational activity. His results showed that most chick loss occurred between the ages of 10-17 days; he speculated that high levels of recreational activity caused mortality of chicks by interfering with feeding during a critical period of energy demand. MacIvor et al. (1987) observed piping plovers on North Beach in Chatham, Massachusetts. Following separation from the mainland during a 1987 storm, this area, which had received extensive OSV use, became inaccessible to vehicles. In 1987, 50 percent of plover pairs shifted their nest sites to areas that were not available for nesting in 1985 or 1986 due to OSV traffic. Further, all three least tern colonies were also in locations that were formerly unavailable due to OSV use. Six years of data collected by Strauss et al. (1986) in Barnstable, Massachusetts show that in their study area, the number of fledglings per nesting pair of plovers in an area with only light pedestrian use was 0.67, compared with 0.32 in an adjacent area with heavy OSV use. Their study also shows that while adult plovers will often move their chicks to feeding habitat with lower levels of disturbance, chicks moved more than 200 meters have half the probability of fledging than those moved less than 200 meters.

It has been documented that piping plover chicks will tend to run along ruts caused by vehicles and remain motionless as vehicles approach (USFWS 1996). Piping plover chicks may also have difficulty crossing deep ruts and moving quickly enough out of a vehicles path. Additionally, piping plovers tend not to reach their full habitat carrying capacity on beaches where vehicles are allowed during the nesting and brood rearing periods (USFWS 1996).

Migrating Birds

Many species of shorebirds (*Charadriiformes*) that breed in North America migrate up to 30,000 kilometers annually, traveling from non-breeding grounds as far south as Argentina to breeding grounds as far north as the Arctic Ocean (Brown et al. 2001, Morrison 1984, Myers et al. 1987). During these long distance migrations, shorebirds rely on strategically located stopover sites which provide abundant food and adjacent resting habitat (Helmers 1992, Myers et al. 1987, Senner & Howe 1984). Coastal stopover sites in particular are increasingly being subjected to development and human disturbance, and loss of suitable stopover habitat may contribute to declines in local abundance and overall populations of shorebirds in North America (Brown et al. 2001, Myers et al. 1987, Pfister et al. 1992).

Studies have shown reduced numbers of migrating shorebirds in response to vehicle traffic on beaches. For example, Pfister et al. (1992) documented long term declines in abundance of red knots (*Calidris canutus*) and short-billed dowitchers (*Limnodromus griseus*) on Plymouth Beach, Massachusetts, that exceeded declines at comparable, less disturbed sites, as well as the overall eastern North American population. Vehicle presence also caused semipalmated sandpipers (*Calidris pusilla*) and sanderlings (*Calidris alba*) to alter their distribution on the beach. A study at Parker River NWR in Newburyport, Massachusetts found that vehicle use on beaches disturbed roosting shorebirds more than pedestrian use (Harrington and Drilling 1996). Off road vehicle use reduces food resources and increases disturbance, contributing to lower weight shorebirds.

Lower weight individuals are less likely to successfully complete their long-distance migrations (Harrington and Drilling 1996). The North Atlantic Shorebird Plan identified protection of food resources and minimizing human disturbance as high priority management objectives (Clark and Niles 2003). We have not quantified migrating shorebird use of Nantucket NWR, but data on species use, and potential disturbance, may be collected in future years.

While we acknowledge the potential impacts of OSV on the physical and biological characteristics of a beach ecosystem, Nantucket NWR is only about 21 acres, and most impacts from OSV on this small area are not likely to detract significantly from the larger landscape. However, we are committed to reducing direct disturbance on nesting, staging, and migrating birds (and seals), as well as protecting the integrity of the dune system and wrack line as much as possible. Seasonal closures for bird and seals, and prohibitions on OSV access in the dune system and along the wrack line will minimize the overall impact of OSV use on Nantucket NWR. The Trustees of Reservations has produced and distributes a guide to OSV use which likely increases voluntary compliance and user safety, and may further lessen disturbance to natural resources. The guide is available at: *http://www.thetrustees.org/pages/293_coskata_coatue_wildlife_refuge.cfm* (accessed March 2011).

PUBLIC REVIEW AND COMMENT:

As part of the comprehensive conservation planning process for Nantucket NWR, this compatibility determination underwent extensive public review, including a comment period of 30 days that followed the release of the draft Comprehensive Conservation Plan and Environmental Assessment.

DETERMINATION (CHECK ONE BELOW):

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Periodic evaluations will be done to insure that visitors and programs are not causing unacceptable adverse impacts. Areas open to these uses will be evaluated on an ongoing basis to ensure visitor safety, compliance with State and Federal tern and plover guidelines, and to minimize impacts on vegetation and wildlife.

Special use permits are required for organizations, outfitters, and individual guides conducting tour activities on Nantucket NWR. A fee may be charged for the special use permit. The areas used by such guides, outfitters, and tours will be monitored to evaluate the impacts on the resource; if adverse impacts appear, the activity may be prohibited. Specific conditions may apply depending upon the requested activity and will be addressed through the special use permit. Regulations to ensure the safety of all participants will also be included. The total number of interpretative tours (conducted by non-profit and/or commercial tour guides) that will occur on the refuge will not exceed more than two a day, and will not occur on a daily basis.

Continued permitting through TTOR at the Wauwinet Gatehouse will assist the dissemination of information about closures and other public use regulations on Nantucket NWR and also provide a means of tracking the number of annual OSV users.

Refuge staff will carefully monitor OSV use to ensure buffers and boundaries of zones for nesting and staging birds are sufficient to prevent disturbance. Closure areas may be increased if OSV access along the zone boundaries disrupts birds or seals. Areas where OSV use are allowed will be evaluated on an annual, seasonal, and sometimes daily basis and will be influenced by beach geomorphology as well as wildlife use. Updates on closures will be disseminated at the Wauwinet Gatehouse and on the refuge Web site.

Occasional law enforcement patrols and regular refuge and TTOR presence should minimize potential violations of refuge closures and other regulations (speed limits, tire deflation requirements, prohibition of dogs). If persistent violations or disturbance to natural resources occur, OSV access will be eliminated.

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. Littering, dumping, and abandoning property are prohibited by Federal regulation at 50 C.F.R. 27.93.94.

All guides and tours will be familiar with State and Federal tern and plover guidelines and will comply with such guidelines on the refuge. Any changes to the schedule which are proposed or requested need to be communicated to the refuge manager. The known presence of an endangered species will preclude the use of an area until the refuge manager determines otherwise.

The refuge manager will be provided a log at the end of each season, or upon request, that shows the number of participants in tours or the number of individual guided customers on a daily basis.

JUSTIFICATION:

Natural and cultural history activities generally support refuge purposes and impacts can largely be minimized. The minor resource impacts attributed to these activities are generally outweighed by the benefits gained by educating present and future generations about refuge resources. Guided natural history tours are a public use management tool used to develop a resource protection ethic within society. This tool allows us to educate refuge visitors about endangered and threatened species management, wildlife management and ecological principles and communities. A secondary benefit of this use is that it instills an 'ownership' or 'stewardship' mentality in visitors and most likely reduces vandalism, littering, and poaching; it also strengthens Service visibility in the local community. Cultural history activities allow visitors to both learn about the artifacts left in an area but also hopefully gain an appreciation for the refuge purpose and lands on which these activities take place.

The issuance of SUPs for commercial guiding/outfitting does not significantly impact biological resources for which the refuge was established and requires no additional facilities. The administrative requirement is minimal. In fact, this activity has a positive effect on the overall interpretive, environmental education, and wildlife observation programs of the refuge, facilitating the message to reach a much larger audience. This use would contribute to the mission of the refuge by increasing the audience that receives the message of the USFWS, producing a greater appreciation of wildlife resources in participants, and building relationships between the refuge and area businesses.

We do not expect pedestrian access to materially interfere with or detract from the mission of the National Wildlife Refuge System, nor diminish the purpose for which the refuge was established. It will not pose significant adverse effects on refuge resources, nor interfere with public use of the refuge, nor cause an undue administrative burden. These uses facilitate wildlife observation and photography, and will provide compatible recreational opportunities for visitors to observe and learn about wildlife and habitats firsthand.

OSV use facilitates five priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997. Allowing controlled OSV access will facilitate visitation, fostering a greater awareness and appreciation of the importance of this site to the National Wildlife Refuge System. Occasional law enforcement patrol and regular Service and TTOR presence should minimize potential violations of refuge regulations and closures, as previously described.

The vehicle limitations outlined in this determination provide maximum protection to prime nesting habitat for piping plovers and terns, as well as minimize disturbance to staging terns and resting seals. With proper

monitoring, this use is not likely to materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose of Nantucket NWR. Therefore, it is the determination of the Service that OSV use, at the discretion of the refuge manager, conducted as described including with stipulations, is sufficient.

Costs associated with administering these uses and likely visitor impacts are both minimal. These uses will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose of Nantucket National Wildlife Refuge. Therefore, it is the determination of the Service that commercially guided tours, at the discretion of the refuge manager, are compatible uses and contribute to the purposes for which the refuge was established.

SIGNATURE:

Refuge Manager: Elizabeth A. Harland (Signature) 7/25/2012 (Date)

CONCURRENCE:

Regional Chief: Scott B. Kahan (Signature) 9/11/2012 (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE: 9/11/2022

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FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Outdoor Events and Ceremonies

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: Stephen M Hurlburt Date: 7/25/2012

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: Marvin F. Moore Date: 8/12/2012

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Outdoor Events and Ceremonies

NARRATIVE:

The Service policy on Appropriate Refuge Uses (603 FW 1) states that: "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."

Outdoor events and ceremonies are group gatherings conducted by non-Service individuals or organizations. These uses are not outlined in an approved plan; however, there may be instances in which they can be conducted in a time, place, and manner which does not conflict with refuge goals and objectives. Although this use is not typically undertaken to promote or benefit refuge natural or cultural resources, it can expose the public to the refuge and provide an opportunity for appreciation of the refuge's natural and cultural resources. Fundraising events are not allowed unless the U.S. Fish and Wildlife Service receives 100 percent of the funds raised by the event. Additionally, events that are conducted where people are receiving an appearance fee or prize of more than nominal value will not be allowed. Organizers may charge a slight fee to recoup the cost of the event, but may not make a profit on the event.

Each event has different logistics, and therefore each would be evaluated for impacts on the refuge mission. A Special Use Permit must be issued with appropriate stipulations, including limitations on the number of people attending, parking restriction, etc. Events and ceremonies found to be detrimental to the refuge mission will not be allowed. A fee will be charged for each permit. Stipulations will be developed to ensure that events do not create an unacceptable impact on wildlife or cultural resources, do not disrupt visitors engaged in priority wildlife-dependent public uses, do not unreasonably disrupt the atmosphere of peace and tranquility, or create an unsafe or unhealthy environment for visitors or employees. Events may not be held in areas closed to the public to protect wildlife, and events may not be held that result in the closure of an area that would otherwise be open to the public.

COMPATIBILITY DETERMINATION

USE:

Outdoor Events and Ceremonies

REFUGE NAME:

Nantucket National Wildlife Refuge

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

Nantucket NWR was established in 1973 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes [16 U.S.C. § 667b].

REFUGE PURPOSE(S):

Nantucket NWR's purpose is its "…particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b-d, as amended)

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

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.

DESCRIPTION OF USE:

(k) What is the use?
The use is outdoor events and ceremonies are group gatherings conducted by non-Service individuals or organizations. Fundraising is only allowed when 100 percent of the proceeds are given to the U.S. Fish and Wildlife Service.

Access to Nantucket NWR for these activities can be achieved by boat, over-sand vehicle (OSV), or foot. The use is primarily facilitated by operation of OSVs, which consists of driving 4-wheeled drive vehicles on designated areas of the Refuge beach and inland sand roads. OSV use is currently the most common means of access for visitors to Nantucket NWR. However, visitors can (and some do) park on adjacent property owned by The Trustees of Reservations (TTOR) and walk to the Refuge. The distance can range from 5 miles (if one parks at the Wauwinet Gatehouse) to mere steps (if one parks close to the property boundary). It is approximately 300 meters from the south boundary to the north boundary of Nantucket NWR. Access to Nantucket NWR can also occur by boat, but boat landings are not common.

TTOR administers additional permits and regulates passage through the Wauwinet Road Gatehouse which provides the only OSV access to Nantucket NWR, Coskata-Coatue Wildlife Refuge (owned by TTOR), and Coatue Wildlife Refuge (owned by Nantucket Conservation Foundation).

(a) Is the use a priority public use?
Outdoor events and ceremonies are not considered priority public uses of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997.

(b) Where would the use be conducted?
Outdoor events and ceremonies will be allowed in any area open to the public under terms specified in a Special Use Permit. The refuge is divided into 5 zones, which indicate pedestrian and vehicular open and closed areas based on time of year and/or the presence of wildlife. The tip of the refuge (Zone 3) is generally closed for seals and Zone 2 is generally open to both pedestrians and vehicles. The use will not be allowed in environmentally sensitive areas such as the dunes and in any area managed for habitat conservation or wildlife protection.

OSV use is generally permitted on the beach berm from the high tide line to the base of the foredunes, as well as on established, officially designated OSV roads that bisect dunes in natural sand valleys. OSV users are not allowed to drive on dune habitat (Zone 1) or in the wrack line, and are often prohibited from the very northern tip of the refuge to protect seals (Zone 3). Specific OSV traffic routes in other Zones have varied annually and seasonally depending on wildlife use and public safety. For instance, Federal and State regulations require minimum buffer areas for various nesting species of shorebirds and seabirds. Depending on where birds nest and the shifting geomorphology of the dunes and intertidal habitat, it may be impossible to safely allow OSV access along a beach if the berm is narrow and the buffer required by nesting birds effectively extends below the high water line. Buffer distances may differ during the incubation period (When birds are tending to eggs and may require less area) and the chick rearing period (when some species are mobile forages and may need a larger buffer of undisturbed habitat), resulting in changes in access within a season. Generally, Zone 4 will be closed to OSV access seasonally to protect nesting birds, and Zone 5 will be closed to OSV access seasonally to minimize disturbance to staging birds. However, locations of these closures may shift annually or within a season.

(c) When would the use be conducted?
Nantucket NWR is open to approved outdoor events and ceremonies from ½ hour before sunrise to ½ hour after sunset. Outdoor events and ceremonies could occur any time of the year in any areas open to public access. Use of the refuge for these activities is likely to be highest in late spring, summer, and early fall.

(d) How would the use be conducted?
Permission to hold an outdoor event or ceremony must be requested in writing by the organizer a minimum of 60 days in advance of the event. Each request must be submitted to the refuge manager at the Eastern Massachusetts NWR Complex headquarters in Sudbury, Massachusetts. The request must provide details of who, what, where, when, why, and how the event will be conducted. The request must indicate how people will travel to the refuge (foot, boat, or OSV). Each request has different logistics, and therefore will be evaluated for impacts on the refuge mission. Using professional judgment, as long as there is no significant negative impact to natural resources or visitor services, nor violation of refuge regulations, a Special Use Permit will be issued outlining the framework in which the event or ceremony can be conducted. A fee will be required to pay for staff time and travel expenses necessary to monitor the event and ensure compliance with Special Use Permit stipulations.

All visitors who access the refuge by OSV must have an OSV permit from TTOR, required for passage through the Wauwinet Gatehouse. While on Nantucket NWR, OSV use will generally be restricted to the area between the high tideline to the base of the foredunes, as well as established OSV roads that bisect dunes in natural sand valleys (for instance just south of the Great Point Lighthouse where the public restrooms are seasonally located). OSV users are not allowed to drive on dune habitat (Zone 1). Typically, OSVs may park anywhere the berm or crossroads are wide enough so as not to obstruct traffic. Additionally, OSV users are required to deflate tires to 12 psi before passing through the Wauwinet Gatehouse, and speed restrictions are well posted. Events requiring OSV access to the refuge will not be held when seasonal access is prohibited on TTOR or NCF land due to the presence of piping plovers, making vehicular access to the refuge impossible.

All OSV drivers will receive information on annual, seasonal, and daily closures as well as a guide to safe OSV use at the Wauwinet Gatehouse. All OSV users are expected to stay apprised of and respect all closures and regulations. Refuge staff will carefully monitor OSV use to ensure Zone buffers and boundaries are sufficient to prevent disturbance to nesting and staging birds and seals. Closure areas may be increased if OSV access along the zone boundaries disrupts birds.

(e) Why is the use being proposed?
Nantucket NWR staff receive occasional requests to conduct outdoor events or ceremonies and other events have occurred on the refuge for several years without notification by the organizers or permission from refuge staff. While the number of events is low, and the number of future requests we anticipate to receive is low, we want to be able to review the request and issue a Special Use Permit if we determine that we can regulate the

event so that is has minimal impact to refuge resources and visitors. Although outdoor events and ceremonies may not directly contribute to the achievement of the refuge purposes or the National Wildlife Refuge System mission, such events can contribute to the public's understanding and appreciation of the refuge's natural resources.

AVAILABILITY OF RESOURCES:

Permitting this use is generally within the resources of the existing staff. Staff costs are incurred to review each request, coordinate with the permittee and with abutting neighbors (NCF and TTOR for access), and process the Special Use Permit. Monitoring the Special Use Permit to ensure compliance with its conditions will be conducted by seasonal staff (if available) or our refuge law enforcement officers. Nantucket NWR has been seasonally staffed during the summer for 2 years, but future staffing is dependent upon future budgets. Law enforcement staff from the refuge will need to be reimbursed for travel expenses and time to ensure compliance.

Total Initial Cost of Program:			**$0**
Review request, coordination, and process SUP	2 staff	20 hours	$2,000
Biological on-site staff	1 staff	20 hours	$1,000
Law enforcement presence	1 staff	40 hours	$2,000
Travel costs			$2,000
Total Annual Cost of Program:			**$7,000***

**Travel costs would be reimbursed by permittee; assumes 3 events annually.*

Refuge staff time and resources are needed to ensure that delineation of bird nesting and staging areas and seal haul-out areas (and otherwise closed areas) is accomplished on time, and sufficiently maintained to provide maximum protection for biological resources. Refuge law enforcement will be needed to ensure permit compliance. The Service does not estimate additional costs associated with OSV or pedestrian use, as permitting infrastructure is already in place by TTOR, and TTOR staff provide regular presence at the Wauwinet Gatehouse and on Nantucket NWR.

ANTICIPATED IMPACTS OF PROPOSED ACTIONS:

Impacts to refuge resources will be minimal if conducted in accordance with refuge regulations and conditions contained within the Special Use Permit. Possible impacts include disturbing wildlife, removing or trampling of plants, littering, vandalism, and entrance into closed areas. The amount of disturbance is expected to be minimal as events will be structured to be held only in areas open to the public, to be occasional and short term in nature, and to be conducted in a manner which does not interfere with other visitors' enjoyment of the refuge or natural environment. If significant negative impacts from this use cannot be avoided, a Special Use Permit will not be issued.

There are impacts to refuge wildlife, vegetation, and soils from pedestrian and OSV access for visitors engaged in environmental education and/or interpretation. These are described below.

Potential Pedestrian Travel Impacts

Potential Direct Impacts

Pedestrian travel has the potential of impacting shorebird, waterfowl, and other migratory bird populations feeding and resting near trails and on beaches during certain times of the year. Pedestrians can also impact seals resting on the beach if they get too close. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). Response of wildlife to human activities includes: departure from site (Owen 1973, Burger 1981, Kaiser and Fritzell 1984, Korschgen et al 1985, Henson and Grant 1991, Kahl 1991, Klein 1993), use of sub-optimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Korschgen et al. 1985, Morton et al. 1989, Ward and Stehn 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990).

Numerous studies have documented that migratory birds are disturbed by human activity on beaches. Erwin (1989) documented disturbance of common terns and skimmers and recommended that human activity be restricted a distance of 100 meters around nesting sites. Klein (1993) in studying waterbird response to human disturbance found that as intensity of disturbance increased, avoidance response by the birds increased and found that out of vehicle activity to be more disruptive than vehicular traffic. Pfister et al. (1992) found that the impact of disturbance was greater on species using the heavily disturbed front side of the beach, with the abundance of the impacted species being reduced by as much as 50 percent. Roberton et al. (1980) discovered, in studying the effects of recreational use of shorelines on nesting birds, that disturbance negatively impacted species composition. Piping plovers which use the refuge heavily are also impacted negatively by human activity. Pedestrians on beaches may crush eggs (Burger 1987, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Dogs may chase plovers (McConnaughey et al. 1990), destroy nests (Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980). Other studies have shown that if pedestrians cause incubating plovers to leave their nest, the eggs can overheat (Bergstrom 1991) or the eggs can cool to the point of embryo death (Welty 1982). Pedestrians have been found to displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993).

The Delaware Natural Heritage Program, Division of Fish & Wildlife and the Department of Natural Resources and Environmental Control prepared a document on the "The Effects of Recreation on Birds: A literature Review" which was completed in April of 1999. The following information was reference from this document:

Several studies have examined the effects of recreation on birds using shallow- water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger 1981; Burger 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1995, 1997; Burger & Gochfeld 1998). Overall, the existing research clearly demonstrates that disturbance from recreation activities always have at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger 1981, 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1997; Burger & Gochfeld 1998). The findings that were reported in these studies are summarized as follows in terms of visitor activity and avian response to disturbance.

Presence: Birds avoided places where people were present and when visitor activity was high (Burger 1981; Klein et al. 1995; Burger & Gochfeld 1998).

Distance: Disturbance increased with decreased distance between visitors and birds (Burger 1986), though exact measurements were not reported.

Approach Angle: Visitors directly approaching birds on foot caused more disturbance than visitors driving by in vehicles, stopping vehicles near birds, and stopping vehicles and getting out without approaching birds (Klein 1993). Direct approaches may also cause greater disturbance than tangential approaches to birds (Burger & Gochfeld 1981; Burger et al. 1995; Knight & Cole 1995a; Rodgers & Smith 1995, 1997).

Noise: Noise caused by visitors resulted in increased levels of disturbance (Burger 1986; Klein 1993; Burger & Gochfeld 1998), though noise was not correlated with visitor group size (Burger & Gochfeld 1998).

The proposed use has the potential of intermittently interrupting the feeding habits of a variety of shorebirds, gulls, and terns, but encounters between pedestrians and migratory birds will be temporary. Refuge staff will manage visitor access via seasonal closures to minimize disturbance to nesting, resting, and foraging waterbirds on the refuge.

Pedestrian use also has the potential to disturb loafing seals. Gray and harbor seals haul-out on the refuge year round. A 150-foot buffer around all seals is required by the National Oceanic Atmospheric Administration to ensure compliance with the Marine Mammals Protection Act.

Pedestrian Indirect Impacts

Heavy beach use can dry out the sand and contribute to beach erosion. Trash left on the beach, particularly food or wrappers can attract predators that prey on nesting piping plovers and least terns or roosting shorebirds. Impacts of walking are likely to be minimal if conducted in accordance with refuge regulations. The new trail we propose to establish is on an existing unauthorized trail. The remaining unauthorized trails will be shut down, reducing the amount of disturbance from walkers through the dune habitat. We will manage refuge

closures which restrict pedestrian access to minimize disturbance to priority avian species during critical times of the year. Closures can be expanded or contracted as needed depending on bird activity and results of further disturbance studies.

Potential OSV Impacts

Although a specific study on the effects of OSV use has not been conducted on Nantucket NWR, studies have been done on beaches with similar ecological characteristics. Studies show that OSVs affect the physical and biological processes that take place within the beach ecosystem. Specifically, OSV use on the beach may result in the following negative impacts.

Foredune Profile

Over the long term, OSV use can have a negative effect on foredune growth. Long term OSV use can lead to an abrupt rather than sloping dune base, leaving the dune more susceptible to wave energy and erosion (Anders and Leatherman 1987a). The tracks created by OSV use can also affect the geomorphology of the beach through sand displacement and compaction (Schlacher and Thompson 2008). The amount of sand displaced increases as the number of vehicles (traffic flow) increases. Sand displacement is most pronounced with the first few vehicles (up to 10), and is most crucial near the foredune, where the highest sand displacement occurs, leading to steeper slopes. The use of wide tires with low pressure can reduce some of these impacts (Anders and Leatherman 1987b).

Wrack Habitat and Macroinvertebrates

Living organisms concentrate in the wrack lines that wash up during high tide. For example, bacteria, which play a vital role in breaking down organic matter, are 1,000 times more abundant in the wrack than on bare sand. If OSVs drive over wrack habitat, they may break it up and/or dry it out. Godfrey and Godfrey (1980) found that OSV use reduced the amount of bacteria present by 50 percent and the amount of diatoms in the sand by 90 percent. Steinback *et al.* (2004/2005) found that while different species of invertebrates respond differently to OSV use (some populations increase while others decrease), the overall abundance of invertebrates is significantly lower in beaches with OSV use. Steinback *et al.* also found less wrack on beaches with OSV use. Organisms found in the wrack are an important food source for nesting and migrating shorebirds including piping plovers. OSV use has also been shown to directly reduce macroinvertebrate density and diversity (Wolcott and Wolcott 2003, Schlacher et al. 2008), which reduces biological integrity and also may impact birds which forage on these species.

Vegetation

OSV use reduces vegetative cover (Anders and Leatherman 1987a) and species diversity through trampling, and can also result in a slower rate of plant recolonization (Godfrey and Godfrey 1980). Off-road vehicle use can cause soil compaction for ORV use and thus limit moisture and oxygen available for geminating seeds (Gehlhausen and Harper 1998). Plant seeds in trampled and dried out wrack lines may not reproduce. Reduced vegetation likely contributes to increased susceptibility to wave- and wind-driven erosion.

Nesting Birds

The Service's 2009 Five-year Status Review cites disturbance by humans as a continuing widespread and severe threat to Atlantic Coast piping plovers (USFWS 2009). Threats from human beach-users are cited in the final listing rule (USFWS 1985) and described in detail in the revised Atlantic Coast recovery plan (USFWS 1996). Threats to breeding piping plovers from both motorized and non-motorized beach recreation activities are relatively well understood, and recommended management options are described in the *Guidelines for Managing Recreation* (USFWS 1994).

Studies have shown that beach use including use of OSVs negatively impacts productivity of beach-nesting birds, particularly piping plovers. Vehicles have been shown to crush eggs, adults, and chicks (Wilcox 1959, Tull 1984, Burger 1987, Patterson et al. 1991, Shaffer and Laporte 1992). Cairns (1977) found reproductive success of piping plovers was 1.3 to 2.1 fledged young per pair on remote beaches but only 0.7 to 1.1 fledged young per pair on beaches used for recreation in Nova Scotia. Fleming (1984) calculated that fledgling success per nest attempt on beaches in Nova Scotia was significantly reduced from 1.8 to 0.5 young per pair for birds exposed to low and high recreational activity, respectively. He defined low activity as 0-20 visits per week and high activity as 30 or more visits per week by people and their vehicles. Fleming also found that piping plover chick survivorship was significantly decreased by higher levels of recreational activity. His results showed that most chick loss occurred between the ages of 10-17 days; he speculated that high levels of recreational activity

caused mortality of chicks by interfering with feeding during a critical period of energy demand. MacIvor et al. (1987) observed piping plovers on North Beach in Chatham, MA. Following separation from the mainland during a 1987 storm, this area, which had received extensive OSV use, became inaccessible to vehicles. In 1987, 50 percent of plover pairs shifted their nest sites to areas that were not available for nesting in 1985 or 1986 due to OSV traffic. Further, all three least tern colonies were also in locations that were formerly unavailable due to OSV use. Six years of data collected by Strauss et al. (1986) in Barnstable, MA show that in their study area, the number of fledglings per nesting pair of plovers in an area with only light pedestrian use was 0.67, compared with 0.32 in an adjacent area with heavy OSV use. Their study also shows that while adult plovers will often move their chicks to feeding habitat with lower levels of disturbance, chicks moved more than 200 meters have half the probability of fledging than those moved less than 200 meters.

It has been documented that piping plover chicks will tend to run along ruts caused by vehicles and remain motionless as vehicles approach (USFWS 1996). Piping plover chicks may also have difficulty crossing deep ruts and moving quickly enough out of a vehicles path. Additionally, piping plovers tend not to reach their full habitat carrying capacity on beaches where vehicles are allowed during the nesting and brood rearing periods (USFWS 1996).

Migrating Birds

Many species of shorebirds (suborder Charadrii) that breed in North America migrate up to 30,000 km annually, traveling from non-breeding grounds as far south as Argentina to breeding grounds as far north as the Arctic Ocean (Brown *et al.* 2001, Morrison 1984, Myers *et al.* 1987). During these long distance migrations, shorebirds rely on strategically located stopover sites which provide abundant food and adjacent resting habitat (Helmers 1992, Myers *et al.* 1987, Senner & Howe 1984). Coastal stopover sites in particular are increasingly being subjected to development and human disturbance, and loss of suitable stopover habitat may contribute to declines in local abundance and overall populations of shorebirds in North America (Brown *et al.* 2001, Myers *et al.* 1987, Pfister *et al.* 1992).

Studies have shown reduced numbers of migrating shorebirds in response to vehicle traffic on beaches. For example, Pfister et al. (1992) documented long term declines in abundance of red knots (*Calidris canutus*) and short-billed dowitchers (*Limnodromus griseus*) on Plymouth Beach, MA, that exceeded declines at comparable, less disturbed sites, as well as the overall eastern North American population. Vehicle presence also caused semipalmated sandpipers (*Calidris pusilla*) and sanderlings (*Calidris alba*) to alter their distribution on the beach. A study at Parker River NWR in Newburyport, MA found that vehicle use on beaches disturbed roosting shorebirds more than pedestrian use (Harrington and Drilling 1996). ORV use reduces food resources and increases disturbance, contributing to lower weight shorebirds. Lower weight individuals are less likely to successfully complete their long-distance migrations (Harrington and Drilling 1996). The North Atlantic Shorebird Plan identified protection of food resources and minimizing human disturbance as high priority management objectives (Clark and Niles 2003). We have not quantified migrating shorebird use of Nantucket NWR, but data on species use, and potential disturbance, may be collected in future years.

While we acknowledge the potential impacts of OSV on the physical and biological characteristics of a beach ecosystem, Nantucket NWR is only about 21 acres, and most impacts from OSV on this small area are not likely to detract significantly from the larger landscape. However, we are committed to reducing direct disturbance on nesting, staging, and migrating birds (and seals), as well as protecting the integrity of the dune system and wrack line as much as possible. Seasonal closures for bird and seals, and prohibitions on OSV access in the dune system and along the wrack line will minimize the overall impact of OSV use on Nantucket NWR. TTOR has produced and distributes a guide to OSV use which likely increases voluntary compliance and user safety and may further lessen disturbance to natural resources. The guide is available at: *http://www.thetrustees.org/pages/293_coskata_coatue_wildlife_refuge.cfm*.

PUBLIC REVIEW AND COMMENTS:

As part of the comprehensive conservation planning process for Nantucket NWR, this compatibility determination underwent extensive public review, including a comment period of 30 days that followed the release of the draft Comprehensive Conservation Plan and Environmental Assessment.

DETERMINATION (CHECK ONE BELOW):

____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

STIPULATIONS TO INSURE COMPATIBILITY:

Special use permits are required for organizations wishing to hold an outdoor event or ceremony or individuals wishing to hold a ceremony on the refuge.

The refuge manager must receive a written application for a Special Use Permit no later than 60 days before the event. The written request must provide clear and concise information about the nature of the event (who, what, where, when, why, and how), including the estimated number of attendees. The refuge manager will not consider incomplete requests that do not provide full details of the event.

Each application will be evaluated for impacts to the refuge, its wildlife and visitors. Refuge staff will use professional judgment to ascertain the proposed impacts of the event. As long as there are minimal impacts to refuge resources and visitors, a Special Use Permit will be issued outlining the framework in which this use can be conducted. The refuge manager may impose a limitation on the number of attendees allowed per event if disturbance to refuge resources or other visitors indicates that such a limitation is necessary to ensure compatibility.

The Service may recover from the permittee all agency costs incurred in processing the application for a Special Use Permit, and monitoring the permitted activity if the request is approved. Costs associated with processing the application may be required even if the request is subsequently denied. A fee may be charged for the special use permit, particularly if the permittee is not a conservation partner and there is a need for law enforcement presence to ensure compliance with refuge regulations and permit conditions.

Events may only take place while the refuge is open, which is one-half hour before sunrise to one-half hour after sunset. Activities may only take place in areas open to the public, and refuge regulations will be posted and enforced. Beach sports, kites, and dogs are not allowed at any time. Additional restrictions may be imposed by the refuge manager.

The refuge manager will make the final decision about where, when and how events may be held on the refuge.

If access to the refuge is via OSV, all event attendees will obtain permits from the TTOR to cross TTOR and NCF land.

The permittee will comply with all pedestrian and vehicle closures on the refuge and partner conservation land (NCF and TTOR). This may result in the inability of a scheduled event to be held due to closures for pedestrians and/or vehicles.

The number of attendees may be limited by the refuge manager, as may the number of OSVs that are permitted on the refuge. There is no formal parking area on the refuge, and permittees may not conduct events that prevent, even inadvertently, authorized public access for priority, wildlife-dependent public use.

Events may be catered, with tables, tents, and chairs. Tents must be set up in an area that avoids disturbance of refuge resources and visitors. All tents must be set up and taken down the same day as the event and within regular hours that the refuge is open to the public. Permittees must ensure that all excess food is removed from the refuge and not made available for consumption by wildlife.

Alcohol may be served outdoors. Permittees shall ensure that event and ceremony attendees are not inebriated on the refuge and comply with all applicable Department of Interior and Service policies.

There shall be no electric amplification of musical instruments or voices during any ceremonies or events.

All trash must be removed from site by the end of each day and properly disposed of. The site must be left clean and in an unimpaired manner.

Permittees must provide portable toilets for the event to be used by attendees. The portable toilets must be delivered no earlier than 24 hours before the event and must be removed no later than 24 hours after the event. The permittee will be responsible for any cleanup associated with the use of portable toilets, even if caused by vandalism caused by a refuge visitor who was not an attendee at the permitted event.

In most cases, permittees will be required to carry Commercial General Liability Insurance. Depending on the event, the refuge manager may require additional coverage such as proof of automobile liability insurance or special coverage if alcohol is served.

All permittees must provide its attendees with information about the refuge, our mission and purpose. Permittees are responsible for the compliance of refuge regulations by attendees.

No permittee may create a safe or unhealthy environment for other visitors or employees.

No event may result in the closure of an area normally open to the public.

Failure to comply with refuge regulations or Special Use Permit conditions will result in a denial of Special Use Permits by the permittee for future events.

JUSTIFICATION:

Special outdoor events or ceremonies may not directly contribute to the achievement of the refuge purposes or the National Wildlife Refuge System mission, but can contribute to the public's understanding and appreciation of the refuge's natural resources. Therefore, a group event is compatible as long as it is conducted safely and does not conflict with a priority public use, within the confines of open public use areas. It is deemed this activity will not materially interfere with or detract from the mission of the NWRS or purposes for which Nantucket NWR was established.

SIGNATURE:

Refuge Manager: Elizabeth A. Harlow 7/25/2012
(Signature) (Date)

CONCURRENCE:

Regional Chief: Scott B. Kahan 9/11/2012
(Signature) (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE:

9/11/2022

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FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Non-Motorized Boat Landing and Launching

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: Elizabeth A. Herlands Date: 7/25/2012

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: Marvin F. Moriarty Date: 8/12/2012

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Non-Motorized Boat Landing and Launching

NARRATIVE

The Refuge System Improvement Act of 1997 instructs refuge managers to seek ways to accommodate the six priority public uses of the National Wildlife Refuge System. Although non-motorized boating is not a priority public use, it facilitates participation in priority wildlife-dependent recreation, including the five priority public uses which occur on Nantucket National Wildlife Refuge. Non-motorized boating will provide opportunities for fishing, wildlife observation, photography, environmental education, and interpretation. Boating will be restricted to smaller, non-motorized vessels to avoid impacts to wildlife and habitat. It is unlikely that many people will travel to the refuge to launch non-motorized boats. Boat landings from kayakers who launch from other sites on Nantucket Island will occur. Given the distance of the refuge on the Coskata-Coatue Peninsula from suitable launch sites on Nantucket Island, the amount of non-motorized boat traffic is expected to be fairly low. All boat use, including landings and distance from shore that needs to be maintained to minimize disturbance to wildlife, will be subject to all Federal and State regulations and seasonal closures for nesting shorebirds and seals.

COMPATIBILITY DETERMINATION

USE:

Non-Motorized Boat Landing and Launching

REFUGE NAME:

Nantucket National Wildlife Refuge

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

Nantucket NWR was established in 1973 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes [16 U.S.C. § 667b].

REFUGE PURPOSE(S):

Nantucket NWR's purpose is its ". . . particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b-d, as amended)

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

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.

DESCRIPTION OF USE:

(a) What is the use?
The use is the landing and launching of non-motorized boats on the refuge beach. The majority of the boats will be kayaks.

(b) Is the use a priority public use?
The use is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). However, it does facilitate the priority public uses of wildlife observation, wildlife photography, environmental education, interpretation, and fishing.

(c) Where would the use be conducted?
Non-motorized boat access is allowed on any part of the refuge beach that is open to the public. Public access is dictated by wildlife use. In general, much of the intertidal area is open (at least to pedestrian traffic) for most of the year. Some areas of beach berm are closed seasonally to protect nesting shorebirds and seabirds and some intertidal areas are closed for resting seals. Public access is currently restricted from dune habitat to minimize trampling of American beach grass (*Ammophila breviligulata*) although refuge staff plan to establish an authorized, permanent path from the lighthouse to the beach on the Atlantic Ocean. Visitors should contact Eastern Massachusetts NWR Complex staff for up-to-date information on seasonal closures, visit the refuge Web site, or contact our conservation partner on the refuge, The Trustees of Reservations (TTOR).

(d) When would the use be conducted?
Nantucket NWR is open to the public from ½ hour before sunrise to ½ hour after sunset. Surf fishing is permitted 24 hours a day. This is the only activity allowed on the refuge at night. Over-sand vehicle (OSV) access is permitted year round, except for potential seasonal closures due to wildlife use and/or public safety concerns. While visitors could launch a non-motorized boat from the refuge, most of this use will be from people paddling or rowing to the refuge from other places on Nantucket Island.

(e) How would the use be conducted?
Non-motorized boating, such as kayaks, will be allowed as a means to facilitate refuge public use programs, namely the priority public use programs of fishing, wildlife observation and photography, and environmental education and interpretation. The use would be conducted consistent with refuge and Massachusetts regulations, with some additional restrictions to protect fish, wildlife, and habitat. Visitors can launch non-motorized boats from cars in areas where the beach is open to OSVs. Additional opportunities to launch non-motorized boats exist on nearby non-refuge lands.

A TTOR OSV permit is required for passage through the Wauwinet Gatehouse. While on Nantucket NWR, OSV use will generally be restricted to the area between the high tide line to the base of the foredunes, as well as established OSV roads that bisect dunes in natural sand valleys (for instance just south of the Great Point Lighthouse where the public restrooms are seasonally located). OSV users are not allowed to drive on dune habitat (Zone 1). Typically, OSVs may park anywhere the berm or crossroads are wide enough so as not to obstruct traffic. Additionally, OSV users are required to deflate tires to 12 pounds per square inch before passing through Wauwinet Gatehouse, and speed restrictions are well posted. Information on annual, seasonal, and daily closures (as well as a guide to safe OSV use) will be disseminated at the Wauwinet Gatehouse and closures will be well marked with informative signage. While on Nantucket NWR, all OSV users are expected to stay apprised of, and respect all closures and regulations. For instance, the current prohibition of dogs on Nantucket NWR also applies to dogs inside OSVs. Refuge staff will carefully monitor OSV use to ensure buffers and boundaries of zones for nesting and staging birds is sufficient to prevent disturbance. Closure areas may be increased if OSV access along the zone boundaries disrupts birds. If persistent violations or disturbance to natural resources occur, OSV access may be eliminated.

The refuge does not provide boat trailer access. The refuge does not have the infrastructure to support large, trailered, motorized boats. In addition, these vessels have greater tendencies to erode sensitive marsh shoreline with their wakes, disturb nesting birds, and re-suspend bottom sediments. These effects reduce water quality and submerged aquatic vegetation production, which is contrary to refuge goals and objectives. Also, large, recreational motorboats can diminish quality, wildlife-dependent experiences due to the noise disturbance.

(f) Why is the use being proposed?
Fishing, wildlife observation and photography, and environmental education and interpretation are five of the six priority public uses of the Refuge System. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses. Non-motorized boating is allowed as a means to facilitate these priority public uses. By allowing this use, we are providing opportunities and facilitating refuge programs in a manner and location that offer high quality, wildlife-dependent recreation and maintain the level of current fish and wildlife values.

AVAILABILITY OF RESOURCES:

No additional resources are needed to facilitate non-motorized boat landing and launching. The estimated costs of allowing these uses is minimal because there is little infrastructure involved and administration of these uses is done collectively in conjunction with other uses. These costs include all beach use activities, including walking and beachcombing. The costs associated with signage, law enforcement, and seasonal staff presence are common to all these uses.

Purchase new signage			$5,000
Install new signage	2 staff	24 hours each	$1,000
Total Initial Cost of Program:			**$6,000**

Maintain signage	1 staff	24 hours	$1,000
Occasional law enforcement presence	1 staff	40 hours	$2,000
Seasonal staff presence	1 staff	200 hours	$5,000
Fuel and Vehicle Costs			$1,000
Total Annual Cost of Program:			**$9,000**

ANTICIPATED IMPACTS OF THE USE:

Access to the refuge beach for the purpose of launching non-motorized boats poses minimal impacts to plant and wildlife species. Access for kayaking is typically by individuals or small groups. On average they transport one to four kayaks on top of their motorized vehicles. The use is restricted to non-motorized boats to avoid negative impacts on water quality from motor fuel and wake disturbance. Within the non-restricted areas of the refuge, vehicles must stay on the designated OSV routes to reduce impacts to the beach ecosystem. Based on biological data, conservation management plans, unreasonable harassment of wildlife, or destruction of the habitat, the manager may restrict the use or close some beaches and other areas from this and other public use, if it is determined that they could have negative impacts on the resources and on bird nesting activities.

Damage to habitat by walking or dragging a kayak to and from the launch sites is minimal and temporary. At current levels of use, we do not expect increased erosion because of boating activities. Another possible impact is litter from users which affects water quality and attracts predators to bird nesting areas. Litter also impacts the visual experience of visitors (Marion and Lime 1986). Several enforcement issues may result from the use, including trampling of vegetation following trespass into closed areas, illegal taking of fish (undersized, over limit), illegal fires, and disorderly conduct.

Popular public use boating seasons coincide in part with spring-early summer nesting and brood-rearing periods for many species of migratory birds. Boaters may disturb nesting birds by approaching too closely to nests, causing nesting birds to flush. Flushing may expose eggs to predation or cooling, resulting in egg mortality. Both adult and flightless young birds may be injured or killed if run over by speeding boats. Some disturbance of roosting and feeding shorebirds probably occurs (Burger 1981) but this will be minimized if closed areas are respected and OSV speed limits are obeyed. We will continue to close refuge areas seasonally to boating around sensitive nest sites, in conjunction with our conservation partners. We will also continue our public outreach and the placement of warning signs.

Potential OSV Impacts

Although a specific study on the effects of OSV use has not been conducted on Nantucket NWR, studies have been done on beaches with similar ecological characteristics. Studies show that OSVs affect the physical and biological processes that take place within the beach ecosystem. Specifically, OSV use on the beach may result in the following negative impacts.

Foredune Profile

Over the long term, OSV use can have a negative effect on foredune growth. Long term OSV use can lead to an abrupt rather than sloping dune base, leaving the dune more susceptible to wave energy and erosion (Anders and Leatherman 1987a). The tracks created by OSV use can also affect the geomorphology of the beach through sand displacement and compaction (Schlacher and Thompson 2008). The amount of sand displaced increases as the number of vehicles (traffic flow) increases. Sand displacement is most pronounced with the first few vehicles (up to 10), and is most crucial near the foredune, where the highest sand displacement occurs, leading to steeper slopes. The use of wide tires with low pressure can reduce some of these impacts (Anders and Leatherman 1987b).

Wrack Habitat and Macroinvertebrates

Living organisms concentrate in the wrack lines that wash up during high tide. For example, bacteria, which play a vital role in breaking down organic matter, are 1,000 times more abundant in the wrack than on bare sand. If OSVs drive over wrack habitat, they may break it up and/or dry it out. Godfrey and Godfrey (1980) found that OSV use reduced the amount of bacteria present by 50 percent and the amount of diatoms in the sand by 90 percent. Steinback et al. (2004, 2005) found that while different species of invertebrates

respond differently to OSV use (some populations increase while others decrease), the overall abundance of invertebrates is significantly lower in beaches with OSV use. Steinback et al. also found less wrack on beaches with OSV use. Organisms found in the wrack are an important food source for nesting and migrating shorebirds including piping plovers. Over-sand vehicle use has also been shown to directly reduce macroinvertebrate density and diversity (Wolcott and Wolcott 2003, Schlacher et al. 2008), which reduces biological integrity and also may impact birds which forage on these species.

Vegetation

Over-sand vehicle use reduces vegetative cover (Anders and Leatherman 1987a) and species diversity through trampling, and can also result in a slower rate of plant recolonization (Godfrey and Godfrey 1980). Off-road vehicle use can cause soil compaction for ORV use and thus limit moisture and oxygen available for geminating seeds (Gehlhausen and Harper 1998). Plant seeds in trampled and dried out wrack lines may not reproduce. Reduced vegetation likely contributes to increased susceptibility to wave- and wind-driven erosion.

Nesting Birds

The Service's 2009 Five-year Status Review cites disturbance by humans as a continuing widespread and severe threat to Atlantic Coast piping plovers (USFWS 2009). Threats from human beach-users are cited in the final listing rule (USFWS 1985) and described in detail in the revised Atlantic Coast recovery plan (USFWS 1996). Threats to breeding piping plovers from both motorized and non-motorized beach recreation activities are relatively well understood, and recommended management options are described in the *Guidelines for Managing Recreation* (USFWS 1994).

Studies have shown that beach use including use of OSVs negatively impacts productivity of beach-nesting birds, particularly piping plovers. Vehicles have been shown to crush eggs, adults, and chicks (Wilcox 1959, Tull 1984, Burger 1987, Patterson et al. 1991, Shaffer and Laporte 1992). Cairns (1977) found reproductive success of piping plovers was 1.3 to 2.1 fledged young per pair on remote beaches but only 0.7 to 1.1 fledged young per pair on beaches used for recreation in Nova Scotia. Fleming (1984) calculated that fledgling success per nest attempt on beaches in Nova Scotia was significantly reduced from 1.8 to 0.5 young per pair for birds exposed to low and high recreational activity, respectively. He defined low activity as 0-20 visits per week and high activity as 30 or more visits per week by people and their vehicles. Fleming also found that piping plover chick survivorship was significantly decreased by higher levels of recreational activity. His results showed that most chick loss occurred between the ages of 10-17 days; he speculated that high levels of recreational activity caused mortality of chicks by interfering with feeding during a critical period of energy demand. MacIvor et al. (1987) observed piping plovers on North Beach in Chatham, Massachusetts. Following separation from the mainland during a 1987 storm, this area, which had received extensive OSV use, became inaccessible to vehicles. In 1987, 50 percent of plover pairs shifted their nest sites to areas that were not available for nesting in 1985 or 1986 due to OSV traffic. Further, all three least tern colonies were also in locations that were formerly unavailable due to OSV use. Six years of data collected by Strauss et al. (1986) in Barnstable, Massachusetts show that in their study area, the number of fledglings per nesting pair of plovers in an area with only light pedestrian use was 0.67, compared with 0.32 in an adjacent area with heavy OSV use. Their study also shows that while adult plovers will often move their chicks to feeding habitat with lower levels of disturbance, chicks moved more than 200 meters have half the probability of fledging than those moved less than 200 meters.

It has been documented that piping plover chicks will tend to run along ruts caused by vehicles and remain motionless as vehicles approach (USFWS 1996). Piping plover chicks may also have difficulty crossing deep ruts and moving quickly enough out of a vehicles path. Additionally, piping plovers tend not to reach their full habitat carrying capacity on beaches where vehicles are allowed during the nesting and brood rearing periods (USFWS 1996).

Migrating Birds

Many species of shorebirds (*Charadriiformes*) that breed in North America migrate up to 30,000 kilometers annually, traveling from non-breeding grounds as far south as Argentina to breeding grounds as far north as the Arctic Ocean (Brown et al. 2001, Morrison 1984, Myers et al. 1987). During these long distance migrations, shorebirds rely on strategically located stopover sites which provide abundant food and adjacent resting habitat (Helmers 1992, Myers et al. 1987, Senner & Howe 1984). Coastal stopover sites in particular are increasingly being subjected to development and human disturbance, and loss of suitable stopover habitat may contribute to

declines in local abundance and overall populations of shorebirds in North America (Brown et al. 2001, Myers et al. 1987, Pfister et al. 1992).

Studies have shown reduced numbers of migrating shorebirds in response to vehicle traffic on beaches. For example, Pfister et al. (1992) documented long term declines in abundance of red knots (*Calidris canutus*) and short-billed dowitchers (*Limnodromus griseus*) on Plymouth Beach, Massachusetts, that exceeded declines at comparable, less disturbed sites, as well as the overall eastern North American population. Vehicle presence also caused semipalmated sandpipers (*Calidris pusilla*) and sanderlings (*Calidris alba*) to alter their distribution on the beach. A study at Parker River NWR in Newburyport, Massachusetts found that vehicle use on beaches disturbed roosting shorebirds more than pedestrian use (Harrington and Drilling 1996). Off road vehicle use reduces food resources and increases disturbance, contributing to lower weight shorebirds. Lower weight individuals are less likely to successfully complete their long-distance migrations (Harrington and Drilling 1996). The North Atlantic Shorebird Plan identified protection of food resources and minimizing human disturbance as high priority management objectives (Clark and Niles 2003). We have not quantified migrating shorebird use of Nantucket NWR, but data on species use, and potential disturbance, may be collected in future years.

While we acknowledge the potential impacts of OSV on the physical and biological characteristics of a beach ecosystem, Nantucket NWR is only about 21 acres, and most impacts from OSV on this small area are not likely to detract significantly from the larger landscape. However, we are committed to reducing direct disturbance on nesting, staging, and migrating birds (and seals), as well as protecting the integrity of the dune system and wrack line as much as possible. Seasonal closures for bird and seals, and prohibitions on OSV access in the dune system and along the wrack line will minimize the overall impact of OSV use on Nantucket NWR. The Trustees of Reservations has produced and distributes a guide to OSV use which likely increases voluntary compliance and user safety, and may further lessen disturbance to natural resources. The guide is available at: *http://www.thetrustees.org/pages/293_coskata_coatue_wildlife_refuge.cfm* (accessed March 2011).

PUBLIC REVIEW AND COMMENT:

As part of the comprehensive conservation planning process for Nantucket NWR, this compatibility determination underwent extensive public review, including a comment period of 30 days that followed the release of the draft Comprehensive Conservation Plan and Environmental Assessment.

DETERMINATION (CHECK ONE BELOW):

____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Landing and launching of non-motorized boats will only be allowed on sections of the beach that are open for public use. The beach is subject to seasonal closures for staging and breeding terns and plovers and loafing seals. Access by over-sand vehicles is authorized on designated routes and must be coordinated with the adjacent landowners, TTOR and the Nantucket Conservation Foundation.

Harassment of wildlife and excessive damage to vegetation is prohibited.

No kayaks or related equipment may be left overnight on the refuge unless the owner is surf fishing, which is the only authorized nighttime use.

Providing outfitting or commercial services for non-motorized boating on the refuge requires a special use permit issued by the refuge (see commercial tours and services compatibility determination).

Occasional law enforcement patrol and regular staff and conservation partner presence should minimize potential violations. Refuge regulations will be posted and enforced.

Periodic evaluations will be done to insure that visitors are not causing unacceptable adverse impacts. Areas open to these uses will be evaluated on an annual basis depending on geomorphology and wildlife use.

JUSTIFICATION:

This use has been determined compatible because allowing the general public to use non-motorized boats for wildlife observation, wildlife photography, and recreation will not interfere with the Service's work to protect and conserve natural resources. The level of use for these activities is moderate on the refuge. The associated disturbance to wildlife is temporary and minor. Although recreational kayaking is not priority public uses, under the conditions described above, they are not detrimental activities. Access for fishing, wildlife observation and photography, and environmental education and interpretation, which are priority uses, allows visitors to enjoy the outdoors and wild lands. Boating on Nantucket National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

SIGNATURE:

Refuge Manager: _____ 7/25/2012
(Signature) (Date)

CONCURRENCE:

Regional Chief: _____ 9/11/2012
(Signature) (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE:

9/11/2022

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FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Beachcombing

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: Elizabeth A. Harkness Date: 7/25/2012

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: Marvin F. Moriarty Date: 8/12/2012

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Beachcombing

NARRATIVE:

The Service policy on Appropriate Refuge Uses (603 FW 1) states that: "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."

Beachcombing can occur on the refuge beach when visitors collect shells, wildlife, plants, and other refuge resources. Allowing visitors to pick up shells and beach debris and take home a small amount of shells from the refuge will encourage an appreciation for the beach and marine environment. While this activity can have negative impacts on wildlife and habitat, as invertebrates which are a food source for shorebirds are at times attached to shells and other pieces of marine debris, it will not be conducted in areas which are being used by resting, nesting or feeding wildlife. Visitor use will be restricted in time and place to minimize disturbance to wildlife. Additionally, the refuge is a small part of a much larger Coskata-Coatue Peninsula, so the impact of beachcombing on the refuge will be diminished by the existence of many miles of beach habitat that has limited visitation.

COMPATIBILITY DETERMINATION

USE:

Beachcombing

REFUGE NAME:

Nantucket National Wildlife Refuge

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

Nantucket NWR was established in 1973 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes [16 U.S.C. § 667b].

REFUGE PURPOSE(S):

Nantucket NWR's purpose is its ". . . particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b-d, as amended)

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

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.

DESCRIPTION OF USE:

(a) What is the use?
This use involves walking along the beach and picking up small amounts of shells and stones. The collection of plants and living animals would not be allowed.

(b) Is the use a priority public use?
Beachcombing is not specifically identified as priority public uses in the National Wildlife Refuge System Improvement Act of 1997, but beachcombing often leads to wildlife observation and interpretation, which are priority public uses.

(c) Where would the use be conducted?
Beachcombing could occur on any areas of Nantucket NWR that are open to public access. Public access is dictated by wildlife use and presence of sensitive vegetation. In general, much of the intertidal area and established vehicle trails through the dune system are open (at least to pedestrian traffic) for much of the year. Some areas of beach berm are closed seasonally to protect seals, nesting shorebirds, and seabirds. Visitors should contact Eastern Massachusetts NWR Complex staff for up-to-date information on seasonal closures. Information about closures will also be available on the refuge Web site or at the Wauwinet Gatehouse when staffed.

(d) When would the use be conducted?
Nantucket NWR is open to beachcombing from ½ hour before sunrise to ½ hour after sunset. Beachcombing could occur any time of the year in any areas open to public access. Use for these activities is likely to be highest in summer and early fall.

(e) How would the use be conducted?
Beach combing must be conducted in accordance with refuge regulations (including seasonal closures). Beachcombing would be limited to the collection of small amounts of seashells and stones.

The use is primarily facilitated by pedestrian walking access or by operation of over-sand vehicles (OSVs), which consists of driving 4-wheel drive vehicles on designated areas of the refuge beach and inland sand roads. Over-sand vehicle use is currently the most common means of access for visitors to Nantucket NWR. However, visitors can (and some do) park on adjacent property owned by the Trustees of Reservations (TTOR) and walk to the refuge. The distance can range from 5 miles (if one parks at the Wauwinet Gatehouse) to mere steps (if one parks close to the property boundary). It is approximately 300 meters from the south boundary to the north boundary of Nantucket NWR. Access to Nantucket NWR can also occur by boat, but boat landings are not common.

A TTOR OSV permit is required for passage through the Wauwinet Gatehouse. While on Nantucket NWR, OSV use will generally be restricted to the area between the high tide line to the base of the foredunes, as well as established OSV roads that bisect dunes in natural sand valleys (for instance just south of the Great Point Lighthouse where the public restrooms are seasonally located). Over-sand vehicle users are not allowed to drive on dune habitat (Zone 1). Typically, OSVs may park anywhere the berm or crossroads are wide enough so as not to obstruct traffic. Additionally, OSV users are required to deflate tires to 12 pounds per square inch before passing through Wauwinet Gatehouse, and speed restrictions are well posted. Information on annual, seasonal, and daily closures (as well as a guide to safe OSV use) will be disseminated at the Wauwinet Gatehouse and closures will be well marked with informative signage. While on Nantucket NWR, all OSV users are expected to stay apprised of, and respect all closures and regulations. For instance, the current prohibition of dogs on Nantucket NWR also applies to dogs inside OSVs. Refuge staff will carefully monitor OSV use to ensure buffers and boundaries of zones for nesting and staging birds is sufficient to prevent disturbance. Closure areas may be increased if OSV access along the zone boundaries disrupts birds. If persistent violations or disturbance to natural resources occur, OSV access may be eliminated.

(f) Why is the use being proposed?
Beachcombing has historically occurred on Nantucket NWR. Although small, Nantucket NWR serves as a great example of dynamic barrier beach habitat that is constantly impacted by wind and tidal energy. A variety of wildlife use Nantucket NWR and surrounding waters year round. Affording opportunities for public enjoyment by collecting small amounts of shells and stones through beachcombing will increase visitor appreciation and foster a greater awareness of the importance of this site to the National Wildlife Refuge System.

AVAILABILITY OF RESOURCES:

Beachcombing is often one of many incidental activities that refuge visitors engage in when on the refuge. As such, we do not anticipate refuge costs associated with this activity alone.

ANTICIPATED IMPACTS OF PROPOSED ACTIONS:

Impacts of beachcombing will likely be minimal if conducted in accordance with refuge regulations. Possible impacts include disturbing wildlife, removing or trampling of plants, littering, vandalism, and entrance into closed areas. Beachcombing may intermittently interrupt the feeding habits of a variety of shorebirds, gulls, and terns. The removal of shells, wrack, and other natural debris from the beach may indirectly affect wildlife by reducing food availability and microhabitat used by invertebrates, which are in turn preyed upon by shorebirds.

Numerous studies have documented that migratory birds are disturbed by human activity on beaches. Erwin (1989) documented disturbance of common terns and skimmers and recommended that human activity be restricted a distance of 100 meters around nesting sites. Klein (1993) in a studying waterbird response to human disturbance found that as intensity of disturbance increased, avoidance response by the birds increased

and found that out of vehicle activity to be more disruptive than vehicular traffic. Pfister et al. (1992) found that the impact of disturbance was greater on species using the heavily disturbed front side of the beach, with the abundance of the impacted species being reduced by as much as 50 percent. Roberson et al. (1980) discovered, in studying the effects of recreational use of shorelines on nesting birds, that disturbance negatively impacted species composition. Pedestrians on beaches may crush eggs (Burger 1987, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Other studies have shown that if pedestrians cause incubating plovers to leave their nests, the eggs can overheat (Bergstrom 1991) or the eggs can cool to the point of embryo death (Welty 1982). Pedestrians have been found to displace unfledged chicks (Strauss 1990, Burger 1981, Hoopes et al. 1992, Loegering 1992, Goldin 1993).

Beachcombing will be restricted spatially and temporally to minimize disturbance. Although some disturbance to migratory birds will occur, it should be minimal due to the location of the activity, the beach areas not impacted, and the closures in place to protect piping plovers, other shorebirds, and staging terns. In the event of persistent disturbance to habitat or wildlife, these activities will be further restricted or discontinued.

Potential Pedestrian Travel Impacts

Potential Direct Impacts

Pedestrian travel has the potential of impacting shorebird, waterfowl, and other migratory bird populations feeding and resting near the trails and on beaches during certain times of the year. Pedestrians can also impact seals resting on the beach if they get too close. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). Response of wildlife to human activities includes: departure from site (Owen 1973, Burger 1981, Kaiser and Fritzell 1984, Korschgen et al.1985, Henson and Grant 1991, Kahl 1991, Klein 1993), use of sub-optimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Korschgen et al. 1985, Morton et al. 1989, Ward and Stehn 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990).

Numerous studies have documented that migratory birds are disturbed by human activity on beaches. Erwin (1989) documented disturbance of common terns and skimmers and recommended that human activity be restricted a distance of 100 meters around nesting sites. Klein (1993) in studying waterbird response to human disturbance found that as intensity of disturbance increased, avoidance response by the birds increased and found that out of vehicle activity to be more disruptive than vehicular traffic. Pfister et al. (1992) found that the impact of disturbance was greater on species using the heavily disturbed front side of the beach, with the abundance of the impacted species being reduced by as much as 50 percent. Roberton et al. (1980) discovered, in studying the effects of recreational use of shorelines on nesting birds, that disturbance negatively impacted species composition. Piping plovers which use the refuge heavily are also impacted negatively by human activity. Pedestrians on beaches may crush eggs (Burger 1987, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Dogs may chase plovers (McConnaughey et al. 1990), destroy nests (Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980). Other studies have shown that if pedestrians cause incubating plovers to leave their nest, the eggs can overheat (Bergstrom 1991) or the eggs can cool to the point of embryo death (Welty 1982). Pedestrians have been found to displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993).

The Delaware Natural Heritage Program, Division of Fish & Wildlife and the Department of Natural Resources and Environmental Control prepared a document on the "The Effects of Recreation on Birds: A literature Review" which was completed in April of 1999. The following information was referenced from this document:

Several studies have examined the effects of recreation on birds using shallow water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger 1981; Burger 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1995, 1997; Burger & Gochfeld 1998). Overall, the existing research clearly demonstrates that disturbance from recreation activities always have at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger 1981, 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1997; Burger & Gochfeld 1998). The findings that were reported in these studies are summarized as follows in terms of visitor activity and avian response to disturbance.

Presence: Birds avoided places where people were present and when visitor activity was high (Burger 1981; Klein et al. 1995; Burger & Gochfeld 1998).

Distance: Disturbance increased with decreased distance between visitors and birds (Burger 1986), though exact measurements were not reported.

Approach Angle: Visitors directly approaching birds on foot caused more disturbance than visitors driving by in vehicles, stopping vehicles near birds, and stopping vehicles and getting out without approaching birds (Klein 1993). Direct approaches may also cause greater disturbance than tangential approaches to birds (Burger & Gochfeld 1981; Burger et al. 1995; Knight & Cole 1995a; Rodgers & Smith 1995, 1997).

Noise: Noise caused by visitors resulted in increased levels of disturbance (Burger 1986; Klein 1993; Burger & Gochfeld 1998), though noise was not correlated with visitor group size (Burger & Gochfeld 1998).

The proposed use has the potential of intermittently interrupting the feeding habits of a variety of shorebirds, gulls, and terns, but encounters between pedestrians and migratory birds will be temporary. Refuge staff will manage visitor access via seasonal closures to minimize disturbance to nesting, resting, and foraging waterbirds on the refuge.

Pedestrian use also has the potential to disturb loafing seals. Gray and harbor seals haul-out on the refuge year round. A 150-foot buffer around all seals is required by the National Oceanic Atmospheric Administration to ensure compliance with the Marine Mammals Protection Act.

Pedestrian Indirect Impacts

Heavy beach use can dry out the sand and contribute to beach erosion. Trash left on the beach, particularly food or wrappers can attract predators that prey on nesting piping plovers and least terns or roosting shorebirds. Impacts of walking are likely to be minimal if conducted in accordance with refuge regulations. The new trail we propose to establish is on an existing unauthorized trail. The remaining unauthorized trails will be shut down, reducing the amount of disturbance from walkers through the dune habitat. We will manage refuge closures which restrict pedestrian access to minimize disturbance to priority avian species during critical times of the year. Closures can be expanded or contracted as needed depending on bird activity and results of further disturbance studies

Potential OSV Impacts

Although a specific study on the effects of OSV use has not been conducted on Nantucket NWR, studies have been done on beaches with similar ecological characteristics. Studies show that OSVs affect the physical and biological processes that take place within the beach ecosystem. Specifically, OSV use on the beach may result in the following negative impacts.

Foredune Profile

Over the long term, OSV use can have a negative effect on foredune growth. Long term OSV use can lead to an abrupt rather than sloping dune base, leaving the dune more susceptible to wave energy and erosion (Anders and Leatherman 1987a). The tracks created by OSV use can also affect the geomorphology of the beach through sand displacement and compaction (Schlacher and Thompson 2008). The amount of sand displaced increases as the number of vehicles (traffic flow) increases. Sand displacement is most pronounced with the first few vehicles (up to 10), and is most crucial near the foredune, where the highest sand displacement occurs, leading to steeper slopes. The use of wide tires with low pressure can reduce some of these impacts (Anders and Leatherman 1987b).

Wrack Habitat and Macroinvertebrates

Living organisms concentrate in the wrack lines that wash up during high tide. For example, bacteria, which play a vital role in breaking down organic matter, are 1,000 times more abundant in the wrack than on bare sand. If OSVs drive over wrack habitat, they may break it up and/or dry it out. Godfrey and Godfrey (1980) found that OSV use reduced the amount of bacteria present by 50 percent and the amount of diatoms in the sand by 90 percent. Steinback et al. (2004, 2005) found that while different species of invertebrates respond differently to OSV use (some populations increase while others decrease), the overall abundance

of invertebrates is significantly lower in beaches with OSV use. Steinback et al. also found less wrack on beaches with OSV use. Organisms found in the wrack are an important food source for nesting and migrating shorebirds including piping plovers. Over-sand vehicle use has also been shown to directly reduce macroinvertebrate density and diversity (Wolcott and Wolcott 2003, Schlacher et al. 2008), which reduces biological integrity and also may impact birds which forage on these species.

Vegetation

Over-sand vehicle use reduces vegetative cover (Anders and Leatherman 1987a) and species diversity through trampling, and can also result in a slower rate of plant recolonization (Godfrey and Godfrey 1980). Off-road vehicle use can cause soil compaction for ORV use and thus limit moisture and oxygen available for geminating seeds (Gehlhausen and Harper 1998). Plant seeds in trampled and dried out wrack lines may not reproduce. Reduced vegetation likely contributes to increased susceptibility to wave- and wind-driven erosion.

Nesting Birds

The Service's 2009 Five-year Status Review cites disturbance by humans as a continuing widespread and severe threat to Atlantic Coast piping plovers (USFWS 2009). Threats from human beach-users are cited in the final listing rule (USFWS 1985) and described in detail in the revised Atlantic Coast recovery plan (USFWS 1996). Threats to breeding piping plovers from both motorized and non-motorized beach recreation activities are relatively well understood, and recommended management options are described in the *Guidelines for Managing Recreation* (USFWS 1994).

Studies have shown that beach use including use of OSVs negatively impacts productivity of beach-nesting birds, particularly piping plovers. Vehicles have been shown to crush eggs, adults, and chicks (Wilcox 1959, Tull 1984, Burger 1987, Patterson et al. 1991, Shaffer and Laporte 1992). Cairns (1977) found reproductive success of piping plovers was 1.3 to 2.1 fledged young per pair on remote beaches but only 0.7 to 1.1 fledged young per pair on beaches used for recreation in Nova Scotia. Fleming (1984) calculated that fledgling success per nest attempt on beaches in Nova Scotia was significantly reduced from 1.8 to 0.5 young per pair for birds exposed to low and high recreational activity, respectively. He defined low activity as 0-20 visits per week and high activity as 30 or more visits per week by people and their vehicles. Fleming also found that piping plover chick survivorship was significantly decreased by higher levels of recreational activity. His results showed that most chick loss occurred between the ages of 10-17 days; he speculated that high levels of recreational activity caused mortality of chicks by interfering with feeding during a critical period of energy demand. MacIvor et al. (1987) observed piping plovers on North Beach in Chatham, Massachusetts. Following separation from the mainland during a 1987 storm, this area, which had received extensive OSV use, became inaccessible to vehicles. In 1987, 50 percent of plover pairs shifted their nest sites to areas that were not available for nesting in 1985 or 1986 due to OSV traffic. Further, all three least tern colonies were also in locations that were formerly unavailable due to OSV use. Six years of data collected by Strauss et al. (1986) in Barnstable, Massachusetts show that in their study area, the number of fledglings per nesting pair of plovers in an area with only light pedestrian use was 0.67, compared with 0.32 in an adjacent area with heavy OSV use. Their study also shows that while adult plovers will often move their chicks to feeding habitat with lower levels of disturbance, chicks moved more than 200 meters have half the probability of fledging than those moved less than 200 meters.

It has been documented that piping plover chicks will tend to run along ruts caused by vehicles and remain motionless as vehicles approach (USFWS 1996). Piping plover chicks may also have difficulty crossing deep ruts and moving quickly enough out of a vehicles path. Additionally, piping plovers tend not to reach their full habitat carrying capacity on beaches where vehicles are allowed during the nesting and brood rearing periods (USFWS 1996).

Migrating Birds

Many species of shorebirds (*Charadriiformes*) that breed in North America migrate up to 30,000 kilometers annually, traveling from non-breeding grounds as far south as Argentina to breeding grounds as far north as the Arctic Ocean (Brown et al. 2001, Morrison 1984, Myers et al. 1987). During these long distance migrations, shorebirds rely on strategically located stopover sites which provide abundant food and adjacent resting habitat (Helmers 1992, Myers et al. 1987, Senner & Howe 1984). Coastal stopover sites in particular are increasingly being subjected to development and human disturbance, and loss of suitable stopover habitat may contribute to

declines in local abundance and overall populations of shorebirds in North America (Brown et al. 2001, Myers et al. 1987, Pfister et al. 1992).

Studies have shown reduced numbers of migrating shorebirds in response to vehicle traffic on beaches. For example, Pfister et al. (1992) documented long term declines in abundance of red knots (*Calidris canutus*) and short-billed dowitchers (*Limnodromus griseus*) on Plymouth Beach, Massachusetts, that exceeded declines at comparable, less disturbed sites, as well as the overall eastern North American population. Vehicle presence also caused semipalmated sandpipers (*Calidris pusilla*) and sanderlings (*Calidris alba*) to alter their distribution on the beach. A study at Parker River NWR in Newburyport, Massachusetts found that vehicle use on beaches disturbed roosting shorebirds more than pedestrian use (Harrington and Drilling 1996). Off road vehicle use reduces food resources and increases disturbance, contributing to lower weight shorebirds. Lower weight individuals are less likely to successfully complete their long-distance migrations (Harrington and Drilling 1996). The North Atlantic Shorebird Plan identified protection of food resources and minimizing human disturbance as high priority management objectives (Clark and Niles 2003). We have not quantified migrating shorebird use of Nantucket NWR, but data on species use, and potential disturbance, may be collected in future years.

While we acknowledge the potential impacts of OSV on the physical and biological characteristics of a beach ecosystem, Nantucket NWR is only about 21 acres, and most impacts from OSV on this small area are not likely to detract significantly from the larger landscape. However, we are committed to reducing direct disturbance on nesting, staging, and migrating birds (and seals), as well as protecting the integrity of the dune system and wrack line as much as possible. Seasonal closures for bird and seals, and prohibitions on OSV access in the dune system and along the wrack line will minimize the overall impact of OSV use on Nantucket NWR. The Trustees of Reservations has produced and distributes a guide to OSV use which likely increases voluntary compliance and user safety, and may further lessen disturbance to natural resources. The guide is available at: *http://www.thetrustees.org/pages/293_coskata_coatue_wildlife_refuge.cfm* (accessed March 2011).

PUBLIC REVIEW AND COMMENT:

As part of the comprehensive conservation planning process for Nantucket NWR, this compatibility determination underwent extensive public review, including a comment period of 30 days that followed the release of the draft Comprehensive Conservation Plan and Environmental Assessment.

DETERMINATION (CHECK ONE BELOW):

____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Beachcombing will only be allowed on sections of the beach that are open for public use. The beach is subject to seasonal closures for staging and breeding plovers, other shorebirds, seabirds, and seals.

Occasional law enforcement patrol and regular staff or partner presence should minimize potential violations. The current refuge "open ½ hour before sunrise to ½ hour after sunset" regulation restricts entry after daylight hours and will be maintained. Refuge regulations will be posted and enforced.

Visitors will be provided information to ensure that they understand the value of shells, wildlife, plants on the refuge and particularly in the wrack line. Visitors will be informed to collect only small amounts of shells and stones. The collection of plants and living animals will not be permitted.

Visitors are also not permitted to collect any item prohibited by Federal law, such as historic artifacts, migratory birds, and marine mammals or parts thereof.

Periodic evaluations will be done to ensure that visitors are not causing unacceptable adverse impacts. Areas open to these uses will be evaluated on an annual basis depending on geomorphology and wildlife use.

JUSTIFICATION:

Allowing visitors to collect small amounts of shells and stones while beachcombing will contribute to public appreciation of Nantucket NWR. Costs associated with administering these uses and likely visitor impacts are both minimal. These uses will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose of Nantucket NWR. Therefore, it is the determination of the Service that beachcombingis a compatible use of the refuge.

SIGNATURE:

Refuge Manager: Elizabeth A Harland (Signature) 7/25/2012 (Date)

CONCURRENCE:

Regional Chief: Scott B. Kahan (Signature) 9/11/2012 (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE: 9/11/2022

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FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Sunbathing and Swimming

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: Elizabeth A. Hinkle Date: 7/25/2012

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: Thomas F. Moore Date: 8/17/2012

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Sunbathing and Swimming

NARRATIVE:

Although Service policy does not specifically encourage sunbathing and swimming, these activities often facilitate priority uses such as wildlife observation and photography. The use is a traditional refuge activity that attracts many visitors, especially during the summer and early fall, which increases the refuge's ability to provide opportunities for the priority public uses described in the Refuge System Improvement Act of 1997. The use is not expected to have adverse impacts on refuge wildlife and habitat. Beaches will be closed seasonally in time and place to protect seals, shorebirds, and seabirds, and will be monitored for signs of disturbance.

COMPATIBILITY DETERMINATION

USE:

Sunbathing and Swimming

REFUGE NAME:

Nantucket National Wildlife Refuge

ESTABLISHING AND ACQUISITION AUTHORITY(IES):

Nantucket NWR was established in 1973 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes [16 U.S.C. § 667b].

REFUGE PURPOSE(S):

Nantucket NWR's purpose is its ". . . particular value in carrying out the national migratory bird management program." (16 U.S.C. § 667b-d, as amended)

NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

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.

DESCRIPTION OF USE:

(a) What is the use?
The use is sunbathing and swimming on the refuge beach.

(b) Is the use a priority public use?
The use is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). However, it has occurred on the refuge since its establishment Visitors coming to the refuge to swim might find themselves observing wildlife, but that would not likely be the focus of these visits.

(c) Where would the use be conducted?
Beach sunbathing could occur on the sandy areas of Nantucket NWR that are open to public access. Swimming could occur in the waters off of the refuge shore. Public access is dictated by wildlife use and presence of sensitive vegetation. In general, much of the intertidal area and established vehicle trails through the dune system are open (at least to pedestrian traffic) for most of the year. Some areas of beach berm and intertidal areas are closed seasonally to protect seals, nesting shorebirds, and seabirds. Public access is further restricted during summer months when the road leading to the refuge is closed due to the presence of nesting piping plovers and least terns on the adjacent Trustees of Reservations (TTOR) land. Public access is currently restricted from dune habitat to minimize trampling of American beach grass (*Ammophila breviligulata*),

although a trail is proposed from the lighthouse to the beach on the Atlantic Ocean. Visitors should contact Eastern Massachusetts NWR Complex staff for up-to-date information on seasonal closures. Information about closures will also be available on the refuge Web site or through TTOR.

(d) When would the use be conducted?

Nantucket NWR is open to the public from ½ hour before sunrise to ½ hour after sunset. Sunbathing and swimming could occur any time of the year in any areas open to public access. Use for these activities is likely to be highest in summer and early fall.

(e) How would the use be conducted?
The use must be conducted in accordance with refuge regulations (including seasonal closures).

The use is primarily facilitated by pedestrian walking access or by operation of over-sand vehicles (OSVs), which consists of driving 4-wheel drive vehicles on designated areas of the refuge beach and inland sand roads. Over-sand vehicle use is currently the most common means of access for visitors to Nantucket NWR. However, visitors can (and some do) park on adjacent property owned by the Trustees of Reservations (TTOR) and walk to the refuge. The distance can range from 5 miles (if one parks at the Wauwinet Gatehouse) to mere steps (if one parks close to the property boundary). It is approximately 300 meters from the south boundary to the north boundary of Nantucket NWR. Access to Nantucket NWR can also occur by boat, but boat landings are not common.

A TTOR OSV permit is required for passage through the Wauwinet Gatehouse. While on Nantucket NWR, OSV use will generally be restricted to the area between the high tide line to the base of the foredunes, as well as established OSV roads that bisect dunes in natural sand valleys (for instance just south of the Great Point Lighthouse where the public restrooms are seasonally located). Over-sand vehicle users are not allowed to drive on dune habitat (Zone 1). Typically, OSVs may park anywhere the berm or crossroads are wide enough so as not to obstruct traffic. Additionally, OSV users are required to deflate tires to 12 pounds per square inch before passing through Wauwinet Gatehouse, and speed restrictions are well posted. Information on annual, seasonal, and daily closures (as well as a guide to safe OSV use) will be disseminated at the Wauwinet Gatehouse and closures will be well marked with informative signage. While on Nantucket NWR, all OSV users are expected to stay apprised of, and respect all closures and regulations. For instance, the current prohibition of dogs on Nantucket NWR also applies to dogs inside OSVs. Refuge staff will carefully monitor OSV use to ensure buffers and boundaries of zones for nesting and staging birds is sufficient to prevent disturbance. Closure areas may be increased if OSV access along the zone boundaries disrupts birds. If persistent violations or disturbance to natural resources occur, OSV access may be eliminated.

(f) Why is this use being proposed?
The beach on Nantucket NWR is located at the tip of Great Point. Visitors will come to this beach for a number of reasons, including sunbathing and swimming. Some people will come to the refuge for the experience of driving over 5 miles of beach to reach the very tip of the island, where you look out into the ocean in all directions. The refuge also supports seals, shorebirds, and seabirds, the Great Point lighthouse is only accessible from the refuge, and fishing is excellent on the refuge. Families will come with diverse interests. The ability to sunbathe and swim will increase the number of visits by entire families, and may prolong the amount of time that visitors spend on the refuge. Affording opportunities for public enjoyment by allowing this type of beach use will increase visitor appreciation and foster a greater awareness of the importance of this site to the National Wildlife Refuge System.

AVAILABILITY OF RESOURCES:

No additional resources are needed to facilitate sunbathing and swimming. The estimated costs of allowing these uses is minimal because there is little infrastructure involved and administration of these uses is done collectively in conjunction with other uses. These costs include all beach use activities, including walking and beachcombing. The costs associated with signage, law enforcement, and seasonal staff presence are common to all these uses.

Purchase new signage			$2,000
Install new signage	2 staff	24 hours each	$1,000
Total Initial Cost of Program:			**$3,000**
Maintain signage	1 staff	24 hours	$600
Occasional law enforcement presence	1 staff	40 hours	$2,000
Seasonal staff presence	1 staff	200 hours	$5,000
Fuel and Vehicle Costs			$400
Total Annual Cost of Program:			**$8,000**

ANTICIPATED IMPACTS OF THE USE:

Impacts of sunbathing and swimming will likely be minimal if conducted in accordance with refuge regulations. Possible impacts include disturbing wildlife, removing or trampling of plants, littering, vandalism, and entrance into closed areas. A temporary interruption of feeding or roosting behavior of migratory birds may occur at the approach of beachgoers on foot or by boat. Once visitors get settled in their chosen spot on the beach, however, they tend to be sedentary and migratory birds usually resume their activities just a short distance away.

Potential Pedestrian Travel Impacts

Potential Direct Impacts

Pedestrian travel has the potential of impacting shorebird, waterfowl, and other migratory bird populations feeding and resting near the trails and on beaches during certain times of the year. Pedestrians can also impact seals resting on the beach if they get too close. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). Response of wildlife to human activities includes: departure from site (Owen 1973, Burger 1981, Kaiser and Fritzell 1984, Korschgen et al.1985, Henson and Grant 1991, Kahl 1991, Klein 1993), use of sub-optimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Korschgen et al. 1985, Morton et al. 1989, Ward and Stehn 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990).

Numerous studies have documented that migratory birds are disturbed by human activity on beaches. Erwin (1989) documented disturbance of common terns and skimmers and recommended that human activity be restricted a distance of 100 meters around nesting sites. Klein (1993) in studying waterbird response to human disturbance found that as intensity of disturbance increased, avoidance response by the birds increased and found that out of vehicle activity to be more disruptive than vehicular traffic. Pfister et al. (1992) found that the impact of disturbance was greater on species using the heavily disturbed front side of the beach, with the abundance of the impacted species being reduced by as much as 50 percent. Roberton et al. (1980) discovered, in studying the effects of recreational use of shorelines on nesting birds, that disturbance negatively impacted species composition. Piping plovers which use the refuge heavily are also impacted negatively by human activity. Pedestrians on beaches may crush eggs (Burger 1987, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Dogs may chase plovers (McConnaughey et al. 1990), destroy nests (Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980). Other studies have shown that if pedestrians cause incubating plovers to leave their nest, the eggs can overheat (Bergstrom 1991) or the eggs can cool to the point of embryo death (Welty 1982). Pedestrians have been found to displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993).

The Delaware Natural Heritage Program, Division of Fish & Wildlife and the Department of Natural Resources and Environmental Control prepared a document on the "The Effects of Recreation on Birds: A literature Review" which was completed in April of 1999. The following information was referenced from this document:

Several studies have examined the effects of recreation on birds using shallow water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger 1981; Burger 1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1995, 1997; Burger & Gochfeld 1998). Overall, the existing research clearly demonstrates that disturbance from recreation activities always have at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger 1981,

1986; Klein 1993; Burger et al. 1995; Klein et al. 1995; Rodgers & Smith 1997; Burger & Gochfeld 1998). The findings that were reported in these studies are summarized as follows in terms of visitor activity and avian response to disturbance.

Presence: Birds avoided places where people were present and when visitor activity was high (Burger 1981; Klein et al. 1995; Burger & Gochfeld 1998).

Distance: Disturbance increased with decreased distance between visitors and birds (Burger 1986), though exact measurements were not reported.

Approach Angle: Visitors directly approaching birds on foot caused more disturbance than visitors driving by in vehicles, stopping vehicles near birds, and stopping vehicles and getting out without approaching birds (Klein 1993). Direct approaches may also cause greater disturbance than tangential approaches to birds (Burger & Gochfeld 1981; Burger et al. 1995; Knight & Cole 1995a; Rodgers & Smith 1995, 1997).

Noise: Noise caused by visitors resulted in increased levels of disturbance (Burger 1986; Klein 1993; Burger & Gochfeld 1998), though noise was not correlated with visitor group size (Burger & Gochfeld 1998).

The proposed use has the potential of intermittently interrupting the feeding habits of a variety of shorebirds, gulls, and terns, but encounters between pedestrians and migratory birds will be temporary. Refuge staff will manage visitor access via seasonal closures to minimize disturbance to nesting, resting, and foraging waterbirds on the refuge.

Pedestrian use also has the potential to disturb loafing seals. Gray and harbor seals haul-out on the refuge year round. A 150-foot buffer around all seals is required by the National Oceanic Atmospheric Administration to ensure compliance with the Marine Mammals Protection Act.

Pedestrian Indirect Impacts

Heavy beach use can dry out the sand and contribute to beach erosion. Trash left on the beach, particularly food or wrappers can attract predators that prey on nesting piping plovers and least terns or roosting shorebirds. Impacts of walking are likely to be minimal if conducted in accordance with refuge regulations. The new trail we propose to establish is on an existing unauthorized trail. The remaining unauthorized trails will be shut down, reducing the amount of disturbance from walkers through the dune habitat. We will manage refuge closures which restrict pedestrian access to minimize disturbance to priority avian species during critical times of the year. Closures can be expanded or contracted as needed depending on bird activity and results of further disturbance studies

Potential OSV Impacts

Although a specific study on the effects of OSV use has not been conducted on Nantucket NWR, studies have been done on beaches with similar ecological characteristics. Studies show that OSVs affect the physical and biological processes that take place within the beach ecosystem. Specifically, OSV use on the beach may result in the following negative impacts.

Foredune Profile

Over the long term, OSV use can have a negative effect on foredune growth. Long term OSV use can lead to an abrupt rather than sloping dune base, leaving the dune more susceptible to wave energy and erosion (Anders and Leatherman 1987a). The tracks created by OSV use can also affect the geomorphology of the beach through sand displacement and compaction (Schlacher and Thompson 2008). The amount of sand displaced increases as the number of vehicles (traffic flow) increases. Sand displacement is most pronounced with the first few vehicles (up to 10), and is most crucial near the foredune, where the highest sand displacement occurs, leading to steeper slopes. The use of wide tires with low pressure can reduce some of these impacts (Anders and Leatherman 1987b).

Wrack Habitat and Macroinvertebrates

Living organisms concentrate in the wrack lines that wash up during high tide. For example, bacteria, which play a vital role in breaking down organic matter, are 1,000 times more abundant in the wrack than

on bare sand. If OSVs drive over wrack habitat, they may break it up and/or dry it out. Godfrey and Godfrey (1980) found that OSV use reduced the amount of bacteria present by 50 percent and the amount of diatoms in the sand by 90 percent. Steinback et al. (2004, 2005) found that while different species of invertebrates respond differently to OSV use (some populations increase while others decrease), the overall abundance of invertebrates is significantly lower in beaches with OSV use. Steinback et al. also found less wrack on beaches with OSV use. Organisms found in the wrack are an important food source for nesting and migrating shorebirds including piping plovers. Over-sand vehicle use has also been shown to directly reduce macroinvertebrate density and diversity (Wolcott and Wolcott 2003, Schlacher et al. 2008), which reduces biological integrity and also may impact birds which forage on these species.

Vegetation

Over-sand vehicle use reduces vegetative cover (Anders and Leatherman 1987a) and species diversity through trampling, and can also result in a slower rate of plant recolonization (Godfrey and Godfrey 1980). Off-road vehicle use can cause soil compaction for ORV use and thus limit moisture and oxygen available for geminating seeds (Gehlhausen and Harper 1998). Plant seeds in trampled and dried out wrack lines may not reproduce. Reduced vegetation likely contributes to increased susceptibility to wave- and wind-driven erosion.

Nesting Birds

The Service's 2009 Five-year Status Review cites disturbance by humans as a continuing widespread and severe threat to Atlantic Coast piping plovers (USFWS 2009). Threats from human beach-users are cited in the final listing rule (USFWS 1985) and described in detail in the revised Atlantic Coast recovery plan (USFWS 1996). Threats to breeding piping plovers from both motorized and non-motorized beach recreation activities are relatively well understood, and recommended management options are described in the *Guidelines for Managing Recreation* (USFWS 1994).

Studies have shown that beach use including use of OSVs negatively impacts productivity of beach-nesting birds, particularly piping plovers. Vehicles have been shown to crush eggs, adults, and chicks (Wilcox 1959, Tull 1984, Burger 1987, Patterson et al. 1991, Shaffer and Laporte 1992). Cairns (1977) found reproductive success of piping plovers was 1.3 to 2.1 fledged young per pair on remote beaches but only 0.7 to 1.1 fledged young per pair on beaches used for recreation in Nova Scotia. Fleming (1984) calculated that fledgling success per nest attempt on beaches in Nova Scotia was significantly reduced from 1.8 to 0.5 young per pair for birds exposed to low and high recreational activity, respectively. He defined low activity as 0-20 visits per week and high activity as 30 or more visits per week by people and their vehicles. Fleming also found that piping plover chick survivorship was significantly decreased by higher levels of recreational activity. His results showed that most chick loss occurred between the ages of 10-17 days; he speculated that high levels of recreational activity caused mortality of chicks by interfering with feeding during a critical period of energy demand. MacIvor et al. (1987) observed piping plovers on North Beach in Chatham, Massachusetts. Following separation from the mainland during a 1987 storm, this area, which had received extensive OSV use, became inaccessible to vehicles. In 1987, 50 percent of plover pairs shifted their nest sites to areas that were not available for nesting in 1985 or 1986 due to OSV traffic. Further, all three least tern colonies were also in locations that were formerly unavailable due to OSV use. Six years of data collected by Strauss et al. (1986) in Barnstable, Massachusetts show that in their study area, the number of fledglings per nesting pair of plovers in an area with only light pedestrian use was 0.67, compared with 0.32 in an adjacent area with heavy OSV use. Their study also shows that while adult plovers will often move their chicks to feeding habitat with lower levels of disturbance, chicks moved more than 200 meters have half the probability of fledging than those moved less than 200 meters.

It has been documented that piping plover chicks will tend to run along ruts caused by vehicles and remain motionless as vehicles approach (USFWS 1996). Piping plover chicks may also have difficulty crossing deep ruts and moving quickly enough out of a vehicles path. Additionally, piping plovers tend not to reach their full habitat carrying capacity on beaches where vehicles are allowed during the nesting and brood rearing periods (USFWS 1996).

Migrating Birds

Many species of shorebirds (*Charadriiformes*) that breed in North America migrate up to 30,000 kilometers annually, traveling from non-breeding grounds as far south as Argentina to breeding grounds as far north as the Arctic Ocean (Brown et al. 2001, Morrison 1984, Myers et al. 1987). During these long distance migrations,

shorebirds rely on strategically located stopover sites which provide abundant food and adjacent resting habitat (Helmers 1992, Myers et al. 1987, Senner & Howe 1984). Coastal stopover sites in particular are increasingly being subjected to development and human disturbance, and loss of suitable stopover habitat may contribute to declines in local abundance and overall populations of shorebirds in North America (Brown et al. 2001, Myers et al. 1987, Pfister et al. 1992).

Studies have shown reduced numbers of migrating shorebirds in response to vehicle traffic on beaches. For example, Pfister et al. (1992) documented long term declines in abundance of red knots (*Calidris canutus*) and short-billed dowitchers (*Limnodromus griseus*) on Plymouth Beach, Massachusetts, that exceeded declines at comparable, less disturbed sites, as well as the overall eastern North American population. Vehicle presence also caused semipalmated sandpipers (*Calidris pusilla*) and sanderlings (*Calidris alba*) to alter their distribution on the beach. A study at Parker River NWR in Newburyport, Massachusetts found that vehicle use on beaches disturbed roosting shorebirds more than pedestrian use (Harrington and Drilling 1996). Off road vehicle use reduces food resources and increases disturbance, contributing to lower weight shorebirds. Lower weight individuals are less likely to successfully complete their long-distance migrations (Harrington and Drilling 1996). The North Atlantic Shorebird Plan identified protection of food resources and minimizing human disturbance as high priority management objectives (Clark and Niles 2003). We have not quantified migrating shorebird use of Nantucket NWR, but data on species use, and potential disturbance, may be collected in future years.

While we acknowledge the potential impacts of OSV on the physical and biological characteristics of a beach ecosystem, Nantucket NWR is only about 21 acres, and most impacts from OSV on this small area are not likely to detract significantly from the larger landscape. However, we are committed to reducing direct disturbance on nesting, staging, and migrating birds (and seals), as well as protecting the integrity of the dune system and wrack line as much as possible. Seasonal closures for bird and seals, and prohibitions on OSV access in the dune system and along the wrack line will minimize the overall impact of OSV use on Nantucket NWR. The Trustees of Reservations has produced and distributes a guide to OSV use which likely increases voluntary compliance and user safety, and may further lessen disturbance to natural resources. The guide is available at: *http://www.thetrustees.org/pages/293_coskata_coatue_wildlife_refuge.cfm* (accessed March 2011).

PUBLIC REVIEW AND COMMENT:

As part of the comprehensive conservation planning process for Nantucket NWR, this compatibility determination underwent extensive public review, including a comment period of 30 days that followed the release of the draft Comprehensive Conservation Plan and Environmental Assessment.

DETERMINATION (CHECK ONE BELOW):

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

The refuge will be managed to protect seals, nesting shorebirds, and all resting and foraging seabirds. Closures will be maintained to reduce impacts from all public use at certain times and in specific places. Swimming and sunbathing will not be allowed in closed areas.

Occasional law enforcement patrol and regular staff and conservation partner presence should minimize potential violations. The current refuge "open ½ hour before sunrise to ½ hour after sunset" regulation restricts entry after daylight hours and will be maintained. Refuge regulations will be posted and enforced.

Periodic evaluations will be done to insure that visitors are not causing unacceptable adverse impacts. Areas open to these uses will be evaluated on an annual basis depending on geomorphology and wildlife use.

JUSTIFICATION:

Allowing sunbathing and swimming will contribute to public appreciation of Nantucket NWR. Costs associated with administering these uses and likely visitor impacts are both minimal. These uses will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose of Nantucket NWR. Therefore, it is the determination of the Service that swimming and sunbathing are compatible uses of the refuge.

SIGNATURE:

Refuge Manager: _____ (Signature) _____ (Date)

CONCURRENCE:

Regional Chief: _____ (Signature) _____ (Date)

MANDATORY 10 YEAR RE-EVALUATION DATE:

_____

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FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Organized Picnicking

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

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

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

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✔ No _____

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

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

Not Appropriate ✔ **Appropriate** _____

Refuge Manager: [signature] Date: 7/25/2012

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Organized Picnicking

NARRATIVE:

Service policy does not encourage picnicking, although it is recognized to occur incidental to the priority public uses described in the Refuge System Improvement Act of 1997. The refuge does not provide amenities for any large scale or organized gatherings for this activity. Allowing this activity would enable visitors to bring food and picnic while not participating in wildlife-dependent recreation. Introducing food to the beach ecosystem would encourage scavengers and likely impact the natural balance of the food chain, potentially causing harm to priority species that the refuge seeks to protect. The use is expected to have potentially significant adverse impacts on refuge wildlife and habitat and would require monitoring by refuge staff above refuge resource capacity. In addition, the use is expected to detract from the mission of the National Wildlife Refuge System, and potentially diminish the purpose for which the refuge was established.

This finding for organized picnicking should not be read as banning all food and drink of the refuge. We understand that those engaged in most permitted uses of the refuge will bring food and drink, as appropriate, for consumption while engaged in those uses, and we take this into account in analyzing the impacts of those uses. 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. Littering, dumping, and abandoning property are prohibited by Federal regulation at 50 C.F.R. 27.93.94.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Beach Sports and Kite Flying

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: Elizabeth A. Herland Date: 7/25/2012

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Beach Sports and Kite Flying

NARRATIVE:

The Service policy on Appropriate Refuge Uses (603 FW 1) states that: "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."

Beach sports include, but are not limited to, volleyball, football, soccer, frisbee, baseball, surfing, and skim boarding. Kite-related activities include kite flying, kite surfing, and kite boarding. These activities are determined to be inappropriate because they disturb wildlife and increase beach erosion and habitat destruction. These uses do not contribute to quality, wildlife-dependent, recreational uses nor do they support the purpose for which the refuge was established.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Bicycling

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: Elizabeth A. Herland Date: 7/25/2012

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Bicycling

NARRATIVE:

To access the refuge by land, visitors must cross more than five miles of sandy beach on foot or in permitted over-sand vehicles. None of the trails on the refuge are maintained for bicycles. The Trustees of Reservations (TTOR) do not allow bicycles on their adjacent property, the Coskata-Coatue Wildlife Refuge, which visitors have to pass through to access the refuge. There is limited vehicular access on the refuge, and bicycles would be in conflict with vehicles in the limited area that would be available for bicycle use. The refuge is only about 21 acres, so access by bicycle is not necessary to provide the visitor an opportunity to see wildlife throughout the refuge. Controlled over-sand vehicle use and pedestrian access is sufficient to provide the public with opportunities to observe wildlife and enjoy the natural conditions on the refuge. Given the difficult cycling conditions on the refuge and restrictions of the abutting TTOR property, bicycling is not an appropriate recreational use for Nantucket National Wildlife Refuge.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Camping

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: Elizabeth A. Harkness Date: 7/25/2012

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Camping

NARRATIVE:

The Service policy on Appropriate Refuge Uses (603 FW 1) states that: "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."

Camping is not consistent with Service policy on secondary uses and would divert existing and future resources from accomplishing priority tasks. It also presents unacceptable levels of risk from the potential spread of campfires to wildfires. The refuge is only about 21 acres in size, and there is not enough space on the refuge to allow camping without disturbing wildlife or having an adverse impact on the vegetation and dune habitat. Additionally, the town of Nantucket does not allow camping anywhere on Nantucket Island, so allowing the use on the refuge would not support the town of Nantucket's position on camping. The use does not support the refuge's purpose in carrying out the national migratory bird program. This use is also not consistent with any approved refuge management plan. While there would be some benefit for the visitor to experience wildlife and nature on the refuge through camping, the lack of staff and financial resources to manage the use and the conflict it would cause with other users, as well as the impact on refuge plant and wildlife resources, makes this an inappropriate use.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Fires

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: Elizabeth A Herkert Date: 7/25/2012

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Fires

NARRATIVE:

The Service policy on Appropriate Refuge Uses (603 FW 1) states that: "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."

Fires are not appropriate wildlife-dependent, recreational activities, nor does the refuge have the resources needed to manage this activity. Fires can disturb nesting shorebirds that use the refuge and have the potential to spread and endanger plants, wildlife, and public safety. Fires also are associated with nonwildlife-dependent forms of recreation, some of which have been found not to be appropriate. The use does not support the refuge's establishing purpose to provide for migratory birds.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Fireworks

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: Elizabeth A Herlevich Date: 7/25/2012

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Fireworks

NARRATIVE:

The Service policy on Appropriate Refuge Uses (603 FW 1) states that: "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."

Fireworks are not an appropriate use on the refuge. The size of the refuge is so small that there is no place on the refuge where this use could be accommodated with stipulations. Additionally, fireworks pose significant impacts to wildlife and habitat, especially during the summer and early fall when shorebirds nest on the refuge. In addition, fireworks are a public safety risk that could start wildfires or cause injury to refuge visitors. This use does not support the refuge's establishing purpose to provide for migratory birds.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Pets

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: Elizabeth A. Harland Date: 7/25/2012

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

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

JUSTIFICATION FOR A FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Nantucket National Wildlife Refuge

Use: Pets

NARRATIVE:

The Service policy on Appropriate Refuge Uses (603 FW 1) states that: "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."

Dogs and other pets can have a significant impact on wildlife. The presence of dogs may flush incubating birds from nests (Yalden and Yalden 1990), disrupt breeding displays (Baydack 1986), disrupt foraging activity in shorebirds (Hoopes 1993), and disturb roosting activity in ducks (Keller 1991). Many of these authors indicated that both people with dogs on a leash and loose dogs provoked the most pronounced disturbance reactions from their study animals. However, the greatest stress reaction results from unanticipated disturbance. Animals show greater flight response to humans moving unpredictably than to humans following a distinct path (Gabrielsen and Smith 1995). Dogs that are unleashed or not under the control of their owners may disturb or potentially threaten the lives of some wildlife. In effect, off-leash dogs increase the radius of human recreational influence or disturbance beyond what it would be in the absence of a dog. In addition, dog waste is known to transmit diseases that may threaten the health of some wildlife and other domesticated animals. Domestic dogs can potentially introduce various diseases and transport parasites into wildlife habitats (Sime 1999).

Dogs are prohibited from adjacent conservation land owned by The Trustees of Reservations (TTOR) from April 1 through September 15 to protect nesting shorebirds. The TTOR has much more land in which wildlife is dispersed, thereby decreasing the likelihood that an individual pet will disrupt wildlife. At Nantucket NWR, which is only about 21 acres in size, it is much more difficult to limit this disturbance. Additionally, many pet owners fail to keep pets leashed or cleanup pet waste. To ensure the protection of wildlife and habitat and to support the refuge's establishing purpose in providing for migratory birds, the refuge has determined the presence of pets to be inappropriate on Nantucket National Wildlife Refuge.

LITERATURE CITED:

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Appendix C



Karen Terwilliger/TCI

Refuge shoreline

Wilderness Review

- Introduction
- Site Description
- Wilderness Inventory
- Wilderness Inventory Conclusions

Introduction

A wilderness review is the process followed to identify and recommend for congressional designation National Wildlife Refuge System (refuge system) lands and waters that merit inclusion in the National Wilderness Preservation System (NWPS). Wilderness reviews are a required element of comprehensive conservation plans (CCPs), and we conduct them in accordance with the refuge planning policy outlined in 602 FW 1 and 3, including interagency and Tribal coordination, public involvement, and National Environmental Policy Act (NEPA) compliance.

The wilderness review process is conducted in three phases: inventory, study, and recommendation. During the inventory phase, we identify refuge lands and waters owned by the Service in fee simple that meet the minimum criteria for wilderness. These areas are called Wilderness Study Areas (WSA). In the study phase, we evaluate WSAs to determine if they are suitable for wilderness designation. The findings of the study phase determine whether we will recommend the area for designation as wilderness in the final CCP. In the recommendation phase, we forward our wilderness recommendations from the Director to the Secretary of Interior (Secretary). The Secretary next forwards the final proposal to the President for consideration. The President is then responsible for formally transmitting to both houses of Congress recommendations for wilderness designation. We will conduct a wilderness review on a given refuge every 15 years through the CCP process, or sooner if significant new information becomes available affecting wilderness potential, or if a major refuge expansion occurs that warrants a re-evaluation.

Site Description

The refuge is approximately 21 acres and is located in the town of Nantucket, in Nantucket County, Massachusetts (MA) (map 1-2). The refuge is primarily a barrier beach ecosystem, found at the tip of the Coskata-Coatue Peninsula, with sand beaches around the periphery and vegetated dunes in the interior portions of the refuge. As such, it is heavily influenced by maritime processes. It provides habitat for many coastal waterbird species of conservation concern. The refuge is bounded on three sides by ocean waters and to the south by The Trustees of Reservations (TTOR) land. The refuge is contiguous except for a small one acre inholding containing an operational lighthouse owned by the U.S. Coast Guard (map 1-1).

Wilderness Inventory

The wilderness inventory is a broad look at each planning area (Wilderness Inventory Area (WIA)) to identify Wilderness Study Areas. A Wilderness Study Area is required to be a roadless area or a roadless island of any size, meet the size criteria, appear natural, and provide for solitude or primitive recreation. Section 2(c) of the Wilderness Act provides the following definition,

> A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions, and which: (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

The wilderness inventory process was conducted by the CCP Planning Team. After evaluating the refuge land base, the surrounding landscape, and transportation corridors, the review team considered it most practicable to inventory and assess the refuge as a whole due to its small size. All of the approximately 21 acres of the refuge were assessed in its present state. The team's first objective was to identify contiguous areas as large as possible that met the roadless criteria. Only lands currently owned by the Service in fee title were evaluated. The review team identified the refuge as a whole unit as one WIA (Map C-1).

Evaluation of the Roadless Criteria

Permanent roads are prohibited in wilderness under Section 4(c) of the Act. A WSA is required to be a roadless area or a roadless island of any size. For the purposes of the wilderness inventory, a "roadless area" is defined as "a reasonably compact area of undeveloped Federal land that possesses the general characteristics of a wilderness and within which there is no improved road that is suitable for public travel by means of four-

Map C-1. Wilderness Study Area



wheeled, motorized vehicles intended primarily for highway use. A route maintained solely by the passage of vehicles does not constitute a road." 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." Motorized vehicles and motorized equipment are also prohibited uses in refuge wilderness areas.

The following factors were the primary considerations in evaluating the roadless criteria:

A. The area does not contain improved roads suitable and maintained for public travel by means of motorized vehicles primarily intended for highway use.

B. The area is an island, or contains an island, that does not have improved roads suitable and maintained for public travel by means of motorized vehicles primarily intended for highway use.

C. The area is in Federal fee title ownership.

Evaluation of the Size Criteria

The size criteria can be satisfied if an area has at least 5,000 acres of contiguous roadless public land, or is sufficiently large that its preservation and use in an unimpaired condition is practicable. The following factors were the primary considerations in evaluating the size criteria:

A. An area of more than 5,000 contiguous Federal acres (State and private lands are not included in making this acreage determination).

B. A roadless island of any size.

C. An area of less than 5,000 contiguous Federal acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition, and of a size suitable for wilderness management.

D. An area of less than 5,000 contiguous acres that is contiguous with a designated wilderness, recommended wilderness, or area under wilderness review by another Federal wilderness managing agency such as the Forest Service, National Park Service, or Bureau of Land Management.

Evaluation of the 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 human work substantially unnoticeable." The area must appear natural to the average visitor, rather than "pristine." The presence of historic landscape conditions is not required.

An area may include some human impacts provided they are substantially unnoticeable in the unit as a whole. Significant hazards caused by humans, such as the presence of unexploded ordnance from military activity and the physical impacts of refuge management facilities and activities, are also considered in evaluating the naturalness criteria.

An area may not be considered unnatural in appearance solely on the basis of the sights and sounds of human impacts and activities outside the boundary of the unit. The cumulative effects of these factors, in conjunction with land base size, physiographic, and vegetative characteristics, were considered in the evaluation of naturalness.

The following factors were the primary considerations in evaluating naturalness:

A. The area appears to have been affected primarily by the forces of nature with the imprint of human work substantially unnoticeable.

B. The area may include some human impacts, but they are substantially unnoticeable in the unit as a whole.

C. Does the area contain significant hazards caused by humans, such as the presence of unexploded ordnance from military activity?

D. Are there the presence of physical impacts of refuge management facilities and activities?

Evaluation of the Solitude or Primitive and Unconfined Recreation Criteria

A WSA must provide outstanding opportunities for solitude or primitive and unconfined recreation. The area does not have to possess outstanding opportunities for both solitude and primitive and unconfined recreation, and does not need to have outstanding opportunities on every acre. Further, an area does not have to be open to public use and access to qualify under this criteria; Congress has designated a number of wilderness areas in the refuge system that are closed to public access to protect resource values.

Opportunities for solitude refer to the ability of a visitor to be alone and secluded from other visitors in the area. Primitive and unconfined recreation means non-motorized, dispersed outdoor recreation activities that are compatible and do not require developed facilities or mechanical transport. These primitive recreation activities may provide opportunities to experience challenge and risk, self reliance, and adventure. These two elements are not well defined by the Wilderness Act, but can be expected to occur together in most cases. However, an outstanding opportunity for solitude may be present in an area offering only limited primitive recreation potential. Conversely, an area may be so attractive for recreation use that experiencing solitude is not an option.

The following factors were the primary considerations in evaluating outstanding opportunities for solitude or primitive unconfined recreation:

A. The area offers the opportunity to avoid the sights, sounds, and evidence of other people. A visitor to the area should be able to feel alone or isolated.

B. The area offers non-motorized, dispersed outdoor recreation activities that are compatible and do not require developed facilities or mechanical transport.

Evaluation of the Supplemental Values Criteria

The Wilderness Act states that an area of wilderness may contain ecological, geological, or other features of scientific, educational, scenic, or historical value. Supplemental values of the area are optional, but the degree to which their presence enhances the area's suitability for wilderness designation should be considered. The evaluation should be based on an assessment of the estimated abundance or importance of each of the features.

Wilderness Inventory Conclusions

The CCP Planning Team inventoried the lands and waters in fee title ownership within the Nantucket National Wildlife Refuge. We found that no lands met the minimum criteria to be a WSA. The review team identified one WIA (map C-1), the refuge unit in its entirety, and found that it did not meet the minimum criteria. The team considered refining the WIA by eliminating areas with no obvious wilderness character; however, they determined that further refinement of the WIA would result in much smaller areas with unmanageable boundaries. The refuge is located at the tip of the Coskata-Coatue Peninsula, bounded by ocean waters on three sides and TTOR property to the south. As a result, the team concluded that refining the size of the WIA would not make practicable its preservation and use in an unimpaired condition, and they would not be of a size suitable for wilderness management.

The team determined that the WIA, as identified on map C-1, does not meet the criteria for a WSA as defined by the Wilderness Act. In conclusion, we do not recommend this WIA be evaluated further as a WSA. A summary of our CCP Planning Team Wilderness Review findings are listed in table C.1.

Table C.1. Nantucket NWR Wilderness Review Finding Summary.

Refuge unit and acreage	(1) Has at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in an unconfined condition, or is a roadless island;	(2) Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;	(3a) Has outstanding opportunities for solitude;	(3b) Has outstanding opportunities for a primitive and unconfined type of recreation;	(4) Contains ecological, geological or other features of scientific, educational, scenic, or historical value.	Parcel qualifies as a wilderness study area (meets criteria 1, 2, and 3a or 3b)
Nantucket NWR Approximately 21 acres	No. The refuge is approximately 21 acres, located at the tip of the Coskata-Coatue Peninsula. It is bounded on three sides by ocean waters, and to the south by TTOR property.	No. The refuge is at the tip of a long peninsula that requires the use of OSVs to gain access, resulting in OSV tracks and parked vehicles along the beach. OSV tracks can remain evident throughout the refuge after the vehicles are gone. In addition, a one-acre inholding on the refuge contains an operating U.S. Coast Guard lighthouse, and this is a popular destination as well.	No. The refuge is small and does not offer sights and sounds of wilderness. It is also a highly sought-after tourist destination reached by OSV, and with periodic OSV tours.	No. These types of opportunities do not exist on the refuge due to its small size, status as a popular tourist destination, and the need for OSVs to access the refuge.	Yes. The refuge supports beach-nesting birds of conservation concern, including piping plover (federally threatened) and American oystercatcher (regional concern), and staging terns including roseate tern (federally endangered).	No.

Appendix D



Karen Terwilliger/TCI

OSV directional signs

Refuge Operations Needs System (RONS) and Service Asset Maintenance Management System (SAMMS)

Refuge Operations Needs System (RONS) Databases

Table D.1. Proposed Projects Currently in RONS Database for Nantucket NWR.

Project Title	Project Number	Costs: One Time	Costs: Recurring Base	Total Need in First Year
Restore and Preserve Biological Integrity	FY08-3505		$97,911	$97,911
Improve Public Understanding and Compliance	FY08-2785		$35,020	$35,020
Evaluate Impacts of Recreation on Staging Terns and Other Resources of Concern	FY10-2253	$63,000	$13,000	$93,951
Restore Productive Beach Nesting Sites for Rare Birds by Controlling Non-native Predators	FY08-4293	$65,000	$27,000	$92,000
Expand Interpretation and Visitor Services at Nantucket NWR	FY08-3131	$137,000	$15,000	$174,235
Climate Adaptation and Coastal Geomorphology Study	FY10-2257	$85,000	$7,000	$136,470
Conduct Outreach Islandwide off-refuge	FY10-2244	$110,000	$11,000	$143,235

Service Asset Maintenance Management System (SAMMS) Database

Table D.2. Projects Currently in SAMMS Database for Nantucket NWR.

Project Title	Project Number	Cost Estimate
Entrance, information, and regulation signs	100213652	$15,000
Boundary signs and posts	10056066	$7,500
Replace entrance and information signs and develop informational panels and kiosk	2008858804	$13,000

Appendix E

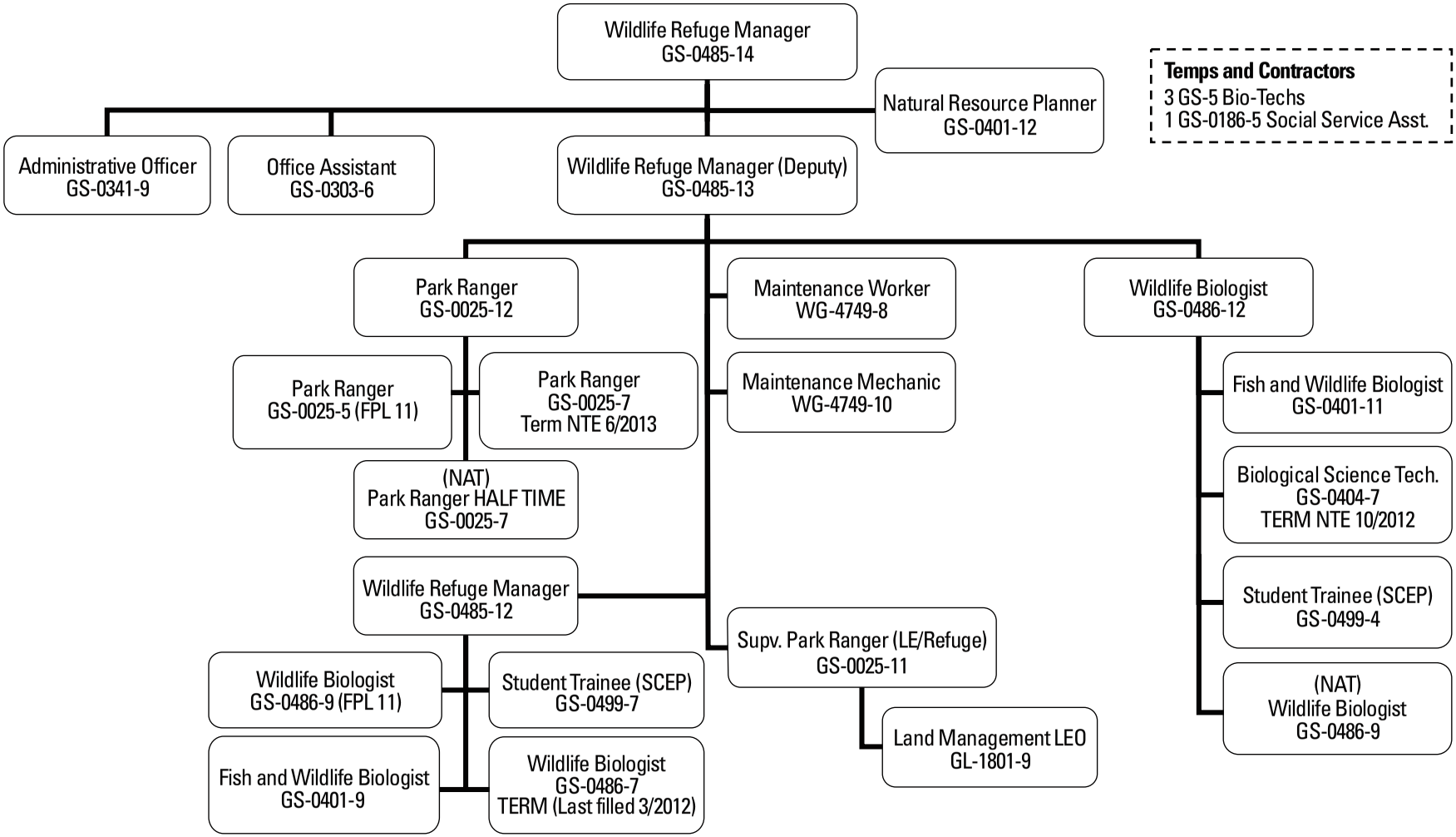


Elizabeth Wunker/USFWS

Sunset

Staffing Chart

U.S. Fish and Wildlife Service
Northeast Region
Regional Chief, National Wildlife Refuge System
Eastern Massachusetts National Wildlife Refuge Complex
(with new Nantucket (NAT) Refuge positions)



Appendix F



Karen Terwilliger/TCI

Refuge vegetation

Fire Management Program Guidance

- Introduction
- The Role of Fire
- Wildland Fire and Management Policy and Guidance
- Fire Management Planning
- Fire Management Program at Nantucket National Wildlife Refuge

Introduction

The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" as stated in the National Wildlife Refuge Improvement Act (October 9, 1997). The U.S. Fish and Wildlife Service's (Service) Northeast Regional Fire Program (Fire Program) helps support this mission by creating and managing important wildlife habitat with prescribed fire and protecting human safety by reducing the risk of wildfire and through fire suppression. This document provides an outline of the Fire Program's guidance on fire management, explains the fire management planning process, and describes the fire management program at Nantucket National Wildlife Refuge (NWR).

The Role of Fire

Historically, natural fire and ignitions by Native American people has played an important disturbance role in many ecosystems by:

- Removing fuel accumulations.
- Decreasing the impacts of insects and diseases.
- Stimulating regeneration of vegetation.
- Cycling nutrients.
- Providing a diversity of habitats for plants and wildlife.

In the heavily developed areas of the northeastern U.S. that role has been modified significantly. However, when fire is used properly it can:

- Reduce hazardous fuels build-up in both wildland-urban interface[1] and other areas.
- Improve wildlife habitats by reducing the density of vegetation, and/or changing plant species composition.
- Sustain and increase biodiversity.
- Improve woodlands and shrublands by reducing plant density.
- Reduce the susceptibility of plants to insect and disease outbreaks.
- Assist in the control of invasive and noxious species.

Wildland Fire and Management Policy and Guidance

In 2001, the Secretaries of the Interior and Agriculture approved an update to the 1995 "Federal Fire Policy." The 2001 "Federal Wildland Fire Management Policy" directs Federal agencies to achieve a balance between using fire suppression to protect life, property, and resources, and using wildland fire to regulate fuels and maintain healthy ecosystems. It also directs agencies to provide a management response to all wildfires that is commensurate with the values at risk, human safety, and the costs for suppression.

This policy provides nine guiding principles that are fundamental to the success of the fire management program. These guiding principles are as follows:

1. Firefighter and public safety is the first priority in every fire management activity.
2. The role of wildland fire as an essential ecological process and natural change agent will be incorporated into all land management planning processes.
3. Fire management plans, programs, and activities support land and resource management plans and their implementation.

[1] The wildland-urban interface is the line, area, or zone where human development and structures meet with undeveloped wildland or vegetative fuels.

4. Sound risk management is a foundation for all fire management activities.

5. Fire management programs and activities are economically viable, based upon values to be protected, costs, and land and resource management objectives.

6. Fire management plans and activities are based upon the best available science.

7. Fire management plans and activities incorporate public health and environmental quality considerations.

8. Federal, State, Tribal, local, interagency, and international coordination and cooperation are essential.

9. Standardization of policies and procedures among Federal agencies is an ongoing objective.

The following provide further direction on fire management decisions:

- Every fire requires a response and decision on how to respond to it.
- The Service's initial reaction to human caused fires will be to suppress the fire while providing for firefighter and public safety, limiting damage and loss, and minimizing costs of the fire.
- The interagency nature of fire management work requires the involvement and participation of cooperators, including both State and local agencies, in planning for, and potentially responding to, wildland fire.

Fire Management Planning

A Fire Management Plan (FMP) is required for every national wildlife refuge that has burnable acres. The FMP defines the refuge's fire management direction based on the objectives outlined in the refuge's Comprehensive Conservation Plan (CCP) and Habitat Management Plan (HMP). It provides a detailed description of how the refuge will:

- Respond to wildland fires.
- Manage fuels to reduce the risk of wildland fires.
- Use prescribed burning to meet management objectives, if applicable.

In order for a refuge to use wildlife fire, prescribed burning, and other hazardous fuel reduction techniques, these methods must be specified and pre-approved as appropriate management responses in the refuge's FMP. If none of these methods are described in the FMP, the refuge's only allowed response to wildland fire is aggressive suppression.

Fire Management Program at Nantucket National Wildlife Refuge

Management Direction

Nantucket NWR was established in 1975 for its "particular value in carrying out the national migratory bird management program." The 21-acre refuge is cooperatively managed with The Trustees of Reservations and is located on the eastern side of Nantucket Island. Nantucket NWR is an unstaffed unit of the Eastern Massachusetts National Wildlife Refuge Complex. The refuge provides important nesting, resting, and foraging habitat for coastal waterbird species and marine mammals. It is located about 20 miles offshore from Hyannis, Massachusetts. There have been no wildfires on the refuge since its establishment, and to date, there have been no hazard fuels or resource management activities involving the use of prescribed fire. In the future, the refuge may use prescribed fire as a management tool to promote and accomplish the goals defined in the refuge's CCP.

Specifically, prescribed fire may be used to:

- Protect and enhance Service Trust Resources and Species and Habitats of Special Concern.

- Maintain a healthy and diverse complex of natural community types comprised of native plants and animals to pass on to future generations of Americans.
- Conduct effective outreach activities to promote quality offsite wildlife-dependent public use programs, raise public awareness of the refuge and the refuge system, and promote enjoyment and stewardship of natural resources in the Cape Cod and Islands region.
- Work collaboratively with other land management partners on Nantucket to protect land from wildfire and to enhance landscapes through the use of prescribed burning.

All aspects of the fire management program will be conducted in a manner consistent with applicable laws, policies, and regulations. Nantucket NWR will maintain a FMP to accomplish the fire management goals that follow (see Fire Management Goals). Any future prescribed fire, chemical, manual, and mechanical fuel treatments will be applied in a scientific way, under selected weather and environmental conditions.

Fire Management Goals

The goals and strategies of the National Wildlife Refuge System Wildland Fire Management Program Strategic Plan are consistent with Department of the Interior and the U.S. Forest Service policies, National Fire Plan direction, the President's Healthy Forest Initiative, the 10-year Comprehensive Strategy and Implementation Plan, National Wildfire Coordinating Group Guidelines, initiatives of the Wildland Fire Leadership Council, and Interagency Standards for Fire and Aviation Operations.

The current fire management goal for Nantucket NWR is to protect Service lands and wildlife from wildfire. Future direction may address and allow wildland fire as a tool to meet the habitat goals and objectives identified in this CCP.

Fire Management Objectives

The purpose of the fire management program at Nantucket NWR would be to use chemical, manual, and mechanical fuel treatments to ensure public and firefighter safety, while protecting property and natural resource values from wildfire. The objectives of Nantucket NWR's fire management program include the following:

- Reduce the wildfire impacts to all resource management activities.
- Reduce the threats associated with accumulations of hazardous fuel loads to improvements, such as the Great Point Lighthouse.
- Provide, enhance, and protect habitats for State and federally endangered and threatened species and species of special concern.
- Provide, maintain, enhance, and protect feeding, resting, nesting, and brood habitat that meet the requirements of migratory waterfowl, other migratory birds, and resident wildlife.
- Maintain health and vigor of the beach, sand dune vegetation community type.
- Facilitate the control of invasive and exotic species.
- Increase habitat diversity in refuge upland habitats.
- Demonstrate and educate the public about the role and benefits of wildfire protection and prescribed fire use in resource management.
- Maintain current ecosystem diversity within the landscape context.
- Comply with State Air Quality Implementation Plans and regulations to protect public health and the environment.

Fire Management Strategies

The refuge will use fire management strategies and tactics that consider public and firefighter safety, as well as resource values at risk. The FMP will provide a more detailed description of the wildfire suppression, prescribed fire, chemical, manual, and mechanical treatment methods the refuge plans to use. The FMP

will also explain the timing and monitoring of the refuge's fire management strategies. The refuge will develop prescribed fire burn plans for specific sites, following the interagency Prescribed Fire Planning and Implementation Procedures Reference Guide (2009) template.

Some fire management strategies techniques, such as prescribed burning, may impact air quality. Prescribed fire temporarily reduces air quality by diminishing visibility and releasing particulates and pollutants through combustion. However, the refuge will meet the Clean Air Act emission standards by adhering to the Massachusetts Air Quality requirements during all prescribed fire activities.

Fire Management Organization, Contracts, and Cooperation

The Service's Northeast Regional Fire Program is divided into four fire management zones which provide technical fire management oversight to refuges. Nantucket NWR is currently within the New England fire management zone, which includes all the national wildlife refuges in Massachusetts. The primary fire management staffing and support equipment are located at the Eastern Massachusetts National Wildlife Refuge Complex, and are shared among all units. All fire management activities are conducted in a coordinated and collaborative manner with the refuge and other Federal and non-Federal partners. The New England fire management zone has also developed a close working relationship with the Massachusetts Department of Fish and Game and The Nature Conservancy.

Upon approval of this CCP, a new FMP will be developed for the refuge. This FMP may cover only Nantucket NWR, or may cover all of the refuges within the Eastern Massachusetts National Wildlife Refuge Complex.

Appendix G



S. Maslowski/USFWS

Least tern

Land Protection Plan

- Introduction and Purpose
- Project Description
- Refuge Purpose
- Status of Resources to be Protected
- Threats to the Resource
- Action and Objectives
- Protection Options
- Land Protection Methods
- Service Land Protection Policy
- Funding for Fee or Easement Purchase
- Coordination
- Socioeconomic and Cultural Impacts
- Literature Cited

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240

In Reply Refer To:
FWS/ANRS/052251

JAN 15 2013

Memorandum

To: Regional Director, Region 5

From: Director

Subject: Approval to Proceed with Publication and Distribution of the Final Planning Documents for the Expansion of the Nantucket National Wildlife Refuge, Nantucket County, Massachusetts

I approve your request dated September 28, 2012, to expand the current 21-acre Nantucket National Wildlife Refuge by up to 2,036 acres.

This request is based on the preferred alternative (Alternative B) in the Comprehensive Conservation Plan that was initiated for the refuge on April 7, 2008. Public participation was solicited during the planning process. Federal, State, and local governments, and private organization and citizens have provided input.

The Decision Package you submitted for my review included an Environmental Assessment, Land Protection Plan, and other related documents indicative of detailed planning. These documents comply with the requirements of the Director's land acquisition planning procedures memo dated August 11, 2000.

The lands targeted for protection will assist the refuge in addressing two priority conservation objectives: recovering listed threatened and endangered species and conserving Migratory Birds in decline.

Attachments

Introduction and Purpose

This land protection plan (LPP) provides detailed information about the U.S. Fish and Wildlife Service's (Service, we, our) proposal to expand Nantucket National Wildlife Refuge (Nantucket NWR, refuge) on Nantucket, Massachusetts. This LPP identifies the proposed land protection boundary for the Nantucket NWR. Working with numerous partners, we delineated 2,036 acres of biologically significant land on the island of Nantucket. These acres are encompassed by the recommended acquisition boundary established in alternative B of the Nantucket NWR Draft Comprehensive Conservation Plan and Environmental Assessment (draft CCP/EA). We plan to protect these lands through transfers at no cost, fee-title acquisition, conservation easements, and management agreements. Of the total acreage, we recommend acquiring 206 acres in fee title through transfers at no cost, 17 acres in fee title through purchase, 1,117 acres in conservation easements, and 696 acres through management agreement.



Amanda Boyd/USFWS

Nantucket National Wildlife Refuge

The purposes of this LPP are to:

1) Provide landowners and the public with an outline of Service policies, priorities, and protection methods for land in the project area.
2) Assist landowners in determining whether their property lies within the proposed acquisition boundary.
3) Inform landowners about our long-standing policy of acquiring land only from willing sellers (we will not buy any lands or easements if the owners are not interested in selling).

This LPP presents the methods the Service and interested landowners can use to accomplish their objectives for wildlife habitat within the refuge boundary. The maps (G-1 through G-5) at the end of this document show the study area boundary and the land parcels in the preferred action area (i.e., as defined in alternative B of the EA/draft CCP). Table G.1 at the end of this document identifies each parcel, its tax map number, acreage, and our priority and recommended option for acquiring and protecting its habitat.

Project Description

Expand Refuge Land Protection Boundary

Nantucket NWR, located within the area known locally as "Great Point," is part of the Eastern Massachusetts National Wildlife Refuge Complex (refuge complex). The refuge complex consists of eight refuges in eastern Massachusetts that are managed from the refuge complex headquarters at Great Meadows NWR in Sudbury, Massachusetts. Nantucket NWR is one of four refuges located on Cape Cod and the Islands; Monomoy, Nomans Land Island, and Mashpee NWRs are also part of the refuge complex. Nantucket NWR has been managed with formal and informal assistance from The Trustees of Reservations (TTOR) for several decades. Great Point is known as one of the best surfcasting locations in New England because of the riptide which brings bluefish and striped bass to the point. The refuge is also a destination for hundreds of visitors each year seeking to enjoy a Nantucket beach or a tour of the Great Point Lighthouse. Great Point is the destination for nearly 80 percent of the visitors who enter TTOR's Coskata-Coatue Wildlife Refuge. The proposed refuge expansion would protect a combination of wetland, upland, maritime dune, beach, and scrub-shrub habitat supporting migratory birds, federally listed and State-listed threatened and endangered species, and regionally significant wildlife and plant communities on Nantucket and associated islands.

Conservation of migratory bird, marine mammal, and threatened and endangered species' habitat within the proposed boundaries is one of the primary reasons for expanding the refuge and guiding its management. Bird species of particular concern include the federally and State-threatened piping plover (*Charadrius melodus*), federally and State endangered roseate tern (*Sterna dougallii*), and State-listed least tern (*Sterula antillarum*), American oystercatcher (*Haematopus palliates*), and common tern (*Sterna hirundo*). Additional species include the federally endangered American burying beetle (*Nicrophorus americanus*), the New England cottontail (*Sylvilagus transitionalis*, candidate for Federal listing) and gray seal (*Halichoerus grypus*). These and other trust species are addressed individually below and grouped according to habitat.

Maritime Beach Habitats and Associated Species

The Nantucket main island and adjacent Muskeget Island provide over 3,100 acres of maritime beach habitats that support nesting populations of piping plover, least tern, and American oystercatcher, and staging roseate and common terns. Muskeget Island also supports a large gray seal population. This proposal for land protection would allow improved management on over 1,200 acres of this habitat and provide an opportunity for the Service to work with partners to balance the needs of our trust resources with public use. Additional information on Federal trust species using maritime beach habitat on Nantucket and surrounding islands are discussed below.

Piping Plovers. Nantucket and the adjacent islands had 43 pairs of nesting piping plovers in 2010, which accounted for about 7 percent of the Statewide total population (Melvin 2011) and 2.4 percent of the 2010 Atlantic Coast population. Nesting data from 2011 are still being analyzed, but 56 pairs were preliminarily reported for 2011 (Jedrey 2012 personal communication) with reports of plovers using Muskeget Shoals during the post-breeding and migration season as well (Schulte 2012 personal communication). Increased habitat protection and management through acquisition and easements will help meet several recovery plan tasks including: monitoring the status and management at specific nesting sites (recovery task 1.1), reducing disturbance of breeding plovers from humans and pets (recovery task 1.3), reducing predation (recovery task 1.4), developing mechanisms to provide long-term protection, and protecting plovers during migration (recovery task 2.3) (USFWS 1994). Summaries of nesting piping plover numbers are included in the parcel descriptions for Coskata-Coatue Wildlife Refuge, Coatue Wildlife Refuge, Loran Station, and Muskeget Island.



Bill Byrne/USFWS

Piping plover on nest

Roseate and Common Terns. While Nantucket Island has not recently supported many nesting common terns, or any nesting roseate terns (Mostello 2007, 2008, 2009, 2010, 2011), small numbers of common terns have periodically nested in the last decade (Mostello 2003, 2005, 2006, Blodget 2002) and Muskeget Island was historically the largest roseate tern nesting site in North America (USFWS 1998). In recent years, the importance of Nantucket and the surrounding islands and shoals to post-breeding staging terns has become apparent. The post-breeding dispersal period is an especially sensitive time for terns because parental care may continue well into fall migration and even after arrival at their wintering areas (Ashmole and Tovar 1968, Nisbet 1976, Feare 2002, Hays et al. 2010). At fledging, young terns usually have not achieved adult mass, and several studies have demonstrated that post-fledging parental care given prior to departure from their breeding colony sites (Watson et al. 2012) provides for an increase in mass and later post-fledging survival probability (Feare 2002, Stienen and Brenninkmeijer 2002, Schauroth and Becker 2008). During the post-breeding dispersal period, young terns start to transition to independence, learning skills needed to fish independently (Watson and Hatch 1999), and increasing body condition and strength of flight muscles needed for the 4,350-mile (7,000-kilometer) migration to South America. Much of the presumed recent reduction in post-fledging to first-breeding survival in roseate terns likely results from events that take place during this period (Spendelow et al. 2002). After an initial period of more widespread dispersal (Shealer and Kress 1994, Gochfeld et al. 1998), most, if not all (Spendelow et al. unpublished data), northwestern Atlantic roseate terns congregate at locations around Cape Cod and the offshore islands from Martha's Vineyard to Nantucket, Massachusetts



Kirk Rogers/USFWS

The federally endangered roseate tern

(Trull et al. 1999, Jedrey et al. 2010). During the staging period, terns use beaches free of human disturbance and near moving schools of forage fish (Blake 2010). Management of the parcels identified below will contribute to recovery by protecting an important historical nesting site (recovery tasks 1.2 and 1.3), and reducing disturbance at multiple staging sites (recovery tasks 2.1 and 2.2) (USFWS 1998). Developing a better understanding of roseate tern habitat, and factors limiting use, during the post-breeding staging period was identified as an important action for the northeastern population (USFWS 2010). Staging tern use is discussed in the parcel descriptions for Coskata-Coatue Wildlife Refuge, Coatue Wildlife Refuge, and Muskeget Island.

Least Terns. Least terns are a State-listed species of concern and are a high priority for Bird Conservation Region 30 (USFWS 2008). Least tern numbers in Massachusetts generally increased from 1985 to 2001, declined from 2001 to 2003, showed an increase in 2006 through 2008 (Mostello 2010), and have been decreasing since (information from 2011 is based on preliminary data from the 2010 and 2011 Massachusetts Coastal Waterbird Meeting in Barnstable, Massachusetts). In 2009, 45 percent of the State's least tern population could be found in three large colony sites (Mostello 2010) which increases the vulnerability of the State population. In 2011, Massachusetts hosted over 40 percent of the total 8,334 pairs of least terns nesting on the Atlantic Coast (O'Brien 2012 personal communication), and over 1,000 pairs were on Tuckernuck Island, Nantucket (Mostello 2012 personal communication). Within Massachusetts, the islands and shoals off of Nantucket are prime nesting and foraging sites for least terns. In 2010, Nantucket, Tuckernuck, and Muskeget Islands and shoals supported about 200 pairs of least terns (6 percent of a total 3,484 Statewide; Mostello 2011). In 2009 they supported 181 nesting pairs (5 percent of a total 3,569 pairs Statewide; Mostello 2010) and in 2008, they supported 484 pairs (13 percent of a total 3,776 pairs Statewide; Mostello 2009). Least terns are highly susceptible to abandonment due to predator pressures, but abandonment or localized shifts in colony sites can occur in response to flooding, changes in colony size, increased vegetative cover, and human activities as well (Kotliar and Burger 1986, Atwood and Massey 1988). This emphasizes the importance of protecting and managing multiple suitable sites for the long term.

Historically, least terns have also been reported at Great Point and Low Beach on Nantucket, and we anticipate that with appropriate management these two sites could potentially support colonies in the future. Summaries of nesting least tern numbers are included in the parcel descriptions for Coskata-Coatue Wildlife Refuge, Coatue Wildlife Refuge, Loran Station, and Muskeget Island.



Amanda Boyd//USFWS

American oystercatcher

American Oystercatcher. The American oystercatcher is a bird of conservation concern and is a species of highest priority in Bird Conservation Region 30 (USFWS 2008). The islands of Nantucket, Tuckernuck, and Muskeget collectively host 50 to 60 pairs of American oystercatchers each year, nearly one-third of the Massachusetts nesting population. These islands are one of the most important breeding areas in the Northeast for American oystercatchers in part because of high reproductive rates observed on the islands, apparently as a result of lower predation pressure. Reproductive rates for oystercatchers on Nantucket and adjacent islands average 0.55 chicks/pair, which contrasts to the 0.35 chicks/pair average in the rest of the State. When producing 0.55 chicks per pair the population can increase, assuming constant levels of adult and sub-adult survival across the State (Schulte 2012 personal communication). Summaries of nesting and staging American oystercatcher numbers are included in the parcel descriptions for Coskata-Coatue Wildlife Refuge, Coatue Wildlife Refuge, and Muskeget Island.

Seals. In recent years, two areas in Nantucket have become a haul-out site for gray seals: Nantucket NWR and Muskeget Island. Gray seals were found along the northwestern Atlantic coast until the 17th century, and were considered locally extinct until the 1980s (see Wood 2009 for detailed accounts of seal numbers). While their pupping grounds are historically further north on Sable Island and in the Gulf of St. Lawrence in Canada, there has been a year-round breeding population around Cape Cod and associated islands since the late 1990s. In fact, Muskeget Island and the associated shoals supports the largest breeding population of gray seals in the United States (U.S.) and represents one of only two sites in Massachusetts where gray seals regularly pup.

The other site is Monomoy NWR. Though there is currently no estimate for the U.S. population, surveys conducted since their arrival in the 1980s indicate a steady increase in abundance in both Maine and Massachusetts, though it is unclear if this is due to population expansion or immigration (Waring et al. 2009). Even if the U.S. population is truly increasing, the increase in seal numbers on Nantucket may not reflect the degree of increase in the entire seal population; seals are using many other sites throughout the Northeast and surveys need to encompass all these areas to accurately reflect changes in the U.S. population.



Amanda Boyd/USFWS

Grey seal

Northeastern Beach Tiger Beetle. In 1990, the northeastern beach tiger beetle was listed as federally threatened. This tiger beetle is also a State-endangered species in Massachusetts. The loss of protected and undisturbed beaches has been cited as one of the primary reasons for the decline of this species (USFWS 1994a). The northeastern beach tiger beetle occurred historically in "great swarms" on beaches along the Atlantic Coast from Cape Cod to central New Jersey, and along the Chesapeake Bay beaches in Maryland and Virginia. Currently, there are only two populations in New England: one on Martha's Vineyard and the other at Monomoy NWR/South Beach (USFWS 1994a, USFWS 2009).

This particular tiger beetle has been identified as an indicator species for healthy beach communities and its presence reflects positively on the ecological value of the habitats where it can be found. Preferred habitat is healthy, wild beach ecosystems that are highly dynamic, subject to natural erosion and accretion processes, and undisturbed by heavy human use (USFWS 1994a). These tiger beetles are unlikely to be found on beaches with intense coastal development, shoreline stabilization, or heavy recreational use. Reintroduction at appropriate locations within the historical range (recovery task 9) is identified as an important strategy in the Recovery Plan (USFWS 1994a). Muskeget Island currently has the best potential to support a reintroduction effort, if there is suitable habitat, since there is no offroad vehicle use.

Seabeach Amaranth. The last record of this federally threatened beach plant anywhere in the State of Massachusetts was from Nantucket in 1849 (USFWS 1996). The recovery plan focuses restoration efforts in the more southern portion of the historic range and adjacent to currently extant sites. However, there have been new populations discovered since the listing of the species in other states, and there is the potential that additional sites in the northern part of the historic range are appropriate for establishment of future populations of this species. Searching for additional populations (recovery task 1.2) and reestablishing populations in suitable habitat (recovery task 2.3) are both actions identified in the Recovery Plan (USFWS 1996). Muskeget Island in particular may be an appropriate site for establishing a population because there is no offroad vehicle use.

Inland Scrub-shrub, Grasslands Habitats and Associated Species

Inland scrub-shrub and grasslands make up a large proportion of Nantucket's island habitat (33 percent) with approximately 59 percent of these early succession communities having some conservation protection. These habitats are important for at least two species that are a high priority for the Service: the federally endangered American burying beetle and the Federal candidate species New England cottontail. Coastal shrub habitats also provide critical feeding and resting areas for migrating landbirds which can rest and refuel on the abundance of nutritious berries during the fall migration period. On offshore islands, these refugia can be especially critical for migrants during their first migration (Smith et al. 2007). This has been demonstrated on other island stopover sites, including Block Island where over 100 species of landbirds have been documented during the fall migration, with 99 percent of them being first-year birds (Comings 2012 personal communication).

American Burying Beetle. The American burying beetle was first reintroduced to Nantucket at Eastern Moors in 1994, following its extirpation in the early 20th century. Release of captive bred beetles continued until 2006, and every beetle caught was provisioned with a quail carcass from 2007 to 2010. In 2011, provisioning was reduced to 25 pairs to assess the population's long-term viability. Although the population is not yet considered self-sustaining, there is evidence that numbers have continued to increase (LoPresti et al. 2011). Success of this effort will ultimately depend upon the size of the population that can be supported by Nantucket Island. This capacity will be determined by the amount of suitable carrion that is available, along with the amount of open habitats with loamy soils that provide suitable conditions for carcass burial. Because habitat on Nantucket Island is limited and isolated from other populations, stochastic events, such as drought or severe overwintering conditions, will likely play a role in determining the persistence of this population; therefore, resiliency of this population is dependent on habitat conditions on the island (Perrotti and Tur 2011 personal communication). This relationship between habitat, stochastic events, and population resiliency was discussed in the most recent 5-year review for the species where it was recognized that protection of large, minimally fragmented beetle-occupied habitats with abundant carrion is important to sustain extant populations in the event of "catastrophic losses or reduced carrying capacity in portions of the range" (USFWS 2008).

New England Cottontail. Although the last record of New England cottontail on Nantucket Island was approximately 30 years ago (Scarpitti 2012 personal communication), there is an abundance of shrub habitat that could support a population (Tur 2012 personal communication). Introduction of the eastern cottontail to Nantucket began in the late 1800s, and appears to have completely replaced the native New England cottontail (Johnston 1972). Habitat suitability models for the New England cottontail have identified numerous sites on Nantucket with features suitable for supporting the New England cottontail. Some of these sites rank among the top 6 percent rangewide for implementation of conservation actions. As such, the island has been identified as a focus area in the New England cottontail conservation strategy (Fuller et al. 2011). Survey efforts by the Nantucket Conservation Foundation (Foundation) and Massachusetts Division of Fish and Wildlife are ongoing to determine if a remnant population still occurs on the island. The results will provide a baseline assessment that will be used to inform specific management actions for Nantucket Island.



Linda Cullivan/USFWS

New England Cottontail

Nantucket Island also provides habitat for many State-listed plants and animals, including the State-threatened northern harrier (*Circus cyaneus*), State-endangered short-eared owl (*Asio flammeus*) and State-endangered peregrine falcon (*Falco peregrinus*), as well as several rare plants of special concern. Striped bass, bluefish, and other game fish are found near the Nantucket shoreline, as are flocks of thousands of seaducks, including common eider (*Somateria mollissima*) and all three scoter species (*Melanitta* spp.). These species of wildlife and fish benefit from the land protection work on Nantucket Island where nearly 45 percent of the island enjoys long-term protection through the work of many conservation organizations. To this end, the preferred action (the Service-preferred alternative B, the "Landscape-level Conservation and Cooperative Partnerships for Balanced Wildlife Management and Wildlife-Dependent Recreation" from the draft CCP/EA) for the proposed expansion of Nantucket NWR establishes a land protection boundary of approximately 2,036 acres. This boundary was developed out of numerous meetings with conservation partners and came from a habitat review based on aerial photography and Geographic Information System (GIS) maps, and a familiarity with on-the-ground habitat features on the part of the local stakeholders.

Refuge Purpose

The approximately 21-acre Nantucket NWR was established in 1973 when the Service acquired the property under An Act Authorizing the Transfer of Certain Real Property for Wildlife or other purposes from the U.S. Coast Guard (Coast Guard, (16 U.S.C. § 667b). The purpose for the establishment of the refuge is "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds…." 16 U.S.C. § 715d (Migratory Bird Conservation Act).

Status of Resources to be Protected

The proposed refuge expansion area includes seven specific, disjunct parcels throughout Nantucket, which are described below.

Great Point Lighthouse, Coast Guard

The Great Point Lighthouse is located within the refuge boundary on a 1-acre parcel of land that was transferred to the Coast Guard in 1987 to replace the original lighthouse that fell into the ocean as a result of erosion and the migration of the point westward. This is not an historic structure and the light is now automated. TTOR currently maintain the lighthouse structure under a license with the Coast Guard. Because this inholding is completely surrounded by refuge land, the Service is interested in acquiring the lighthouse property should the Coast Guard find it excess to their needs or should they wish for the structure to be owned by a different entity. Acquisition of this structure will also allow us to control vehicular traffic, which must cross the refuge to access the lighthouse. This would protect the beach/dune habitat which supports nesting piping plovers, least terns, and American oystercatchers; staging common and roseate terns; and loafing grey seals. We propose to acquire this property as a no-cost transfer for wildlife purposes from the Coast Guard.

Coskata-Coatue Wildlife Refuge, The Trustees of Reservations

Coskata-Coatue's 1,117 acres stretch just beyond The Haulover north to the southern end of Nantucket NWR. Coskata-Coatue is known for its wildlife habitat, rare plants, and recreational value. Habitats include forested upland (consisting of maritime oak and a maritime red cedar savanna), wetlands, salt marsh, a unique salt marsh-maritime shrubland complex, the Great Point Lagoon, 200 acres of maritime dune complexes, and beaches. It offers a variety of public activities, including 16 miles of over-sand vehicle and walking trails, seasonal hunting, fishing opportunities, and guided natural history tours which include a stop at the Great Point Lighthouse. TTOR has expressed an interest to work with the Service to develop a permanent conservation easement so that the Great Point Peninsula could be managed as one wildlife refuge.

TTOR currently monitors and manages beach habitats used by nesting piping plovers, least terns, and American oystercatchers during the breeding season. From 1988 to 1995, the number of plovers on Great Point (the northern portion of TTOR's property and Nantucket NWR combined) ranged from 5 to 8 pairs and productivity was good in most years (Jedrey 2012 personal communication). During the last 10 years, however, plover numbers have usually not exceeded 2 pairs (Melvin 2007, 2008, 2009, 2010, 2011; Melvin and Mostello 2003, 2007; Jedrey 2012 personal communication). On the rest of the Coskata-Coatue peninsula, the number of nesting piping plovers has ranged from 1 to 4 pairs, with an average of 1.5 pairs over the last 15 years and very variable productivity (Melvin and Mostello 2000, 2003, 2007; Mostello and Melvin 2001, 2002; Melvin 2007, 2008, 2009, 2010, 2011; Jedrey 2012 personal communication). Numbers of nesting least terns have fluctuated from 2006 to 2010 from a low of 3 pairs in 2010 to 185 pairs in 2008 (Mostello 2007, 2008, 2009, 2010, 2011). Coskata-Coatue has been very important for nesting American oystercatchers as well, with 9 to 10 pairs nesting collectively on Coskata West Beach, the Glades, and Great Point in 2009 to 2011 (Lang 2012 personal communication). Numbers have been even higher in some past years, with 19 pairs nesting in 2006 (Melvin 2007a).



Chelsi Hornbaker/USFWS

Children at the beach

Great Point, including Nantucket NWR, has also been identified as an important staging area on Nantucket for common and roseate terns. Seasonal closures on Nantucket NWR in recent years have supported an increased number of staging terns, and expanding the area that is managed could dramatically increase protection for terns during a very important window of time during the post-breeding staging period. South of the refuge, terns frequently use the sound-side west of Coskata Pond and the ocean-side of The Galls for staging. Consistent counts of staging terns have not been conducted annually south of the refuge on Coskata-Coatue, but surveys in 2009 revealed a high count of over 500 birds in mid-August (Jedrey 2012 personal communication), and anecdotal observations since then have often turned up counts of over 100 birds (Ray 2012 personal communication; Koch 2012 personal communication; Jedrey 2012 personal communication).

Coatue Wildlife Refuge and the Haulover, Nantucket Conservation Foundation

The Coatue Wildlife Refuge contains over 390 acres of barrier beach that shelters Nantucket Harbor from the sound. With the exception of a few small private inholdings, this refuge is owned and managed for conservation purposes by the Foundation. The entire Coatue Wildlife Refuge is a barrier beach that is constantly shifting

and changing. The six points or "cuspate spits" that form Coatue's distinctive scalloped shoreline were formed and are maintained by wind, wave, and tidal action. The north shore, known as the "Chord of the Bay," and the east facing ocean beach, take the brunt of strong winds and storm tides, which occasionally overwash the narrowest areas. Access to the Coatue Wildlife Refuge is limited to narrow, soft, sand roads that can only be traversed by foot or four-wheel drive vehicles. Coatue is considered part of a larger wildlife refuge system that includes 104 acres at The Haulover, which is also owned by the Foundation, the 916 acres (described above) of the Coatue Wildlife Refuge, owned by TTOR, and the approximately 21-acre Nantucket NWR. The Foundation has expressed an interest to work with the Service to develop a Management Agreement so that the entire peninsula (which begins at the Wauwinet Gatehouse and includes TTOR, Foundation, and Service property) could be managed as one wildlife refuge.



Amanda Boyd/USFWS

Terns staging on Great Point

The Foundation manages and monitors this property for coastal nesting waterbirds. Numbers of nesting piping plovers on Coatue from 1999 to 2006 were generally low, with only one pair nesting in many years (Melvin 2007; Melvin and Mostello 2000, 2003, 2007; Mostello and Melvin 2001, 2002). However, between 2007 and 2010, five to eight pairs of plovers nested each year, with good productivity in most years (ranging from 1.0 to 2.0 chicks fledged per pair; Melvin 2008, 2009, 2010, 2011). In 2011, nine pairs of piping plovers nested, but productivity was poor (Beattie 2012 personal communication). The increase in numbers in recent years may be due to several years of excellent productivity at Jetties Beach (just opposite Coatue Point to the west), and the lack of habitat for birds to expand into at that site (Beattie 2012 personal communication). The smaller Haulover area sometimes has an additional pair of nesting plovers (Melvin 2005 to 2010). Coatue is also very important for nesting American oystercatchers. From 2007 to 2011, 12 to 19 pairs of oystercatchers nested each year on Coatue (Beattie 2012 personal communication; Melvin 2010a). Small colonies of nesting least terns have been documented the past several years as well (Beattie 2012 personal communication). Coatue has also provided habitat for flocks of 20 to 30 post-breeding American oystercatchers on the sound side (Ray 2012 personal communication).



Bill Thompson

Common eider

Nantucket Loran Station, Coast Guard

The Nantucket Loran Station is being decommissioned because the Coast Guard closed the Loran system in February 2010. The Service proposes a Transfer of Real Property at no cost from the Coast Guard. Some of the buildings on the site could provide storage or housing for future refuge staff. The property totals approximately 85 acres in the Village of Siasconset, Massachusetts, and is split by Lower Beach Road which bisects the property.

The northern part of the property currently has an antenna tower with an access road to the antenna, and six houses on the southeast corner. This northern part of the property supports important maritime heathland habitat that has been identified as a priority natural community in Massachusetts

with a State ranking as S1 (i.e., less than five occurrences Statewide and considered especially vulnerable to extirpation). This community is also identified as a globally important community for preserving biodiversity and ecological processes (TNC 2006). In addition, there is a fairly large wetland complex that covers at least half the property. This habitat north of the road may be important to New England cottontail and is crucially important to American burying beetle. It also serves as an important stop-over site for migrating landbirds. Adjacent parcels have been ranked as among the top 50 to 200 sites for New England cottontail conservation in the State of Massachusetts (Fuller et al. 2011), though trapping has not occurred on this property. During surveys in 2010, 17 beetles were captured (including 13 new ones) at the Loran Station on the east side. Five dead beetles were also found. The beetles captured here were teneral adults looking for food before wintering, which confirms that this site is accessed by this species (McKenna-Foster 2010 personal communication; McKenna-Foster 2012 personal communication).

The southern portion of the property below Lower Beach Road is where the former antenna was located prior to being moved to the northern part of the property. There are two barrack-style buildings and the former antenna pad with a short access road. The habitat on the southern portion of the property is composed of beach and dune habitat. Surveys for nesting piping plovers at Low Beach were often grouped with the Tom Nevers area to the west and Siasconset to the north so it is difficult to separate numbers for this particular parcel. But, for all these sites, nesting numbers have been very low in recent years (zero to one pair from 2006 to 2010 and two pairs preliminarily reported in 2011). Low numbers at Low Beach are most likely a combination of erosion and loss of habitat, predators, and human disturbance (Ray 2012 personal communication). Low Beach also likely provides nesting habitat for least terns. State records generally group Low Beach with habitat to the north, but in 2008 and 2010, this general area supported 80 and 72 pairs of least terns respectively (Mostello 2009, 2011). Use of this area varies considerably between years however.



Amanda Boyd/USFWS

Piping Plover

Muskeget Island, Nantucket Land Bank and Privately Owned

Muskeget Island lies west of Nantucket Island and northwest of Tuckernuck Island. The property totals approximately 306 acres (Town of Nantucket 2012) and supports maritime dune and beach habitats. In 2010, the Town of Nantucket placed a conservation restriction on their 119-acre portion of Muskeget Island (the western side) and then conveyed the property to the Land Bank. The rest of the island is owned by a single person and was also placed under a conservation restriction in 2010 (*http://www.nantucketlandbank.org/Documents/AnnualReportFY10-FullVersion.pdf*, accessed March 15, 2012).

Twenty-three species of wading birds, shorebirds, waterfowl, and passerines have nested on the island in the past. Muskeget Island especially provides important nesting habitat for coastal waterbirds. An average of 5.6 pairs/year of piping plovers has been documented over the last 5 years with good productivity in most years (Melvin 2008, 2009, 2010, 2011 and Jedrey 2012 personal communication). Although least tern habitat also exists at this site, no least terns nested here from 2006 to 2010 (Mostello 2007, 2008, 2009, 2010, 2011). However, 175 pairs of least terns nested late in the season in 2011 (Mostello 2012 personal communication). This site has also supported nesting American oystercatchers with 3 pairs nesting in 2006 (Melvin 2007a) and 2009 (Melvin 2010a). Four pairs nested in 2011 with high reproductive success and the adjacent and rapidly expanding Muskeget Shoal appears to be a prime emerging nesting site (Schulte 2012 personal communication). Nesting shorebird numbers may be underestimated in years when monitoring visits were made infrequently.

The shallow waters and shoals around Muskeget Island have been known to be important for foraging and staging terns for more than 40 years, with birds present from mid-July to mid-September, and numbers peaking in August (Veit 2012 personal communication). Muskeget Island was historically the largest roseate tern nesting site in North America (USFWS 1998) and it is likely these shoals were important for staging and foraging birds during that time. In more recent years, observers have seen high counts of 3,000 staging terns (40 percent of which were roseate terns) in August on a sandbar to the southwest of Muskeget Island (Spendelow 2012 personal communication). Although systematic, regular counts have not been conducted at this site due to difficulty in accessing the site, the extensive shoals and lack of human disturbance likely provide

reliable prime foraging and staging habitat for terns.


USFWS

Muskeget Island

There are only three established pupping areas for gray seals in the U.S. Northwest Atlantic. Muskeget Island is the longest established and largest site of the three, and numbers there have been increasing since 1991 (Wood 2009). The pup count in 2008 was 2,095, which is roughly 80 percent of the 2,620 pups produced in all 3 colonies that year. While the population of the East Coast gray seal is currently increasing, the pupping grounds found on Muskeget are critical to maintain a stable population (Wood 2009). At various times of the year, gray seals use Muskeget Island as a haul-out site and as one of three pupping locations in the Northeastern United States. The sandy beach of this island may also be appropriate habitat for the federally threatened northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) and the federally threatened seabeach amaranth (*Amaranthus pumilus*).

Head of the Plains, General Services Administration (Formerly Federal Aviation Administration)

This parcel is located on the southwest side of Nantucket Island in Madaket. The property totals approximately 120 acres. The habitat consists of 30 to 40 percent grassland and 60 to 70 percent shrubland. This property is within an area designated as rare wildlife and plant species habitat by the Massachusetts Natural Heritage and Endangered Species Program. The State-listed special concern rare plants found on the property include sandplain blue-eyed grass (*Sisyrinchium fuscatum*), bushy rockrose (*Helianthemum dumosum*), and Nantucket shadbush (*Amelanchier nantucketensis*). These maritime heathland, grassland, and shrub habitats have been identified as globally significant and Tier 1 for protection of biodiversity and ecological processes in the North Atlantic Ecoregion (TNC 2006). There is also potential, existing, or historical habitat for the New England cottontail, and the parcel is ranked as a priority (#372) in the State for potential conservation actions (Fuller et al. 2011). The property is bounded by conservation lands owned by the Nantucket Land Bank and the Foundation. The Service is interested in acquiring this property through a no-cost transfer for wildlife purposes from the General Services Administration (GSA).

Lohmann/Jellame Property, Privately Owned

This property is an inholding on TTOR's Coskata-Coatue property, located close to the Nantucket NWR boundary. The property totals approximately 17 acres and is maritime dune habitat. There are two camps (seasonal houses) on the property. Because of the proximity of this property to the refuge, these camps could serve as seasonal refuge or partner housing.

Threats to the Resource

The loss, alteration, and fragmentation of habitat all pose the greatest threats to wildlife throughout Nantucket. With increasing pressure for development, fragmentation might occur, breaking up large, contiguous blocks into smaller patches that are unsuitable for area-sensitive species. Preserving the large, contiguous blocks of habitat that remain in the town of Nantucket and maintaining their connectivity are crucial for the long-term viability of populations of area-sensitive wildlife, including species of raptors and passerines. Even large blocks already in conservation are at risk due to different practices within managing organizations. For example, TTOR, the Foundation, and the Service have protected the majority of Great Point Peninsula with the exception of several scattered parcels of private land. In order to maintain the important wildlife habitat, it is critical that these three groups protect the peninsula in a consistent manner. Early successional scrub-shrub and grassland habitats also require ongoing management to maintain them as suitable habitat for the species that are dependent on them.

White-tailed deer pose a significant threat to forest and shrubland health and forest regeneration on Nantucket Island's upland and wetland forests. High numbers of deer take refuge in residential areas or on public or private lands where hunting is not allowed or limited. Their overbrowsing can eliminate native shrub layers and


Tim Williams

White-tailed deer

damage breeding habitat for many species, particularly shrub-nesting birds. In addition, over-browsing can create an environment conducive for invasive plants germinating and crowding out native species, eliminating rare plant communities, and altering the composition and structure of these important habitats.

It is difficult to predict exactly how climate change and sea level rise will impact coastal beach and marsh systems. Without specific knowledge of how these habitats will shift and transition or persist, our best strategy is to protect these important habitats across the landscape. For example, providing protection at Coskata-Coatue, Lower Beach, and Muskeget will provide beach nesting and roosting species with alternatives in a dynamic and changing landscape. In any given year, one beach may provide more suitable nesting habitat or access to foraging resources than another. Providing protection for several locations allows these unique coastal plain species to identify and utilize the best sites from year to year.

Continuing Partnership Effort

The threats to the resource described above make preserving land throughout Nantucket both crucial and challenging. As real estate values increase due to the influx of people from across the country searching out vacation properties, the need to act quickly to preserve key parcels remaining on Nantucket and associated islands becomes more apparent. For that reason, we recognize the need to collaborate with other conservation organizations. Therefore, we would work to combine our efforts with those of many partners, such as TTOR, the Foundation, the Maria Mitchell Foundation, the Nantucket Land Bank, the Nantucket Land Council, the National Park Service, Massachusetts Division of Fisheries and Wildlife, and Massachusetts Audubon Society, as well as other partners yet to be identified. Many of our partners already own or have future plans to protect lands on Nantucket and associated island through fee-title and/or conservation easements. Still others have completed on-the-ground habitat restoration projects. These partners use their individual mission statements to focus protection and restoration efforts. Taken together, those mission statements cover the protection of shrubland, both federally listed and State-listed rare, threatened, and endangered species, scenic areas, wetlands, grassland habitats, and open space that the local community has identified as significant.

Action and Objectives

Land Protection Area

Working with numerous partners, we delineated 2,036 acres of biologically significant land on the town of Nantucket. The area contains portions of Nantucket's important defined ecosystems. In the final CCP, the Service concludes that acquiring identified habitat areas over time will also provide for the protection of rare and unique habitats. Land protection would also help many nongame species that continue to rely on the availability of ample and quality habitat. Additionally, this habitat complex would provide ample opportunities for wildlife-dependent recreation, new and dynamic partnerships, and scientific research.

Maps and Ownership Table

Maps G-1 through G-5 and table G.1 show all land parcels within the acquisition boundary proposed in this LPP. We provided this information in the draft CCP/EA to inform landowners of our interest in lands in that area. We would acquire either full or partial interest in land parcels by fee purchase, as available, from willing sellers over time and as the availability of funding allows. We also plan to develop cooperative management agreements on other public lands in the project area.


Amanda Boyd/USFWS

Common tern

Land Protection Priorities

All of the lands we include in the expansion proposal have significant resource values and high potential for ensuring habitat connectivity between the refuge and surrounding conservation lands. In general, the

availability of land from willing sellers, and the availability of funding at that time will influence the actual order of land protection. However, as landowners offer us parcels, and as funds become available, we will base the priority for land protection on several factors. Priority is assigned as follows:

Priority 1: Priority 1 parcels contain most of the lands and habitats that meet the threshold for Federal protection. They are:

- Parcels that contain a significant amount of functioning undisturbed or relatively undisturbed habitats of significant importance that support Federal trust species (e.g., federally listed species, migratory birds).
- Parcels that contain significant habitat for federally listed or candidate species.
- Parcels that border Nantucket NWR.
- Parcels that have a significant value for migratory birds, with prime nesting and foraging habitats for federally listed or State-listed species.
- Parcels that are currently under the ownership or jurisdiction of another Federal agency which provide facilities and/or habitat for federally listed or candidate species.

Priority 2: Priority 2 parcels are located throughout the preferred action area and contribute to meeting the threshold for Federal protection including:

- Parcels that are of significant importance to Nantucket.
- Parcels that help to restore or maintain habitat connectivity.
- Parcels that support State-listed rare species.
- Areas of high potential for habitat restoration or enhancement.
- Parcels that are currently under the ownership or jurisdiction of another Federal agency which will protect existing refuge lands and resources.
- Parcels of moderate value to a variety of migratory bird species or of significant value to a limited number of migratory bird species.

Our intention is to minimize the need to acquire residences and buildings on these lands, while protecting and restoring habitat, so parcels of this nature will be evaluated on a case-by-case basis. With the above criteria in mind, we configured our boundaries for fee and easement areas. The Service reserves the right to be flexible with the detailed priority list above, because a number of factors also influence the priority of land protection, including the availability of willing sellers and the availability of funding. In addition, the Service must be flexible in its methods and priorities of land protection to meet the needs of individual landowners.

Protection Options

We will use the following options to implement this LPP:

Option 1: Management agreements or land protection by others.
Option 2: Less-than-fee acquisition by the Service.
Option 3: Fee acquisition by the Service.

Service policy in acquiring land is to acquire only the minimum interest necessary to meet refuge goals and objectives, and acquire it only from willing sellers. Our proposal includes a combination of options 1, 2, and 3 above. We believe this approach offers a cost-effective way of providing the minimal level of protection needed to accomplish refuge objectives while also attempting to meet the needs of local landowners.

Option 1. Management Agreements or Land Protection by Others

A great deal of land on Nantucket and associated islands is already owned by our partners or managed by our partners through conservation easements. It should also be emphasized that the protection of these lands fits well into a large landscape-scale wildlife and habitat corridor that is being pieced together in the area. The Service's land protection proposal to use management agreements would serve as an important keystone in this conservation effort. The following partners both manage and own properties that are ecologically associated with the Nantucket NWR:

- The Trustees of Reservations
- Nantucket Conservation Foundation
- Nantucket Land Bank
- Nantucket Land Council
- Massachusetts Audubon Society
- Town of Nantucket
- Local land trusts



Amanda Boyd/USFWS

Greater black-backed gull chick

Option 2. Less-than-fee Acquisition

Under option 2, we will protect and manage land by purchasing only a partial interest, typically in the form of a conservation easement. This option leaves the parcel in private ownership, while allowing us control over the land use in a way that enables us to meet our goals for the parcel or that provides adequate protection for important adjoining parcels and habitats. The structure of such easements will provide permanent protection of existing wildlife habitats while also allowing habitat management or improvements and access to sensitive habitats, such as habitat for endangered species or migratory birds. It will also allow for public use, where appropriate. We will determine, on a case-by-case basis, and negotiate with each landowner, the extent of the rights we will be interested in buying. Those may vary, depending on the configuration and location of the parcel, the current extent of development, the nature of wildlife activities in the immediate vicinity, the needs of the landowner, and other considerations.

In general, any less-than-fee acquisition will maintain the land in its current configuration with no further subdivision. Easements are a property right, and typically are perpetual. If a landowner later sells the property, the easement continues as part of the title. Properties subject to easements generally remain on the tax rolls, although the change in market value may reduce the assessment. The Service does not pay refuge revenue sharing on easement rights. Where we identify conservation easements, we will be interested primarily in purchasing development and some wildlife management rights.

Easements are best when they meet at least one of the following criteria:

- Only minimal management of the resource is needed, but there is a desire to ensure the continuation of current undeveloped uses and to prevent fragmentation over the long term and in places where the management objective is to allow vegetative succession.
- A landowner is interested in maintaining ownership of the land, does not want it to be further developed, and would like to realize the benefits of selling development rights.
- Current land use regulations limit the potential for adverse management practices.
- Only a portion of the parcel contains lands of interest to the Service.

The determination of value for purchasing a conservation easement involves an appraisal of the rights to be purchased, based on recent market conditions and structure in the area. The Land Protection Methods section further describes the conditions and structure of easements.

Option 3. Fee Acquisition

Under Option 3, we will acquire parcels in fee title from willing sellers, thereby purchasing all rights of ownership. This option provides us the most flexibility in managing priority lands, and ensures the protection in perpetuity of nationally significant trust resources.

Generally, the lands acquired by the Service will require more than passive management (e.g., controlling invasive species, mowing or prescribed burning, planting, or managing for the six priority public uses). We only propose fee acquisition when adequate land protection is not assured under other ownerships, active land management is required, or we determined the current landowner would be unwilling to sell a partial interest, such as a conservation easement.



Amanda Boyd/USFWS

Visitors enjoying the refuge

In some cases, it may become necessary to convert a previously acquired conservation easement to fee acquisition. This may occur, for example, when an owner is interested in selling the remainder of interest in the land on which we have acquired an easement. We will evaluate that need on a case-by-case basis.

Land Protection Methods

We may use three methods of acquiring either a full or a partial interest in the parcels identified for Service land protection: (1) Purchase (e.g., complete title, or a partial interest like a conservation easement), (2) donations, or (3) exchanges and transfer of other Federal property.

Purchase

For most of the tracts in the boundary, as indicated in Table G.1, the proposed method is listed as ***Fee*** or ***Easement***. However, the method we ultimately use depends partly on the landowner's wishes.

Fee purchase involves buying the parcel of land outright from a willing seller in fee title (all rights, complete ownership), as the availability of funding allows.

Easement purchase refers to the purchase of limited rights (less than fee) from an interested landowner. The landowner would retain ownership of the land, but would sell certain rights identified and agreed upon by both parties. The objectives and conditions of our proposed conservation easements would recognize lands for their importance to wildlife habitat or outdoor recreational activities, and any other qualities that recommend them for addition to the National Wildlife Refuge System (Refuge System).

Donation

We encourage donations in fee title or conservation easement in the approved areas. We are not currently aware of any formal opportunities to accept donations of parcels in our land protection boundary.

Exchange

We have the authority to exchange federally owned land under Service management for other land that has greater habitat or wildlife value. Inherent in this concept is the requirement to get dollar-for-dollar value with, occasionally, an equalization payment. Exchanges usually do not increase Federal land holdings or require purchase funds; however, they also may be very labor-intensive and take a long time to complete.

Transfer of Other Federal Property

We have the authority to work with other Federal agencies to have land transferred to the Service at no cost from other Federal agencies. These lands identified for transfer must support and benefit wildlife habitat.

Service Land Protection Policy

Once a refuge land protection boundary has been approved, we contact neighboring landowners to determine whether any are interested in selling. If a landowner expresses an interest and gives us permission, a real estate appraiser will appraise the property to determine its market value. Once an appraisal has been approved and assuming funding is available, we can present an offer for the landowner's consideration.



USFWS

Great Point

Our long-established policy is to work with willing sellers, as funds become available. We will continue to operate under that policy. Appraisals conducted by Service or contract appraisers must meet Federal as well as professional appraisal standards. Federal law requires us to purchase properties at their market value, which typically is based on comparable sales of similar types of properties.

We based the land protection boundary on the biological importance of key habitats. This gives the Service the approval to negotiate with landowners that may be interested or may become interested in selling their land in the future. With those internal approvals in place, the Service can react more quickly as important lands become available. Lands in the boundary do not become part of the refuge unless their owners sell or donate them to the Service.



USFWS

Grey seals

A landowner may choose to sell land to the Service in fee simple and retain the right to occupy an existing residence. That is a "life use reservation." It applies during the seller's lifetime, but can also apply for a specific number of years. At the time we acquire the parcel, we would discount from the appraised value of the buildings and land the value of the term of the reservation. The occupant would be responsible for the upkeep on the reserved premises. We would own the land, and pay revenue sharing to the appropriate taxing authority.

In rare circumstances, at the request of a seller, we can use "friendly condemnation." Although the Service has a long-standing policy of acquiring land only from willing sellers, it also has the power of eminent domain, as do other Federal agencies. We use friendly condemnation when the Service and a seller cannot agree on property value, and both agree to allow a court to determine fair market value. When we cannot determine the rightful owner of a property, we also may use friendly condemnation to clear title. We do not expect to use friendly condemnation very often, if at all. We would not use condemnation otherwise, as it counters good working relations with the public.

Funding for Fee or Easement Purchase

Much of our funding to buy land comes from the Land and Water Conservation Fund (LWCF), which derives from certain user fees, the proceeds from the disposal of surplus Federal property, the Federal tax on motor boat fuels, and oil and gas lease revenues. About 90 percent of this fund now derives from Outer Continental Shelf oil and gas leases. The Federal Government receives 40 percent of this fund to acquire and develop nationally significant conservation lands. Another source of funding to purchase land is the Migratory Bird Conservation Fund, which derives from Federal Duck Stamp revenue. We plan to use LWCF funds to buy either full or partial interests in lands in the project area.

Coordination

Throughout the planning process for the proposed expansion at Nantucket NWR, we worked with conservation partners to determine the best ways to ensure that federally listed species, such as the American burying beetle, piping plover and roseate tern; candidate species, such as the New England Cottontail; and other species of management concern, including migratory birds, are protected on Nantucket and associated islands. We met with conservation organizations and land managers to determine the best ways the Service could further contribute to land protection and management. There are already a number of conservation ownerships on Nantucket, and the intention of the Service is to bring a landscape-level perspective to the conservation of key species and habitats on Nantucket, and to be able to share our expertise and expand the reach of our resources to other parcels that will further the mission of the Refuge System. As a result of our conversations and onsite meetings, we developed the protection options outlined earlier in this document. We will use a combination of no cost transfers, fee title acquisition, conservation easements, and management agreements to achieve mutually-held objectives. In particular, TTOR, the Foundation, Nantucket Land Bank, and Nantucket Land Council believe that the Service has an important role to play in the further conservation and management of Nantucket's wildlife resources. We did provide the draft CCP/EA for public review and comment, and we carefully considered public comments on Service land protection. We have strong support from Nantucket's major conservation organizations and some individuals for this proposal. The town of Nantucket does not feel that plans to expand the refuge to other parts of the island, outside the Coskata-Coatue Peninsula, are appropriate at this time. There is also some local opposition to our land protection proposal.



USFWS

Herring gull at Nantucket National Wildlife Refuge

Socioeconomic and Cultural Impacts

We do not predict any significant adverse socioeconomic or cultural impacts. We believe a net positive benefit will result for the local community. Nantucket will benefit from increased refuge revenue sharing payments and lower potential costs from these parcels, savings on the cost of community services, increased property values, increased watershed protection, maintenance of scenic values, and increased revenues for local businesses from refuge visitors who participate in bird watching, hunting, and wildlife observation.

Nantucket voters have consistently supported additional land protection. Land protection by the Service, while aimed at protecting Federal trust resources, watersheds, and other natural resource values, would also maintain the rural island character of Nantucket. Local reaction to proposed development on Nantucket tends to be negative.

One concern we heard expressed about Service land protection was the likelihood of reduced public access. We would review all existing public uses on lands that we acquire and will promote the six priority wildlife-dependent uses of the Refuge System, including hunting, fishing, wildlife observation and photography, and environmental education and interpretation as compatible on any land that we acquire in fee title. Other uses may also be permitted provided they are appropriate and compatible with the purposes of the refuge and the mission of the refuge system.

Refuge lands will also increase protection for cultural resources in the area. Service ownership will protect known cultural sites against vandalism, and protect unidentified or undeveloped cultural sites from disturbance or destruction. Our interpretation and environmental education programs will continue to promote public understanding and appreciation of Nantucket's rich cultural resources.

Table G.1. Proposed Nantucket NWR Land Protection Parcel List.

Parcel	Municipality	Deed Acres	Acquisition Priority	Acquisition Methods	Current Ownership
Great Point Lighthouse	Nantucket	1	2	Fee title ownership (no-cost transfer)	Coast Guard
Coskata-Coatue	Nantucket	1,117	1	Easement (purchase or donation)	The Trustees of Reservations
Coatue	Nantucket	390	1	Management Agreement	Nantucket Conservation Fund
Loran Station	Nantucket	85	1	Fee title ownership (no-cost transfer)	Coast Guard
Muskeget Island	Nantucket	306	1	Fee Title ownership (acquisition or donation), Easement (purchase or donation), or Management Agreement	Private and town of Nantucket
Head of the Plains	Nantucket	120	2	Fee title ownership (no-cost transfer)	General Services Administration (formerly Federal Aviation Administration)
Lohmann/Jellame	Nantucket	17	2	Fee Title (acquisition or donation)	Private

Map G-1. Great Point—Coskata Area



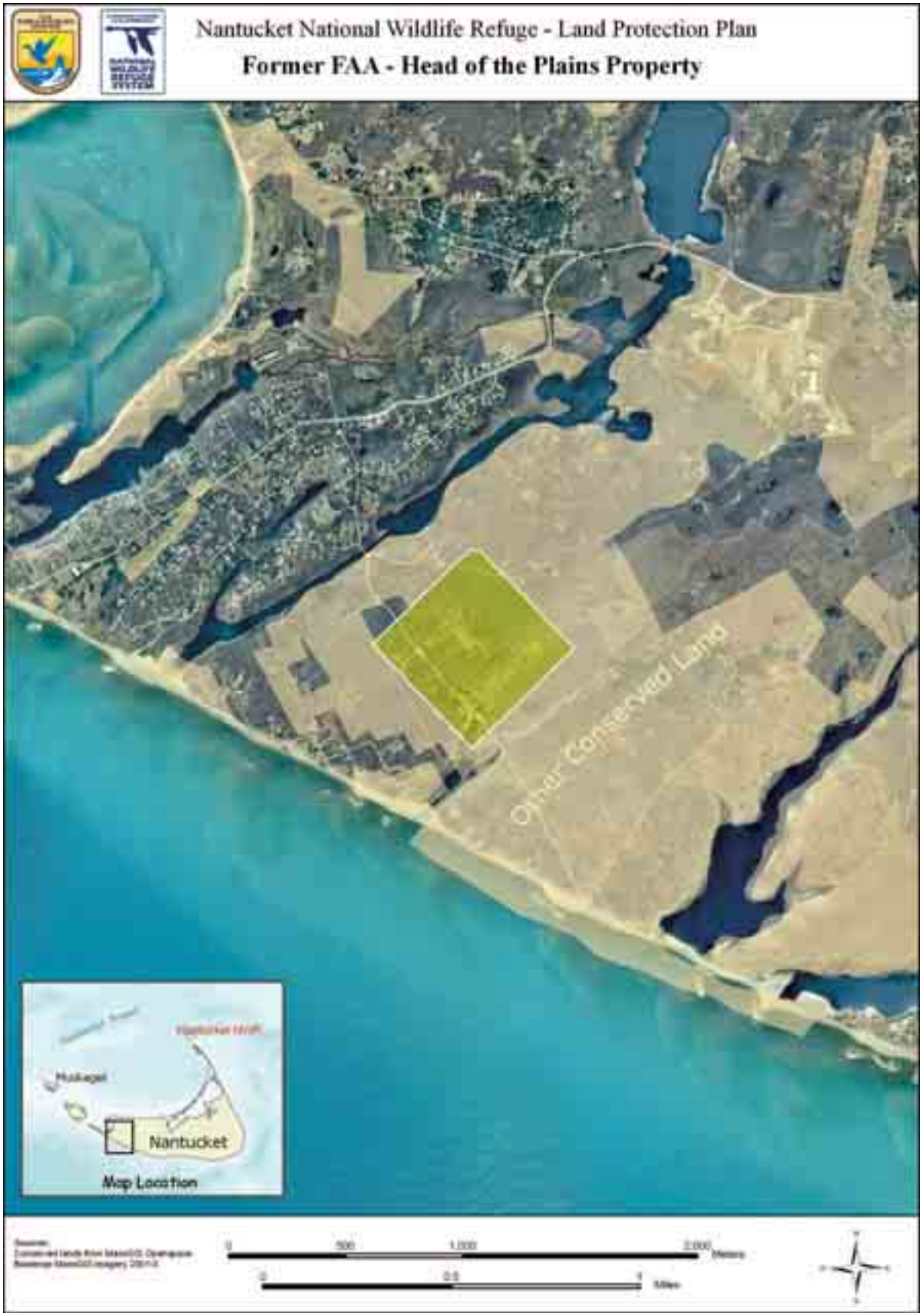
Map G-2. Coatue Area



Map G-3. U.S. Coast Guard Nantucket Loran Station Property



Map G-4. Former FAA—Head of the Plains Property



Map G-5. Muskeget Island



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Appendix H



Karen Terwilliger/TCI

Refuge beaches and dunes

Sea Level Affecting Marshes Model (SLAMM) Analysis

Application of the Sea-Level Affecting Marshes Model (SLAMM 5.0) to Nantucket NWR

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Application of the Sea-Level Affecting Marshes Model (SLAMM 5.0) to Nantucket NWR

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Introduction

Tidal marshes are among the most susceptible ecosystems to climate change, especially accelerated sea level rise (SLR). The International Panel on Climate Change (IPCC) Special Report on Emissions Scenarios (SRES) suggested that global sea level will increase by approximately 30 cm to 100 cm by 2100 (IPCC 2001). Rahmstorf (2007) suggests that this range may be too conservative and that the feasible range by 2100 could be 50 to 140 cm. Pfeffer et al. (2008) suggests that 200 cm by 2100 is at the upper end of plausible scenarios due to physical limitations on glaciological conditions. Rising sea level may result in tidal marsh submergence (Moorhead and Brinson 1995) and habitat migration as salt marshes transgress landward and replace tidal freshwater and brackish marsh (Park et al. 1991).

In an effort to address the potential effects of sea level rise on United States national wildlife refuges, the U. S. Fish and Wildlife Service contracted the application of the SLAMM model for most Region 4 refuges. This analysis is designed to assist in the production of comprehensive conservation plans (CCPs) for each refuge along with other long-term management plans.

Model Summary

Changes in tidal marsh area and habitat type in response to sea-level rise were modeled using the Sea Level Affecting Marshes Model (SLAMM 5.0) that accounts for the dominant processes involved in wetland conversion and shoreline modifications during long-term sea level rise (Park et al. 1989; www.warrenpinnacle.com/prof/SLAMM).

Successive versions of the model have been used to estimate the impacts of sea level rise on the coasts of the U.S. (Titus et al., 1991; Lee, J.K., R.A. Park, and P.W. Mausel. 1992; Park, R.A., J.K. Lee, and D. Canning 1993; Galbraith, H., R. Jones, R.A. Park, J.S. Clough, S. Herrod-Julius, B. Harrington, and G. Page. 2002; National Wildlife Federation et al., 2006; Glick, Clough, et al. 2007; Craft et al., 2009.

Within SLAMM, there are five primary processes that affect wetland fate under different scenarios of sea-level rise:

- **Inundation:** The rise of water levels and the salt boundary are tracked by reducing elevations of each cell as sea levels rise, thus keeping mean tide level (MTL) constant at zero. The effects on each cell are calculated based on the minimum elevation and slope of that cell.
- **Erosion:** Erosion is triggered based on a threshold of maximum fetch and the proximity of the marsh to estuarine water or open ocean. When these conditions are met, horizontal erosion occurs at a rate based on site-specific data.
- **Overwash:** Barrier islands of under 500 meters width are assumed to undergo overwash during each 25-year time-step due to storms. Beach migration and transport of sediments are calculated.
- **Saturation:** Coastal swamps and fresh marshes can migrate onto adjacent uplands as a response of the fresh water table to rising sea level close to the coast.

- **Accretion:** Sea level rise is offset by sedimentation and vertical accretion using average or site-specific values for each wetland category. Accretion rates may be spatially variable within a given model domain.

SLAMM Version 5.0 is the latest version of the SLAMM Model, developed in 2006/2007 and based on SLAMM 4.0. SLAMM 5.0 provides the following refinements:

- The capability to simulate fixed levels of sea-level rise by 2100 in case IPCC estimates of sea-level rise prove to be too conservative.
- Additional model categories such as "Inland Shore," "Irregularly Flooded (Brackish) Marsh," and "Tidal Swamp."
- *Optional*: In a defined estuary, salt marsh, brackish marsh, and tidal fresh marsh can migrate based on changes in salinity, using a simple though geographically-realistic salt wedge model. This optional model was not used when creating results for Nantucket NWR.

Model results presented in this report were produced using SLAMM version 5.0.1 which was released in early 2008 based on only minor refinements to the original SLAMM 5.0 model. Specifically, the accretion rates for swamps were modified based on additional literature review. For a thorough accounting of SLAMM model processes and the underlying assumptions and equations, please see the SLAMM 5.0.1 technical documentation (Clough and Park, 2008). This document is available at http://warrenpinnacle.com/prof/SLAMM

All model results are subject to uncertainty due to limitations in input data, incomplete knowledge about factors that control the behavior of the system being modeled, and simplifications of the system (CREM 2008).

Sea-Level Rise Scenarios

The primary set of eustatic (global) sea level rise scenarios used within SLAMM was derived from the work of the Intergovernmental Panel on Climate Change (IPCC 2001). SLAMM 5 was run using the following IPCC and fixed-rate scenarios:

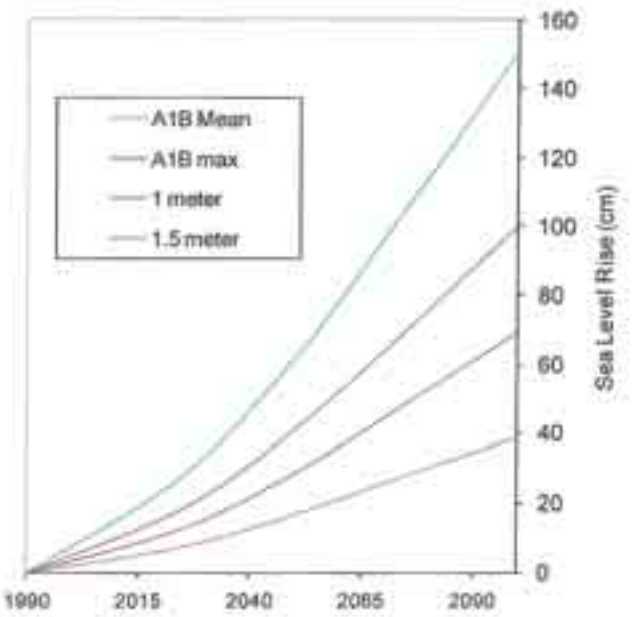
Scenario	Eustatic SLR by 2025 (cm)	Eustatic SLR by 2050 (cm)	Eustatic SLR by 2075 (cm)	Eustatic SLR by 2100 (cm)
A1B Mean	8	17	28	39
A1B Max	14	30	49	69
1 meter	13	28	48	100
1.5 meter	18	41	70	150

Recent literature (Chen et al., 2006, Monaghan et al., 2006) indicates that the eustatic rise in sea levels is progressing more rapidly than was previously assumed, perhaps due to dynamic changes in ice flow omitted within the IPCC report's calculations. A recent paper in the journal *Science* (Rahmstorf, 2007) suggests that, taking into account possible model error, a feasible range by 2100 might be 50 to 140 cm. A recent US intergovernmental report states "Although no ice sheet model is currently capable of capturing the glacier speedups in Antarctica or Greenland that have been observed over the last decade, including these processes in models will very likely show that IPCC

AR4 projected sea level rises for the end of the 21st century are too low." (US Climate Change Science Program, 2008)

To allow for flexibility when interpreting the results, SLAMM was also run assuming 1 meter, 1½ meters of eustatic sea-level rise by the year 2100. The A1B- maximum scenario was scaled up to produce these bounding scenarios (Figure 1).

Figure 1: Summary of SLR Scenarios Utilized



Methods and Data Sources

LIDAR elevation data are unavailable for this National Wildlife Refuge (NWR). Elevation data used are based on National Elevation Data (NED). An examination of the NED metadata indicates that this digital elevation map (DEM) was derived from a 1972 survey (Fig. 2). The contour interval used to derive the DEM was ten feet. The majority of the refuge falls below the ten foot contour line meaning there is significant uncertainty as to dry land elevations at this site. Beach elevations were estimated as a function of tidal range, a procedure that is also subject to uncertainty.



Figure 2: Nantucket Excerpt from USGS Map.

The National Wetlands Inventory for Nantucket is based on a photo date of 1999. An examination of the NWI map overlaid on recent satellite photos indicates a land boundary shift of around 70 meters in places (Figure 3). Because beach elevations are estimated as a function of tide range, using the SLAMM elevation pre-processor, this disconnect between vertical NED data and horizontal beach location may not have a significant effect on model predictions. Dry land elevations are subject to more uncertainty.



Figure 3: Land boundary shift of nearly 70 meters indicated by white line

Converting the NWI survey into 30 meter cells indicates that the approximately twenty nine acre refuge (approved acquisition boundary including water) is primarily composed of the categories as shown below:

Dry Land	62.5%
Ocean Beach	26.6%
Open Ocean	10.9%

Based on the NWI coverage, there are no dikes or impounded wetlands within the Nantucket NWR.

The historic trend for sea level rise was estimated at 2.95 mm/year using the value of the closest station (8449130, Nantucket Island, MA). This measured rate is somewhat higher than the global average for the last 100 years (approximately 1.5-2.0 mm/year). Any effects of isostatic rebound that have affected this region for the last 100 years are measured within that historic trend and that same rate of isostatic rebound is projected forward into the next 100 years.

The tide range at this site was estimated at 1.089 meters using the closest NOAA oceanic gage (8449130, Nantucket Island, MA).



Figure 4: NOAA Gage Relevant to the Study Area.

Accretion rates in salt and brackish marshes are not relevant to this site as no marshes appear in the initial condition, nor in future predictions.

Modeled U.S. Fish and Wildlife Service refuge boundaries are based on Approved Acquisition Boundaries as published on the FWS "National Wildlife Refuge Data and Metadata" website. The modeling team were in contact with Eastern Massachusetts National Wildlife Refuge Complex biologist Stephanie Koch to ensure model parameters were consistent with local knowledge.

The cell-size used for this analysis was 30 meter by 30 meter cells. However, the SLAMM model does track partial conversion of cells based on elevation and slope. (Note that since the LiDAR data produce a more accurate DEM, only the elevations of wetlands classes lying outside of the LiDAR data (in the NED data) in Nantucket were overwritten as a function of the local tidal range using the SLAMM elevation pre-processor.)

SUMMARY OF SLAMM INPUT PARAMETERS FOR GREAT BAY

Description	Nantucket
DEM Source Date (yyyy)	1972
NWI_photo_date (yyyy)	1999
Direction_OffShore (N,S,E,W)	N
Historic_trend (mm/yr)	2.95
NAVD88_correction (MTL-NAVD88 in meters)	-0.09
Water Depth (m below MLW- NWI)	2
TideRangeOcean (meters: MHHW-MLLW)	1.089
TideRangeInland (meters)	1.089
Mean High Water Spring (m above MTL)	0.724
MHSW inland (m above MTL)	0.724
Marsh Erosion (horz meters/year)	1.8
Swamp Erosion (horz meters/year)	1
TFlat Erosion (horz meters/year) [from 0.5]	0.5
Salt marsh vertical accretion (mm/yr) Final	3.78
Brackish Marsh vert. accretion (mm/yr) Final	3.78
Tidal Fresh vertical accretion (mm/yr) Final	5.9
Beach/T.Flat Sedimentation Rate (mm/yr)	0.5
Frequency of Large Storms (yr/washover)	50
Use Elevation Preprocessor for Wetlands	TRUE

Results

Nantucket National Wildlife Refuge is predicted to show effects from sea level rise. The refuge is predicted to lose about one fifth of its dry land and half of its ocean beach in the most conservative scenario.

SLR by 2100 (m)	0.39	0.69	1	1.5
Dry Land	20%	33%	51%	71%
Ocean Beach	49%	57%	77%	89%

Predicted Loss Rates of Land Categories by 2100 Given Simulated Scenarios of Eustatic Sea Level Rise

Maps of SLAMM input and output to follow will use the following legend:

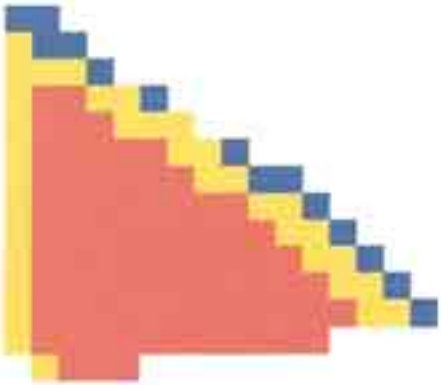


Application of the Sea-Level Affecting Marshes Model (SLAMM 5.0) to Nantucket NWR

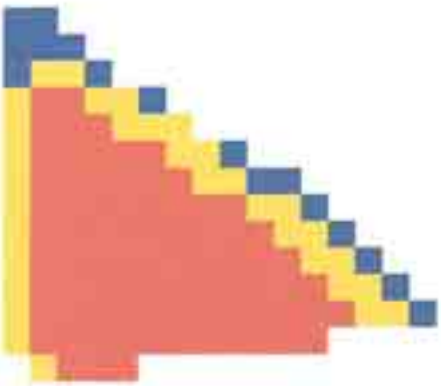
Nantucket
IPCC Scenario A1B-Mean, 0.39 M SLR Eustatic by 2100

Results in Acres

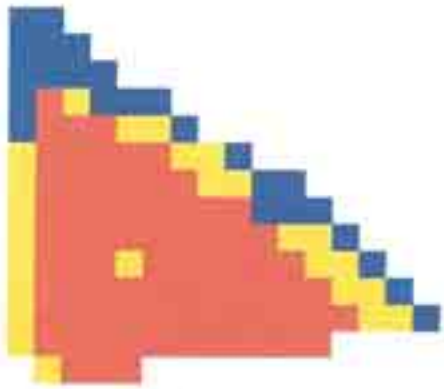
	Initial	2025	2050	2075	2100
Dry Land	17.8	17.5	16.7	15.7	14.3
Ocean Beach	7.6	6.9	6.2	4.8	3.8
Open Ocean	3.1	4.1	5.5	8.0	10.3
Total (incl. water)	**28.5**	**28.5**	**28.5**	**28.5**	**28.5**



Nantucket, Initial Condition



Nantucket, 2025, Scenario A1B Mean



Nantucket, 2050, Scenario A1B Mean



Nantucket, 2075, Scenario A1B Mean

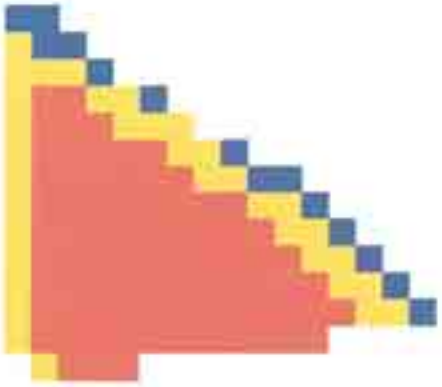


Nantucket, 2100, Scenario A1B Mean

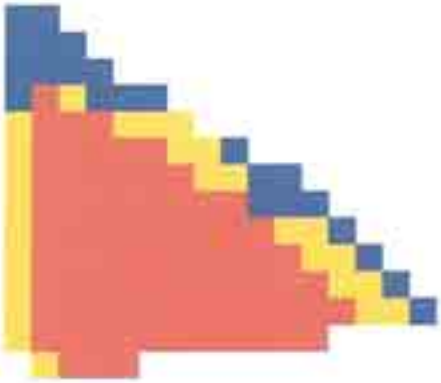
Nantucket
IPCC Scenario A1B-Max, 0.69 M SLR Eustatic by 2100

Results in Acres

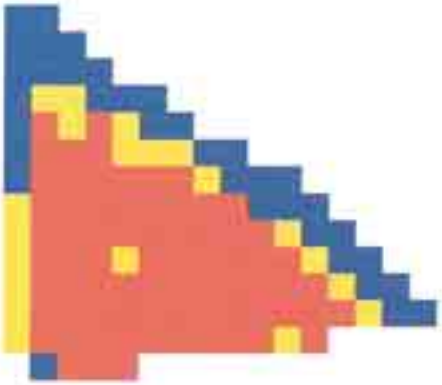
	Initial	2025	2050	2075	2100
Dry Land	17.8	17.3	16.0	13.8	11.9
Ocean Beach	7.6	6.6	5.1	3.9	3.2
Open Ocean	3.1	4.6	7.4	10.7	13.3
Total (incl. water)	**28.5**	**28.5**	**28.5**	**28.5**	**28.5**



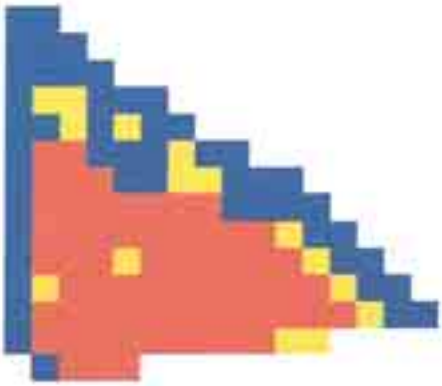
Nantucket, Initial Condition



Nantucket, 2025, Scenario A1B Maximum

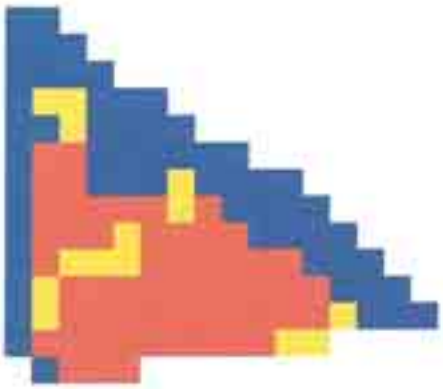


Nantucket, 2050, Scenario A1B Maximum



Nantucket, 2075, Scenario A1B Maximum

Application of the Sea-Level Affecting Marshes Model (SLAMM 5.0) to Nantucket NWR



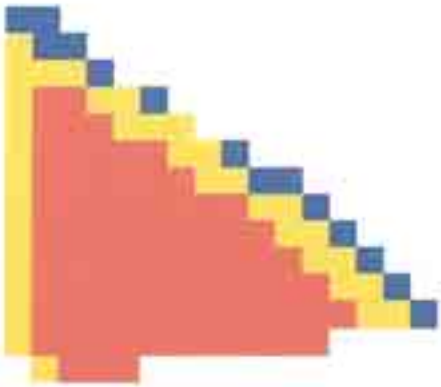
Nantucket, 2100, Scenario A1B Maximum

Application of the Sea-Level Affecting Marshes Model (SLAMM 5.0) to Nantucket NWR

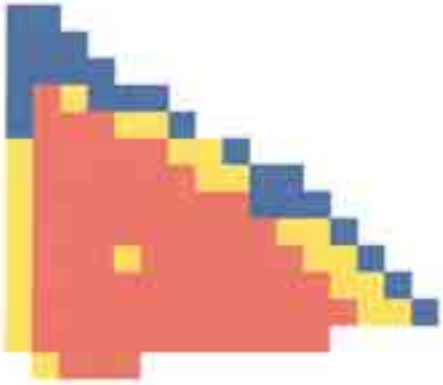
Nantucket
1 Meter Eustatic SLR by 2100

Results in Acres

	Initial	2025	2050	2075	2100
Dry Land	17.8	17.0	15.1	12.3	8.8
Ocean Beach	7.6	6.2	3.6	1.9	1.7
Open Ocean	3.1	5.3	9.8	14.3	18.0
Total (incl. water)	**28.5**	**28.5**	**28.5**	**28.5**	**28.5**



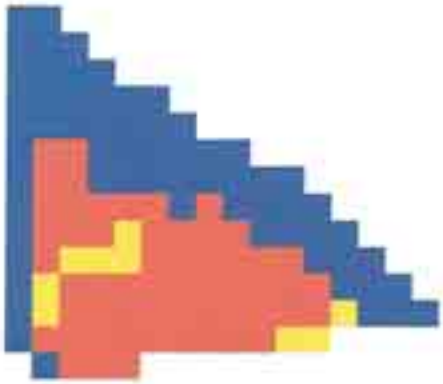
Nantucket, Initial Condition



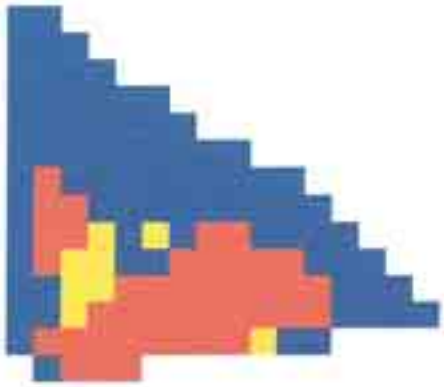
Nantucket, 2025, 1 meter



Nantucket, 2050, 1 meter



Nantucket, 2075, 1 meter



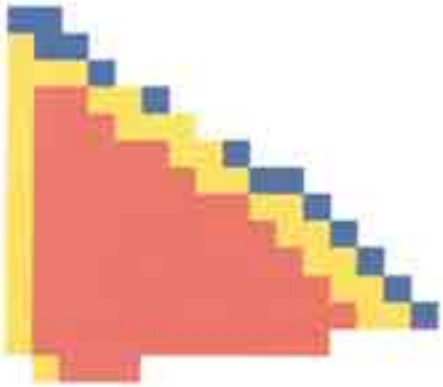
Nantucket, 2100, 1 meter

Application of the Sea Level Affecting Marshes Model (SLAMM 5.0) to Nantucket NWR

Nantucket
1.5 Meters Eustatic SLR by 2100

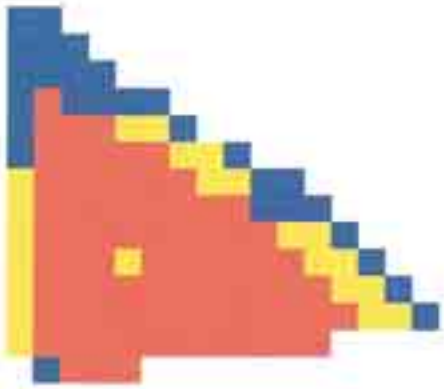
Results in Acres

	Initial	2025	2050	2075	2100
Dry Land	17.8	16.5	13.4	8.9	5.1
Ocean Beach	7.6	5.6	3.7	1.3	0.8
Open Ocean	3.1	6.3	11.4	18.3	22.2
Estuarine Beach	0.0	0.0	0.0	0.0	0.2
Estuarine Open Water	0.0	0.0	0.0	0.0	0.1
Total (incl. water)	**28.5**	**28.5**	**28.5**	**28.5**	**28.5**

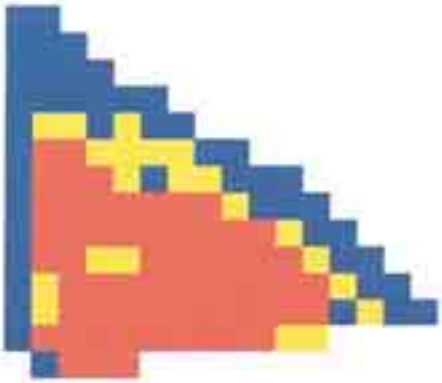


Nantucket, Initial Condition

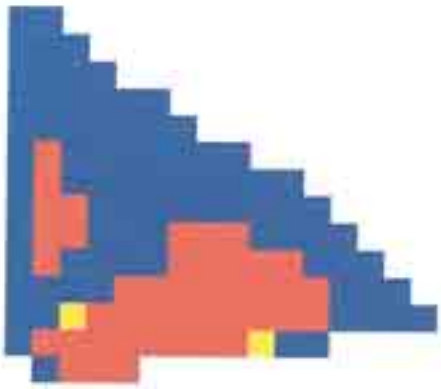
Prepared for USFWS 18 *Warren Pinnacle Consulting, Inc.*



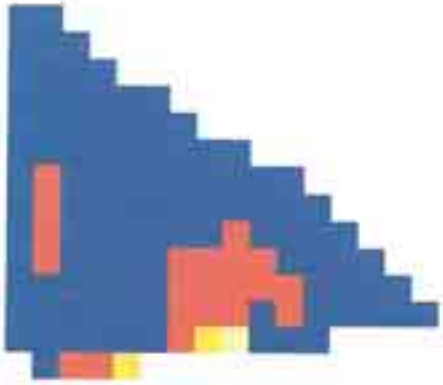
Nantucket, 2025, 1.5 meter



Nantucket, 2050, 1.5 meter



Nantucket, 2075, 1.5 meter



Nantucket, 2100, 1.5 meter

Discussion:

Model results for Nantucket NWR indicate that it is vulnerable to the effects of sea level rise under all scenarios. Vulnerability is relatively high due to the general susceptibility of ocean beaches to sea level rise and the large quantity of dry land that falls below the ten foot USGS contour.

Model results for this site are subject to considerable uncertainty. Dry land elevations are poorly characterized by the low-resolution NED (from 1972). Predicted dry-land loss rates would be refined with a higher vertical resolution dataset. Additionally, ocean beach erosion is difficult to precisely characterize with a relatively simple model. Finally, ocean beach elevations are estimated as a function of tidal range because elevation data have a low vertical resolution.

The SLAMM model does account for the local effects of isostatic rebound by taking into account the historical sea level rise for each site. The historical rate of land movement is predicted to continue through the year 2100 (i.e. the rate of isostatic rebound is assumed to remain constant).

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Appendix A: Contextual Results

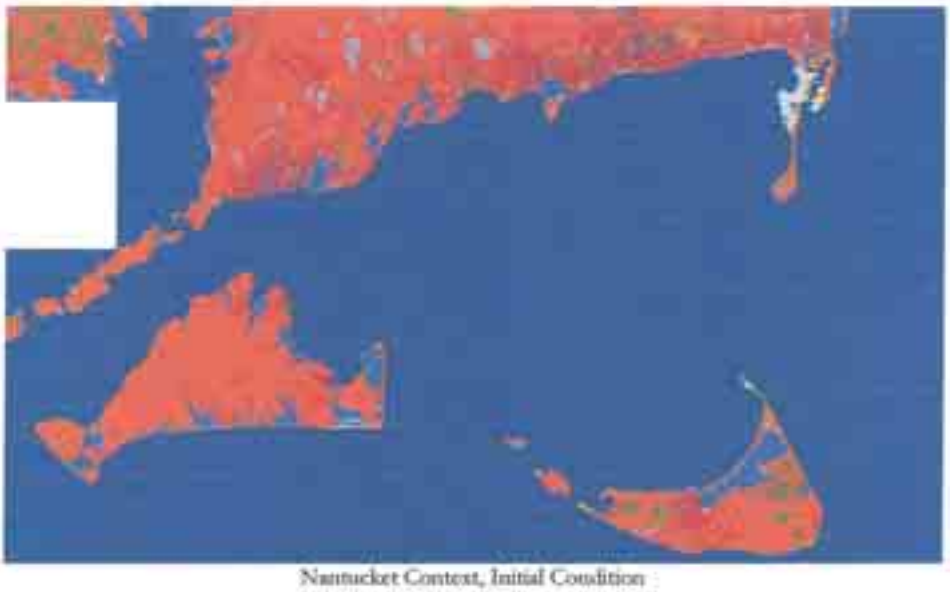
The SLAMM model does take into account the context of the surrounding lands or open water when calculating effects. For example, erosion rates are calculated based on the maximum fetch (wave action) which is estimated by assessing contiguous open water to a given marsh cell. Another example is that inundated dry lands will convert to marshes or ocean beach depending on their proximity to open ocean.

For this reason, an area larger than the boundaries of the USFWS refuge was modeled. These results maps are presented here with the following caveats:

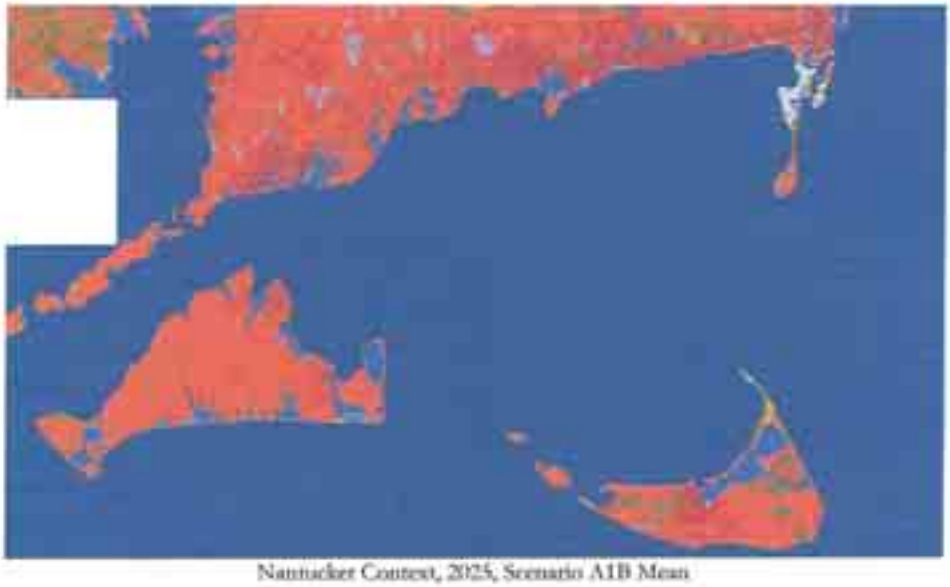
- Results were closely examined (quality assurance) within USFWS refuges but not closely examined for the larger region.
- Site-specific parameters for the model were derived for USFWS refuges whenever possible and may not be regionally applicable.
- Especially in areas where dikes are present, an effort was made to assess the probable location and effects of dikes for USFWS refuges, but this effort was not made for surrounding areas.



Location of Nantucket National Wildlife Refuge within simulation context



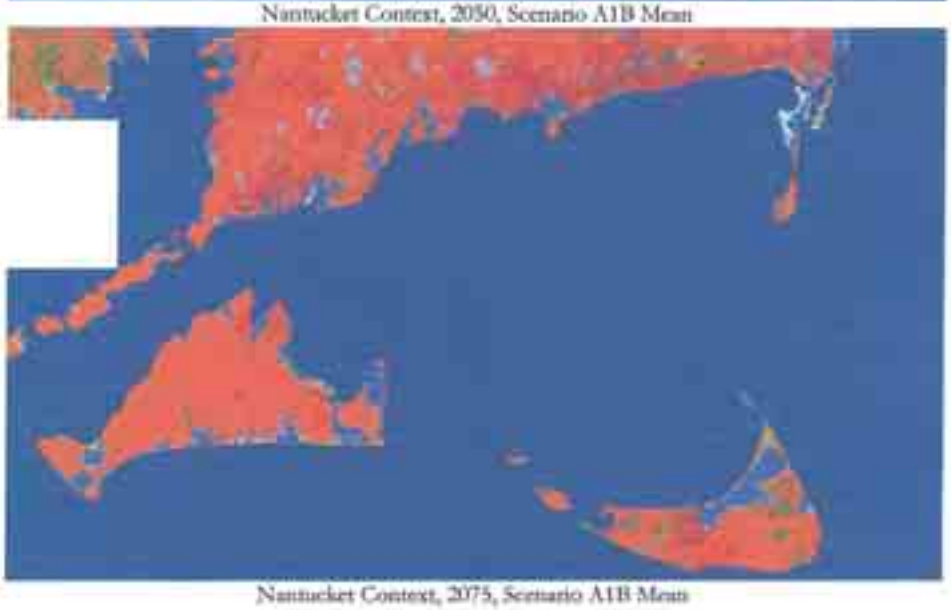
Nantucket Context, Initial Coudition



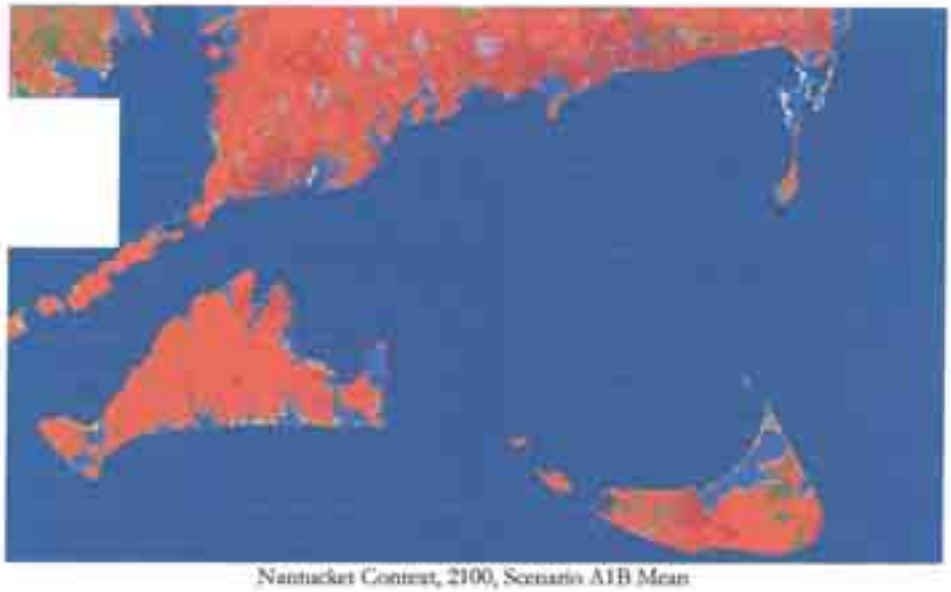
Nantucket Context, 2025, Scenario A1B Mean



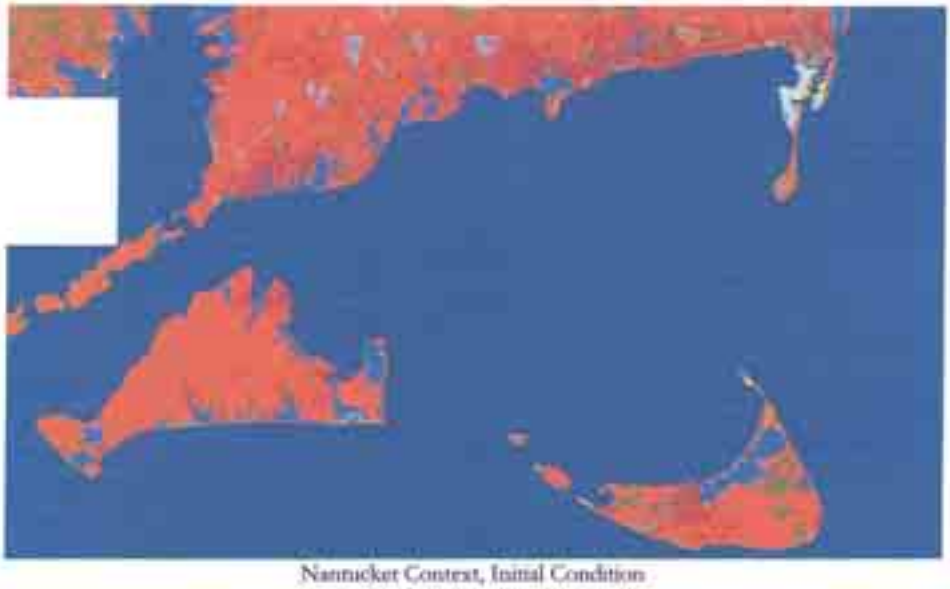
Nantucket Context, 2050, Scenario A1B Mean



Nantucket Context, 2075, Scenario A1B Mean



Nantucket Context, 2100, Scenario A1B Mean



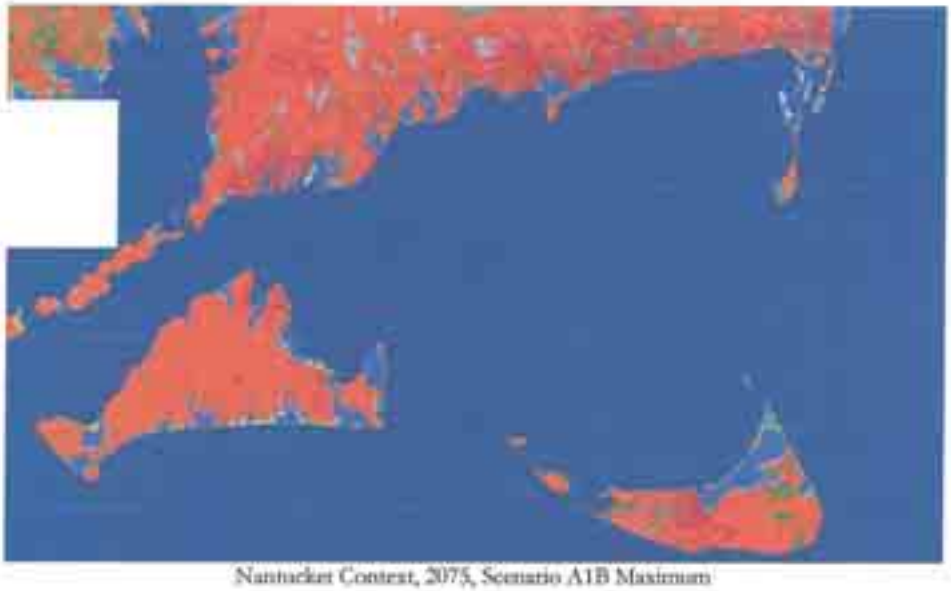
Nantucket Context, Initial Condition



Nantucket Context, 2025, Scenario A1B Maximum



Nantucket Context, 2050, Scenario A1B Maximum

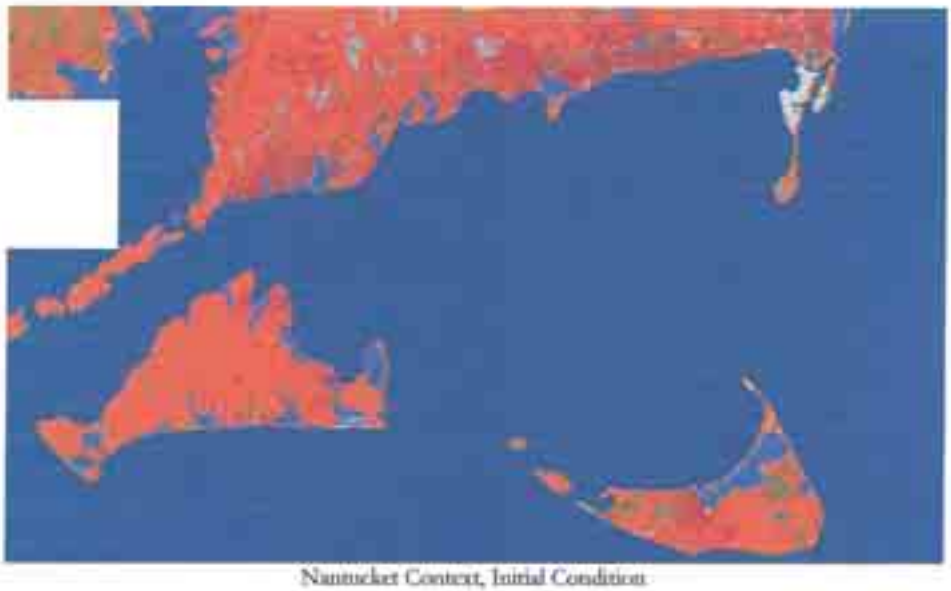


Nantucket Context, 2075, Scenario A1B Maximum

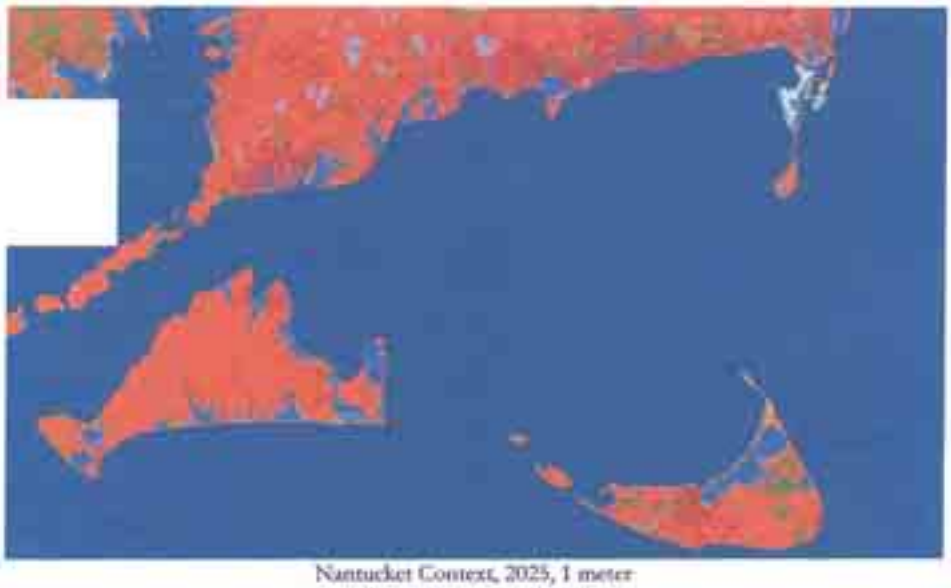


Nantucket Context, 2100, Scenario A1B Maximum

Application of the Sea Level Affecting Marshes Model (SLAMM 5.0) to Nantucket NWR



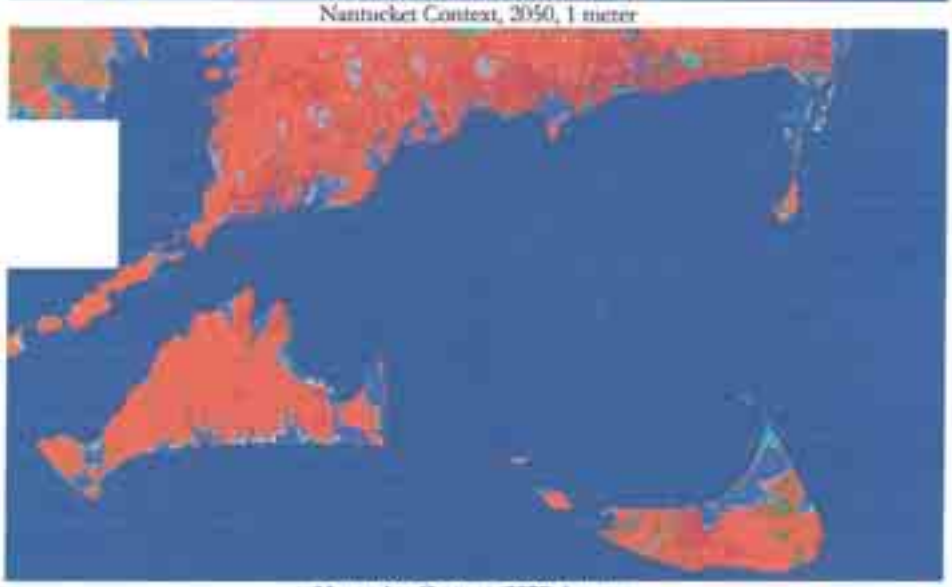
Nantucket Context, Initial Condition



Nantucket Context, 2025, 1 meter



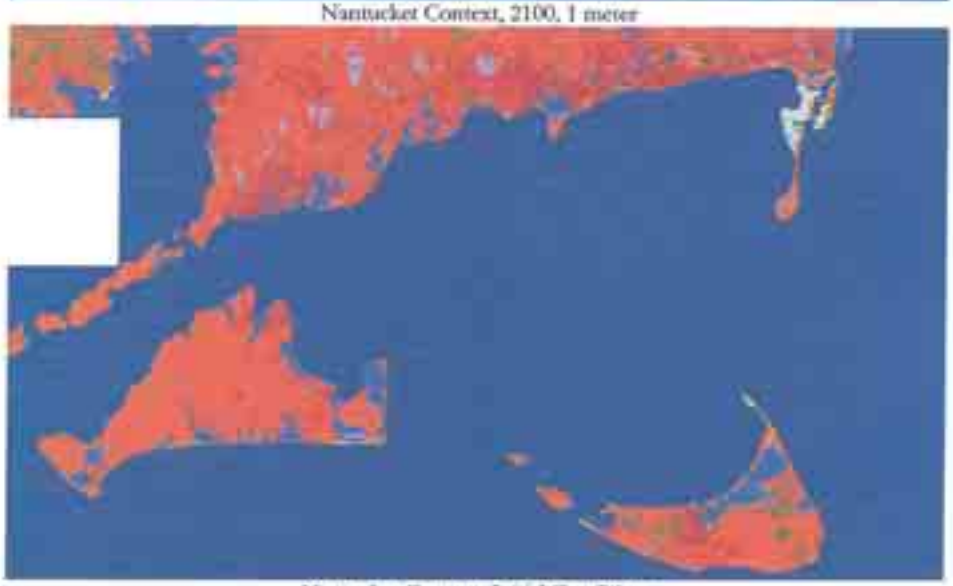
Nantucket Context, 2050, 1 meter



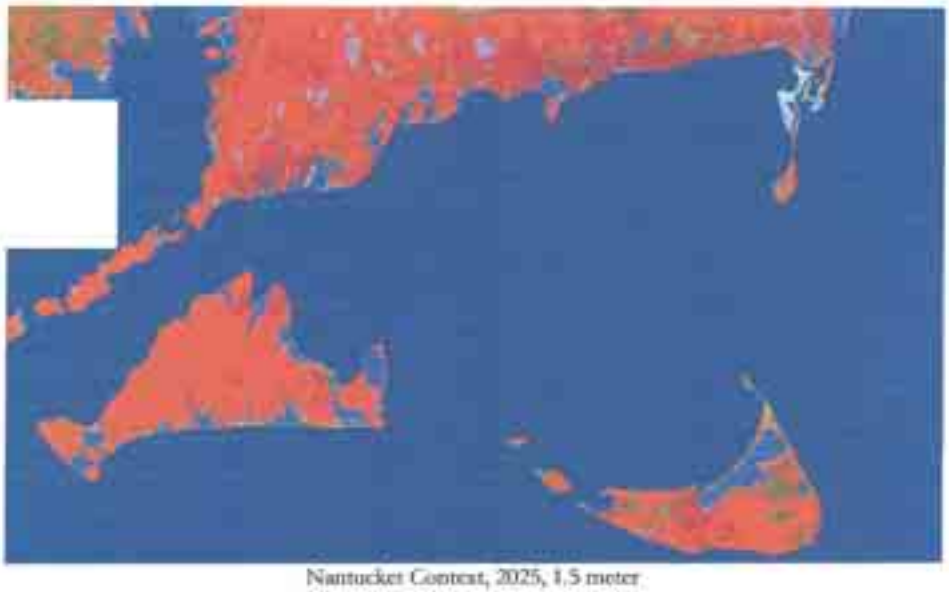
Nantucket Context, 2075, 1 meter



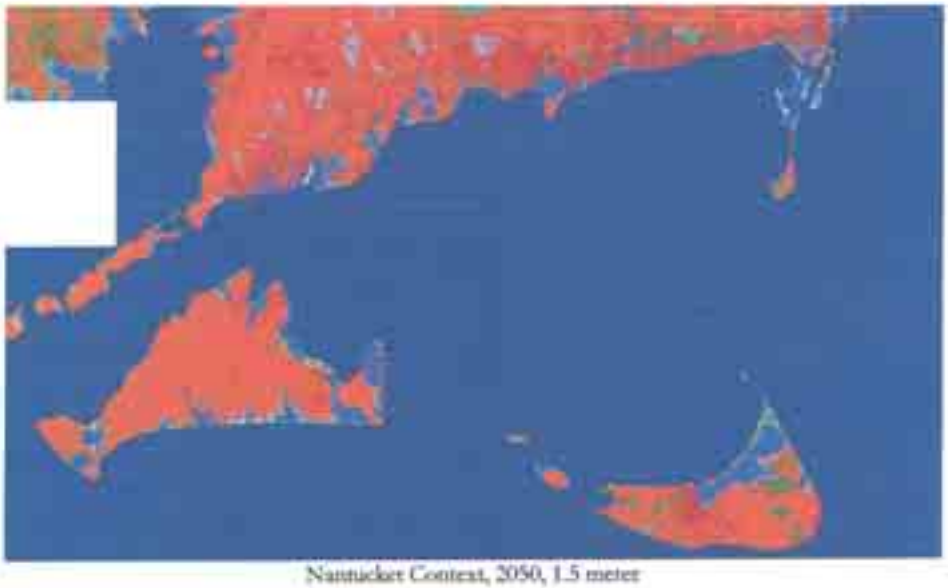
Nantucket Context, 2100, 1 meter



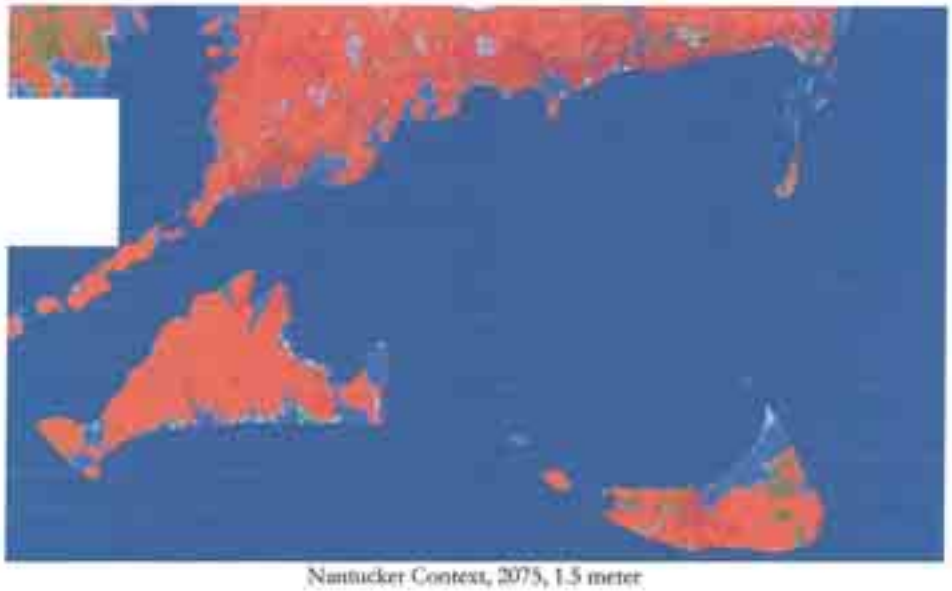
Nantucket Context, Initial Condition



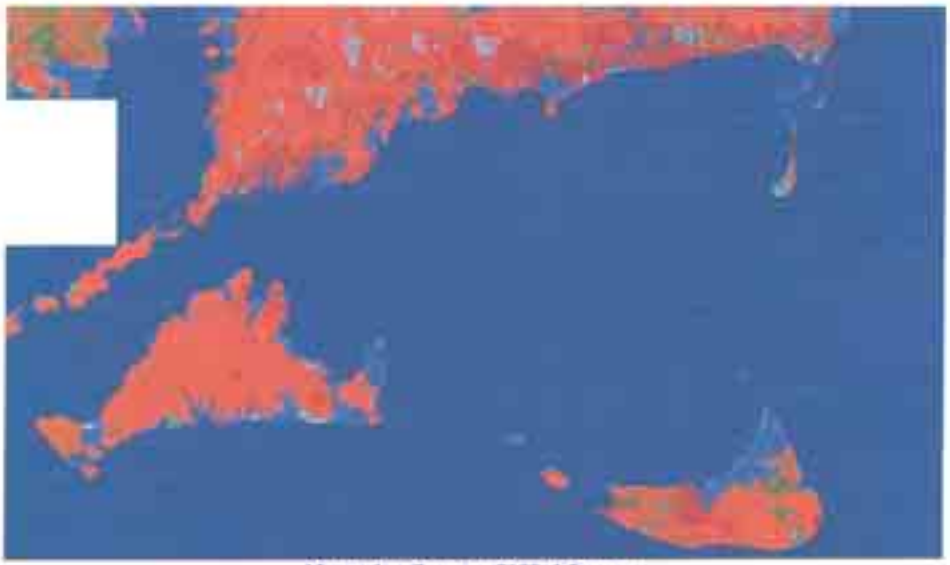
Nantucket Context, 2025, 1.5 meter



Nantucket Context, 2050, 1.5 meter



Nantucket Context, 2075, 1.5 meter



Nantucket Context, 2100, 1.5 meter

Appendix I



Gene Nieminen/USFWS

Piping plover

Federal and State Piping Plover Recovery Guidelines

GUIDELINES FOR MANAGING RECREATIONAL ACTIVITIES IN PIPING PLOVER BREEDING HABITAT ON THE U.S. ATLANTIC COAST TO AVOID TAKE UNDER SECTION 9 OF THE ENDANGERED SPECIES ACT

Northeast Region, U.S. Fish and Wildlife Service
April 15, 1994

The following information is provided as guidance to beach managers and property owners seeking to avoid potential violations of Section 9 of the Endangered Species Act (16 U.S.C. 1538) and its implementing regulations (50 CFR Part 17) that could occur as the result of recreational activities on beaches used by breeding piping plovers along the Atlantic Coast. These guidelines were developed by the Northeast Region, U.S. Fish and Wildlife Service (Service), with assistance from the U.S. Atlantic Coast Piping Plover Recovery Team. The guidelines are advisory, and failure to implement them does not, of itself, constitute a violation of the law. Rather, they represent the Service's best professional advice to beach managers and landowners regarding the management options that will prevent direct mortality, harm, or harassment of piping plovers and their eggs due to recreational activities.

Some land managers have endangered species protection obligations under Section 7 of the Endangered Species Act (see section I below) or under Executive Orders 11644 and 11989[1] that go beyond adherence to these guidelines. Nothing in this document should be construed as lack of endorsement of additional piping plover protection measures implemented by these land managers or those who are voluntarily undertaking stronger plover protection measures.

This document contains four sections: (I) a brief synopsis of the legal requirements that afford protection to nesting piping plovers; (II) a brief summary of the life history of piping plovers and potential threats due to recreational activities during the breeding cycle; (III) guidelines for protecting piping plovers from recreational activities on Atlantic Coast beaches; and (IV) literature cited.

[1] Executive Order 11644, Use of Off-Road Vehicles on the Public Lands and Executive Order 11989, Off-Road Vehicles on Public Lands pertain to lands under custody of the Secretaries of Agriculture, Defense, and Interior (except for Indian lands) and certain lands under the custody of the Tennessee Valley Authority.

I. LEGAL CONSIDERATIONS

Section 9 of the Endangered Species Act (ESA) prohibits any person subject to the jurisdiction of the United States from harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting listed wildlife species. It is also unlawful to attempt such acts, solicit another to commit such acts, or cause such acts to be committed. A "person" is defined in Section 3 to mean "an individual, corporation, partnership, trust, association, or any other private entity; or any officer, employee, agent, department, or instrumentality of the Federal Government, of any State, municipality, or political subdivision of a State, or of any foreign government; any State, municipality, or political subdivision of a State; or any other entity subject to the jurisdiction of the United States." Regulations implementing the ESA (50 CFR 17.3) further define "harm" to include significant habitat modification or degradation that results in the killing or injury of wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. "Harass" means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Penalties for violations of Section 9 are provided in Section 11 of the ESA; for threatened species, these penalties include fines of up to $25,000, imprisonment for not more than six months, or both.

Section 10 of the ESA and related regulations provide for permits that may be granted to authorize acts prohibited under Section 9, for scientific purposes or to enhance the propagation or survival of a listed species. States that have Cooperative Agreements under Section 6 of the ESA, may provide written authorization for take that occurs in the course of implementing conservation programs. For example, State agencies have authorized certain biologists to construct predator exclosures for piping plovers. It is also legal for employees or designated agents of certain Federal or State agencies to take listed species without a permit, if the action is necessary to aid sick, injured, or orphaned animals or to salvage or dispose of a dead specimen.

Section 10 also allows permits to be issued for take that is "incidental to, and not the purpose of, carrying out an otherwise lawful activity" if the Service determines that certain conditions have been met. An applicant for an incidental take permit must prepare a conservation plan that specifies the impacts of the take, steps the applicant will take to minimize and mitigate the impacts, funding that will be available to implement these steps, alternative actions to the take that the applicant considered, and the reasons why such alternatives are not being utilized.

Section 7 of the ESA may be pertinent to beach managers and landowners in situations that have a Federal nexus. Section 7 requires Federal agencies to consult with the Service (or National Marine Fisheries Service for marine species) prior to authorizing, funding, or carrying out activities that may affect listed species. Section 7 also requires that these agencies use their authorities to further the conservation of listed species. Section 7 obligations have caused Federal land management agencies to implement piping plover protection measures that go beyond those required to avoid take, for example by conducting research on threats to piping plovers. Other examples of Federal activities that may affect piping plovers along the Atlantic Coast, thereby triggering Section 7 consultation, include permits for beach nourishment or disposal of dredged material (U.S. Army Corps of Engineers) and funding of beach restoration projects (Federal Emergency Management Authority).

Piping plovers, as well as other migratory birds such as least terns, common terns, American oystercatchers, laughing gulls, herring gulls, and great black-blacked gulls, their nests, and eggs are also protected under the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712). Prohibited acts include pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting such conduct. Violators may be fined up to $5000 and/or imprisoned for up to six months.

Almost all States within the breeding range of the Atlantic Coast piping plover population list the species as State threatened or endangered (Northeast Nongame Technical Committee 1993). Various laws and regulations may protect State-listed species from take, but the Service has not ascertained the adequacy of the guidelines presented in this document to meet the requirements of any State law.

II. LIFE HISTORY AND THREATS FROM HUMAN DISTURBANCE

Piping plovers are small, sand-colored shorebirds that nest on sandy, coastal beaches from South Carolina to Newfoundland. Since 1986, the Atlantic Coast population has been protected as a threatened species under provisions of the U.S. Endangered Species Act of 1973 (U.S. Fish and Wildlife Service 1985). The U.S. portion of the population was estimated at 875 pairs in 1993 (U.S. Fish and Wildlife Service 1993). Many characteristics of piping plovers contribute to their susceptibility to take due to human beach activities.

LIFE HISTORY

Piping plovers begin returning to their Atlantic Coast nesting beaches in mid-March (Coutu et al. 1990, Cross 1990, Goldin 1990, MacIvor 1990, Hake 1993). Males establish and defend territories and court females (Cairns 1982). Eggs may be present on the beach from mid-April through late July. Clutch size is generally four eggs, and the incubation period[2] usually lasts for 27-28 days. Piping plovers fledge only a single brood per season, but may renest several times if previous nests are lost. Chicks are precocial[3] (Wilcox 1959, Cairns 1982). They may move hundreds of yards from the nest site during their first week of life (see Table 1, Summary of Chick Mobility Data). Chicks remain together with one or both parents until they fledge (are able to fly) at 25 to 35 days of age. Depending on date of hatching, flightless chicks may be present from mid-May until late August, although most fledge by the end of July (Patterson 1988, Goldin 1990, MacIvor 1990, Howard et al. 1993).

Piping plover nests are situated above the high tide line on coastal beaches, sand flats at the ends of sandspits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, and washover areas cut into or between dunes. They may also nest on areas where suitable dredge material has been deposited. Nest sites are shallow scraped depressions in substrates ranging from fine grained sand to mixtures of sand and pebbles, shells or cobble (Bent 1929, Burger 1987a, Cairns 1982, Patterson 1988, Flemming et al. 1990, MacIvor 1990, Strauss 1990).

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[2] "Incubation" refers to adult birds sitting on eggs, to maintain them at a favorable temperature for embryo development.

[3] "Precocial" birds are mobile and capable of foraging for themselves within several hours of hatching.

Nests are usually found in areas with little or no vegetation although, on occasion, piping plovers will nest under stands of American beachgrass (Ammophila breviligulata) or other vegetation (Patterson 1988, Flemming et al. 1990, MacIvor 1990). Plover nests may be very difficult to detect, especially during the 6-7 day egg-laying phase when the birds generally do not incubate (Goldin 1994).

Plover foods consist of invertebrates such as marine worms, fly larvae, beetles, crustaceans or mollusks (Bent 1929, Cairns 1977, Nicholls 1989). Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines*, and shorelines of coastal ponds, lagoons or salt marshes (Gibbs 1986, Coutu et al. 1990, Hoopes et al. 1992, Loegering 1992, Goldin 1993). Studies have shown that the relative importance of various feeding habitat types may vary by site (Gibbs 1986, Coutu et al. 1990, McConnaughey et al. 1990, Loegering 1992, Goldin 1993, Hoopes 1993) and by stage in the breeding cycle (Cross 1990). Adults and chicks on a given site may use different feeding habitats in varying proportion (Goldin et al. 1990). Feeding activities of chicks may be particularly important to their survival. Cairns (1977) found that piping plover chicks typically tripled their weight during the first two weeks post-hatching; chicks that failed to achieve at least 60% of this weight gain by day 12 were unlikely to survive. During courtship, nesting, and brood rearing, feeding territories are generally contiguous to nesting territories (Cairns 1977), although instances where brood-rearing areas are widely separated from nesting territories are not uncommon (see Table 1). Feeding activities of both adults and chicks may occur during all hours of the day and night (Burger 1993) and at all stages in the tidal cycle (Goldin 1993, Hoopes 1993).

THREATS FROM NONMOTORIZED BEACH ACTIVITIES

Sandy beaches that provide nesting habitat for piping plovers are also attractive recreational habitats for people and their pets. Nonmotorized recreational activities can be a source of both direct mortality and harassment of piping plovers. Pedestrians on beaches may crush eggs (Burger 1987b, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Unleashed dogs may chase plovers (McConnaughey et al. 1990), destroy nests

* Wrack is organic material including seaweed, seashells, driftwood and other materials deposited on beaches by tidal action.

(Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980).

Pedestrians may flush incubating plovers from nests (see Table 2, Summary of Data on Distances at Which Plovers React to Disturbance), exposing eggs to avian predators or causing excessive cooling or heating of eggs. Repeated exposure of shorebird eggs on hot days may cause overheating, killing the embryos (Bergstrom 1991). Excessive cooling may kill embryos or retard their development, delaying hatching dates (Welty 1982). Pedestrians can also displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993). Fireworks are highly disturbing to piping plovers (Howard et al. 1993). Plovers are particularly intolerant of kites, compared with pedestrians, dogs, and vehicles; biologists believe this may be because plovers perceive kites as potential avian predators (Hoopes et al. 1992).

THREATS FROM MOTOR VEHICLES

Unrestricted use of motorized vehicles on beaches is a serious threat to piping plovers and their habitats. Vehicles can crush eggs (Wilcox 1959; Tull 1984; Burger 1987b; Patterson et al. 1991; United States of America v. Breezy Point Cooperative, Inc., U.S. District Court, Eastern District of New York, Civil Action No. CV-90-2542, 1991; Shaffer and Laporte 1992), adults, and chicks. In Massachusetts and New York, biologists documented 14 incidents in which 18 chicks and 2 adults were killed by vehicles between 1989 and 1993 (Melvin et al. 1994). Goldin (1993) compiled records of 34 chick mortalities (30 on the Atlantic Coast and 4 on the Northern Great Plains) due to vehicles. Many biologists that monitor and manage piping plovers believe that many more chicks are killed by vehicles than are found and reported (Melvin et al. 1994). Beaches used by vehicles during nesting and brood-rearing periods generally have fewer breeding plovers than available nesting and feeding habitat can support. In contrast, plover abundance and productivity has increased on beaches where vehicle restrictions during chick-rearing periods have been combined with protection of nests from predators (Goldin 1993; S. Melvin, pers. comm., 1993).

Typical behaviors of piping plover chicks increase their vulnerability to vehicles. Chicks frequently move between the upper berm or foredune and feeding habitats in the wrack line and intertidal zone. These movements place chicks in the paths of vehicles driving along the berm or through the intertidal zone. Chicks stand in, walk, and run along tire ruts, and sometimes have

difficulty crossing deep ruts or climbing out of them (Eddings et al. 1990, Strauss 1990, Howard et al. 1993). Chicks sometimes stand motionless or crouch as vehicles pass by, or do not move quickly enough to get out of the way (Tull 1984, Hoopes et al. 1992, Goldin 1993). Wire fencing placed around nests to deter predators (Rimmer and Deblinger 1990, Melvin et al. 1992) is ineffective in protecting chicks from vehicles because chicks typically leave the nest within a day after hatching and move extensively along the beach to feed (see Table 1).

Vehicles may also significantly degrade piping plover habitat or disrupt normal behavior patterns. They may harm or harass plovers by crushing wrack into the sand and making it unavailable as cover or a foraging substrate, by creating ruts that may trap or impede movements of chicks, and by preventing plovers from using habitat that is otherwise suitable (MacIvor 1990, Strauss 1990, Hoopes et al. 1992, Goldin 1993).

III. GUIDELINES FOR PROTECTING PIPING PLOVERS FROM RECREATIONAL DISTURBANCE

The Service recommends the following protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks.

MANAGEMENT OF NONMOTORIZED RECREATIONAL USES

On beaches where pedestrians, joggers, sun-bathers, picnickers, fishermen, boaters, horseback riders, or other recreational users are present in numbers that could harm or disturb incubating plovers, their eggs, or chicks, areas of at least 50 meter-radius around nests above the high tide line should be delineated with warning signs and symbolic fencing[5]. Only persons engaged in rare species monitoring, management, or research activities should enter posted areas. These areas should remain fenced as long as viable eggs or unfledged chicks are present. Fencing is intended to prevent accidental crushing of nests and repeated flushing of incubating adults, and to provide an area where chicks can rest and seek shelter when large numbers of people are on

[5] "Symbolic fencing" refers to one or two strands of light-weight string, tied between posts to delineate areas where pedestrians and vehicles should not enter.

the beach.

Available data indicate that a 50 meter buffer distance around nests will be adequate to prevent harassment of the majority of incubating piping plovers. However, fencing around nests should be expanded in cases where the standard 50 meter-radius is inadequate to protect incubating adults or unfledged chicks from harm or disturbance. Data from various sites distributed across the plover's Atlantic Coast range indicates that larger buffers may be needed in some locations (see Table 2). This may include situations where plovers are especially intolerant of human presence, or where a 50 meter-radius area provides insufficient escape cover or alternative foraging opportunities for plover chicks.[8]

In cases where the nest is located less than 50 meters above the high tide line, fencing should be situated at the high tide line, and a qualified biologist should monitor responses of the birds to passersby, documenting his/her observations in clearly recorded field notes. Providing that birds are not exhibiting signs of disturbance, this smaller buffer may be maintained in such cases.

On portions of beaches that receive heavy human use, areas where territorial plovers are observed should be symbolically fenced to prevent disruption of territorial displays and courtship. Since nests can be difficult to locate, especially during egg-laying, this will also prevent accidental crushing of undetected nests. If nests are discovered outside fenced areas, fencing should be extended to create a sufficient buffer to prevent disturbance to incubating adults, eggs, or unfledged chicks.

Pets should be leashed and under control of their owners at all times from April 1 to August 31 on beaches where piping plovers are present or have traditionally nested. Pets should be prohibited on these beaches from April 1 through August 31 if, based on observations and experience, pet owners fail to keep pets leashed and under control.

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[8] For example, on the basis of data from an intensive three year study that showed that plovers on Assateague Island in Maryland flush from nests at greater distances than those elsewhere (Loegering 1992), the Assateague Island National Seashore established 200 meter buffers zones around most nest sites and primary foraging areas (Assateague Island National Seashore 1993). Following a precipitous drop in numbers of nesting plover pairs in Delaware in the late 1980's, that State adopted a Piping Plover Management Plan that provided 100 yard buffers around nests on State park lands and included intertidal areas (Delaware Department of Natural Resources and Environmental Control 1990).

Kite flying should be prohibited within 200 meters of nesting or territorial adult or unfledged juvenile piping plovers between April 1 and August 31. Fireworks should be prohibited on beaches where plovers nest from April 1 until all chicks are fledged. (See the Service's February 4, 1997 Guidelines for Managing Fireworks in the Vicinity of Piping Plovers and Seabeach Amaranth on the U.S. Atlantic Coast.)

MOTOR VEHICLE MANAGEMENT

The Service recommends the following minimum protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks on beaches where vehicles are permitted. Since restrictions to protect unfledged chicks often impede vehicle access along a barrier spit, a number of management options affecting the timing and size of vehicle closures are presented here. Some of these options are contingent on implementation of intensive plover monitoring and management plans by qualified biologists. It is recommended that landowners seek concurrence with such monitoring plans from either the Service or the State wildlife agency.

Protection of Nests

All suitable piping plover nesting habitat should be identified by a qualified biologist and delineated with posts and warning signs or symbolic fencing on or before April 1 each year. All vehicular access into or through posted nesting habitat should be prohibited. However, prior to hatching, vehicles may pass by such areas along designated vehicle corridors established along the outside edge of plover nesting habitat. Vehicles may also park outside delineated nesting habitat, if beach width and configuration and tidal conditions allow. Vehicle corridors or parking areas should be moved, constricted, or temporarily closed if territorial, courting, or nesting plovers are disturbed by passing or parked vehicles, or if disturbance is anticipated because of unusual tides or expected increases in vehicle use during weekends, holidays, or special events.

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If data from several years of plover monitoring suggests that significantly more habitat is available than the local plover population can occupy, some suitable habitat may be left unposted if the following conditions are met:

1. The Service OR a State wildlife agency that is party to an agreement under Section 6 of the ESA provides written concurrence with a plan that:

A. Estimates the number of pairs likely to nest on the site based on the past monitoring and regional population trends.

AND

B. Delineates the habitat that will be posted or fenced prior to April 1 to assure a high probability that territorial plovers will select protected areas in which to court and nest. Sites where nesting or courting plovers were observed during the last three seasons as well as other habitat deemed most likely to be pioneered by plovers should be included in the posted and/or fenced area.

AND

C. Provides for monitoring of piping plovers on the beach by a qualified biologist(s). Generally, the frequency of monitoring should be not less than twice per week prior to May 1 and not less than three times per week thereafter. Monitoring should occur daily whenever moderate to large numbers of vehicles are on the beach. Monitors should document locations of territorial or courting plovers, nest locations, and observations of any reactions of incubating birds to pedestrian or vehicular disturbance.

AND

2. All unposted sites are posted immediately upon detection of territorial plovers.

Protection of Chicks

Sections of beaches where unfledged piping plover chicks are present should be temporarily closed to all vehicles not deemed essential. (See the provisions for essential vehicles below.) Areas where vehicles are prohibited should include all dune, beach, and intertidal habitat within the chicks' foraging range, to be determined by either of the following methods:

1. The vehicle free area should extend 1000 meters on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting 2000 meter-wide area of protected habitat for plover chicks should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally-occurring obstacles.

OR

2. The Service OR a State wildlife agency that is party to an agreement under Section 6 of the ESA provides written concurrence with a plan that:

A. Provides for monitoring of all broods during the chick-rearing phase of the breeding season and specifies the frequency of monitoring.

AND

B. Specifies the minimum size of vehicle-free areas to be established in the vicinity of unfledged broods based on the mobility of broods observed on the site in past years and on the frequency of monitoring. Unless substantial data from past years show that broods on a site stay very close to their nest locations, vehicle-free areas should extend at least 200 meters on each side of the nest site during the first week following hatching. The size and location of the protected area should be adjusted in response to the observed mobility of the brood, but in no case should it be reduced to less than 100 meters on each side of the brood. In some cases, highly mobile broods may require protected areas up to 1000 meters, even where they are intensively monitored. Protected areas should extend from the ocean-side low water line to the bay-side low water line or to the farthest

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extent of dune habitat if no bay-side intertidal habitat exists. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally-occurring obstacles. In a few cases, where several years of data documents that piping plovers on a particular site feed in only certain habitat types, the Service or the State wildlife management agency may provide written concurrence that vehicles pose no danger to plovers in other specified habitats on that site.

Timing of Vehicle Restrictions in Chick Habitat

Restrictions on use of vehicles in areas where unfledged plover chicks are present should begin on or before the date that hatching begins and continue until chicks have fledged. For purposes of vehicle management, plover chicks are considered fledged at 35 days of age or when observed in sustained flight for at least 15 meters, whichever occurs first.

When piping plover nests are found before the last egg is laid, restrictions on vehicles should begin on the 26th day after the last egg is laid. This assumes an average incubation period of 27 days, and provides a 1 day margin of error.

When plover nests are found after the last egg has been laid, making it impossible to predict hatch date, restrictions on vehicles should begin on a date determined by one of the following scenarios:

1) With intensive monitoring: If the nest is monitored at least twice per day, at dawn and dusk (before 0600 hrs and after 1900 hrs) by a qualified biologist, vehicle use may continue until hatching begins. Nests should be monitored at dawn and dusk to minimize the time that hatching may go undetected if it occurs after dark. Whenever possible, nests should be monitored from a distance with spotting scope or binoculars to minimize disturbance to incubating plovers.

OR

2) Without intensive monitoring: Restrictions should begin on May 15 (the earliest probable hatch date). If the nest is discovered after May 15, then restrictions should start immediately.

If hatching occurs earlier than expected, or chicks are discovered from an unreported nest, restrictions on vehicles should begin immediately.

If ruts are present that are deep enough to restrict movements of plover chicks, then restrictions on vehicles should begin at least 5 days prior to the anticipated hatching date of plover nests. If a plover nest is found with a complete clutch, precluding estimation of hatching date, and deep ruts have been created that could reasonably be expected to impede chick movements, then restrictions on vehicles should begin immediately.

Essential Vehicles

Because it is impossible to completely eliminate the possibility that a vehicle will accidently crush an unfledged plover chicks, use of vehicles in the vicinity of broods should be avoided whenever possible. However, the Service recognizes that life-threatening situations on the beach may require emergency vehicle response. Furthermore, some "essential vehicles" may be required to provide for safety of pedestrian recreationists, law enforcement, maintenance of public property, or access to private dwellings not otherwise accessible. On large beaches, maintaining the frequency of plover monitoring required to minimize the size and duration of vehicle closures may necessitate the use of vehicles by plover monitors.

Essential vehicles should only travel on sections of beaches where unfledged plover chicks are present if such travel is absolutely necessary and no other reasonable travel routes are available. All steps should be taken to minimize number of trips by essential vehicles through chick habitat areas. Homeowners should consider other means of access, eg. by foot, water, or shuttle services, during periods when chicks are present.

The following procedures should be followed to minimize the probability that chicks will be crushed by essential (non-emergency) vehicles:

1. Essential vehicles should travel through chick habitat areas only during daylight hours, and should be guided by a qualified monitor who has first determined the location of all unfledged plover chicks.

2. Speed of vehicles should not exceed five miles per hour.

3. Use of open 4-wheel motorized all-terrain vehicles (ATVs) or non-motorized all-terrain bicycles is recommended whenever possible for monitoring and law enforcement because of the improved visibility afforded operators.

4. A log should be maintained by the beach manager of the date, time, vehicle number and operator, and purpose of each trip through areas where unfledged chicks are present. Personnel monitoring plovers should maintain and regularly update a log of the numbers and locations of unfledged plover chicks on each beach. Drivers of essential vehicles should review the log each day to determine the most recent number and location of unfledged chicks.

Essential vehicles should avoid driving on the wrack line, and travel should be infrequent enough to avoid creating deep ruts that could impede chick movements. If essential vehicles are creating ruts that could impede chick movements, use of essential vehicles should be further reduced and, if necessary, restricted to emergency vehicles only.

SITE-SPECIFIC MANAGEMENT GUIDANCE

The guidelines provided in this document are based on an extensive review of the scientific literature and are intended to cover the vast majority of situations likely to be encountered on piping plover nesting sites along the U.S. Atlantic Coast. However, the Service recognizes that site-specific conditions may lead to anomalous situations in which departures from this guidance may be safely implemented. The Service recommends that landowners who believe such situations exist on their lands contact either the Service or the State wildlife agency and, if appropriate, arrange for an on-site review. Written documentation of agreements regarding departures from this guidance is recommended.

In some unusual circumstances, Service or State biologists may recognize situations where this guidance provides insufficient protection for piping plovers or their nests. In such a case, the Service or the State wildlife agency may provide written notice to the landowner describing additional measures recommended to prevent take of piping plovers on that site.

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Table 1. Summary of Chick Mobility Data

Source	Location	Data
Patterson 1988 (p.40)	Maryland and Virginia	18 of 38 broods moved to feeding areas more than 100 meters from their nests; 8 broods moved more than 600 meters (distance measured parallel to wrackline).
Cross 1989 (p.23)	Virginia	At three sites, observers relocated broods as mean distances from their nests of 133 m +/-97m (64 observations, 14 broods); 32 m +/-7 m (8 observations, 3 broods); and 492 m +/-281 m (12 observations, 4 broods).
Cross et al. 1990 (p.12)	North Carolina	Observations of 11 broods averaged 212 m from their nests; 3 broods moved 400-725 m from nest sites.
Strauss 1990 (p.33)	Massachusetts	10 chicks moved more than 200 m during first 5 days post-hatch while 19 chicks moved less than 200 meters during same interval.
Loegering 1992 (p.72)	Maryland	Distances broods moved from nests during first 5 days post-hatch averaged 195 m in May habitat (n=10), 141 m in Interior habitat (n=36), and 131 m in Ocean habitat (n=41). By 21 days, average movement in each habitat had, respectively, increased to 830 m (n=1), 464 m (n=10), and 187 m (n=40). One brood moved more than 1000 m from its nest.
Melvin et al. 1994	Massachusetts and New York	In 14 incidents in which 18 chicks were killed by vehicles, chicks were run over ≤ 10 m in ≥ 300 m from their nests. In 7 of those instances, mortality occurred ≥ 200 m from the nest.

Table 2. Summary of Data on Distances at which Piping Plovers React to Disturbance

Source	Location	Data
Flushing of Incubating Birds by Pedestrians		
Flemming et al. 1988 (p.326)	Nova Scotia	Adults usually flushed from the nests at distances >40 m, however, great variation existed and reaction distances as great as 210 m were observed.
Cross 1990 (p.47)	Virginia	Mean flushing distances in each of two years were 47 m (n=141, range = 5 m to 300 m) and 21 m (n=211, range = 2 m to 100 m).
Lingerny 1992 (p.61)	Maryland	Flushing distances averaged 78 m (n=43); range was 20 m to 174 m. Recommended use of 225 m disturbance buffers on his site.
Cross and Terwilliger 1993	Virginia	Mean flushing distance for all years on all sites (Virginia plover sites, 1986-91) was 63 m (n=291, SD=51), range = 7 m to 200 m). Differences among years were not significant, but differences among sites were.
Hooper, 1993 (p.72)	Massachusetts	Mean flushing distance for incubating plovers was 34 m (n=31)
Disturbance to Non-incubating Birds		
Hooper 1993 (p.89)	Massachusetts	Mean response distance (all ages, all behaviors) was 23 m for pedestrian disturbances (range = 10 m to 40 m); 40 m for vehicles (range = 30 m to 70 m); 46 m for dogs/pets (range = 20 m to 100 m); and 83 m for kites (range = 60 m to 120 m).
Goldin 1993b (p.74)	New York	Average flushing distance for adult and juvenile plovers was 18.7 m for pedestrian disturbances (n=583); 19.5 m for joggers (n=183), and 20.4 m for vehicles (n=111). Pedestrians caused chicks to flush at an average distance of 20.7 m (n=175), joggers at 32.3 m (n=37), and vehicles at 19.3 m (n=7). Tolerance of individual birds varied; one chick moved 240 m in direct response to 20 disturbances in 1 hour.

GUIDELINES FOR MANAGING RECREATIONAL USE OF BEACHES TO PROTECT PIPING PLOVERS, TERNS, AND THEIR HABITATS IN MASSACHUSETTS

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I. INTRODUCTION

The Massachusetts Division of Fisheries and Wildlife (the Division) has developed the following guidelines to assist beach managers and property owners with protecting piping plovers, least terns, common terns, roseate terns, arctic terns, and their habitats. Implementing these guidelines will help beach managers and property owners avoid potential violations of the Massachusetts Endangered Species Act (MGL c. 131A) and its implementing regulations (321 CMR 10.00) involving recreational use of beaches used by piping plovers and terns for breeding and nesting habitat.

The Division intends to apply these guidelines in its review of Notices of Intent, pursuant to the Massachusetts Wetlands Protection Act regulations (310 CMR 10.37), for vehicular use of beaches where piping plovers and terns occur.

The Department of Environmental Protection has developed a set of recommended conditions for barrier beach management to be used by municipal conservation commissions in drafting Orders of Conditions. In addition, the Massachusetts Barrier Beach Task Force, coordinated by the Office of Coastal Zone Management, has developed a comprehensive set of guidelines covering the full range of barrier beach management issues. The following guidelines should be read and applied in conjunction with these other documents.

Users of these piping plover and tern guidelines are advised that they do not supersede any law, regulation, or official policy of this or any other agency. Rather, these guidelines are intended to complement other regulatory review processes regarding recreational activities on beaches by providing a standard set of scientifically based management recommendations.

This document contains five sections: 1) an introduction, 2) summaries of life histories of these species and threats to their continued existence in the state, 3) a summary of pertinent laws and regulations, 4) guidelines for managing and protecting plovers, terns, and their habitats, and 5) literature cited.

In these guidelines, the Division has sought to provide the necessary protection to piping plovers and terns without

unnecessarily restricting appropriate access along all of the state's beaches. The Division has a long history of promoting the rights of citizens to enjoy a variety of outdoor pursuits, provided that they do not jeopardize the state's wildlife resources. The Division has worked to facilitate fishing and hunting access statewide and has supported the common law right of access to the shorelines of the coast and "Great Ponds" for the purposes of fishing and fowling. Although these guidelines make it clear that it will be necessary at times to restrict vehicular access temporarily on beaches where and when piping plovers and terns are present, the Division will only support such restrictions when it is necessary to protect the habitat, nests, and unfledged chicks of plovers and terns. The Division will continue to seek and consider management measures that offer maximum flexibility in balancing recreational use with protection of rare species and their habitats. Even when vehicular access is restricted, the Division will normally support continued access to beaches for fishermen and other recreational users by foot and by boat.

II. SPECIES STATUS, LIFE HISTORY, AND THREATS

Piping Plover

Piping plovers are small, sand-colored shorebirds that nest on sandy, coastal beaches from South Carolina to Newfoundland. The U.S. Atlantic coast population is listed as "Threatened" by the U.S. Fish and Wildlife Service under provisions of the U.S. Endangered Species Act of 1973 (U.S. Fish and Wildlife Service 1988), and was estimated at 780 pairs in 1992 (U.S. Fish and Wildlife Service 1992). In Massachusetts, the piping plover is also listed as "Threatened" by the Massachusetts Division of Fisheries and Wildlife under provisions of the Massachusetts Endangered Species Act. In 1992, 213 pairs of piping plovers nested on Massachusetts beaches (Melvin 1992).

Piping plovers nest on coastal beaches above the high-tide line, sand flats at the end of sand spits, gently sloping foredunes, and in blow-outs or washover areas between or behind coastal dunes. They may also nest where sandy dredged material has been deposited. Nests are simple scrapes in the sand or mixtures of sand, gravel, and shells. Nests are placed on open sand or in patches of sparse to moderately dense beach grass and other dune vegetation. Piping plovers depend on natural processes of beach erosion and accretion through wind and wave action to maintain suitable nesting habitat.

Piping plovers return to nesting beaches in Massachusetts

from mid-March to early May. Males establish and defend territories and court females. Nesting may occur from mid-April through late July. Clutch size is usually four eggs, and eggs are usually incubated for 27-28 days before hatching. Piping plovers fledge only a single brood per season, but may renest several times if previous nests are lost. Chicks are precocial and able to move about within hours after hatching. They may move hundreds of yards from the nest site during their first week of life. Chicks remain together with one or both parents until they fledge (are able to fly) at 25 to 35 days of age. Depending on date of hatching, unfledged chicks may be present from late May until mid-August, although most fledge by the end of July. Adults and chicks feed on amphipods, marine worms, flies, and other invertebrates. The most important feeding habitats for both adults and chicks are intertidal areas and wrack (seaweed, vegetation, shells, and other organic debris deposited on the beach by tides and storms) (Gibbs 1986, Goldin et al. 1990, Hoopes et al. 1992).

Sandy beaches that provide nesting habitat for piping plovers are also attractive recreational habitats for people and their pets. Human recreational activities can be a source of both disturbance and direct mortality to piping plovers (Blodget 1990, Melvin et al. 1991). People on beaches may inadvertently crush eggs, cause nests to be abandoned, and disturb or displace unfledged chicks. Unleashed dogs may chase adults, kill chicks, and eat eggs. Kites and fireworks are highly disturbing to piping plovers (Hoopes et al. 1992; Howard et al. 1993).

Unrestricted use of motorized vehicles on beaches is a serious threat to piping plovers and their habitats. Vehicles can crush both eggs and chicks (Burger 1986, Patterson 1988, Strauss 1990, Melvin et al. 1991). In Massachusetts, biologists documented 7 incidents in which 9 chicks were killed by vehicles between 1989 and 1992 (Melvin et al. 1993). Many biologists that monitor and manage piping plovers believe that many more chicks are killed by vehicles than are found and reported. On sections of Massachusetts beaches used by vehicles during nesting and brood-rearing periods, breeding plovers are generally either absent or less abundant than expected given available nesting and feeding habitat. In contrast, plover abundance and productivity has increased on beaches where vehicle restrictions during chick-rearing periods have been combined with protection of nests from predators.

Typical behaviors of piping plover chicks increase their vulnerability to vehicles (Melvin et al. 1993). Chicks frequently move between the upper berm or foredune and feeding habitats in the wrack line and intertidal zone. These movements place chicks in the paths of vehicles driving along the berm or

through the intertidal zone. Chicks stand in, walk, and run along tire ruts, and sometimes have difficulty crossing deep ruts or climbing out of them. Chicks sometimes stand motionless or crouch as vehicles pass by, or do not move quickly enough to get out of the way. Wire fencing placed around nests to deter predators is ineffective in protecting chicks from vehicles because chicks typically leave the nest within a day after hatching and move extensively along the beach to feed.

Vehicles also degrade piping plover habitat by crushing wrack into the sand and making it unavailable as cover or a foraging substrate, by creating ruts that may trap or impede movements of chicks, and by causing disturbance that may prevent plovers from using habitat that is otherwise suitable (Goldin et al. 1990, Strauss 1990, Melvin et al. 1993).

Least Tern

Least terns are small, white and black seabirds that nest along Atlantic coast beaches from southern Maine to Florida. The least tern is listed as a "Species of Special Concern" by the Division of Fisheries and Wildlife under provisions of the Massachusetts Endangered Species Act. An estimated 2,642 pairs nested at 51 sites in Massachusetts in 1992 (Blodget 1992).

Least terns nest in habitats that are similar to those of the piping plover, and the two species often nest near each other. Least terns arrive in Massachusetts in early May, engage in elaborate courtship rituals, mate, and quickly establish nesting colonies. Actual nesting occurs from about the third week of May to mid-July. Nesting colonies range in size from several pairs to over 500 pairs. Nests are shallow "scrapes" in the sand, usually in sandy areas devoid of vegetation, but sometimes in areas of sparse beach grass, beach pea, and other dune vegetation. Least terns, like piping plovers, have nested along the Atlantic coast for thousands of years and depend on natural processes of beach and dune erosion and accretion to maintain their habitats.

Clutches consist of 1-3 eggs and incubation averages 21 to 23 days. Least terns are single-brooded, but will renest multiple times if previous nests are lost. Chicks are precocial and may move considerable distances along the beach before fledging, which occurs after 20-22 days. Adults deliver fish caught in the surrounding waters to chicks. Soon after chicks are able to fly, least terns gather in pre-migratory flocks and depart southward; most are gone before the end of August.

Least terns are vulnerable to disturbance from humans, pets,

and vehicles during periods of courtship and egg-laying in May and June. Similar to piping plovers, incubating least tern adults, eggs, and chicks are extremely cryptic. Prolonged or repeated disturbance at colonies can lead to egg and chick loss from exposure, predation, or abandonment. Least tern chicks are also vulnerable to mortality caused by off-road vehicles, and may stand or crouch in or walk and run along vehicle ruts.

Common, Roseate, and Arctic Terns

These three similar species of white and black seabirds nest together in mixed-species colonies. All are slightly larger than the least tern. The common tern is indeed the most "common" of the group. In 1992, 8,600 pairs were estimated at 35 sites in Massachusetts, although only 9 of those colonies exceeded 100 pairs (Blodget 1992). The arctic tern, at the southern edge of its natural range in Massachusetts, has been declining since the 1950's and reached an all-time low of only 8 pairs in 1992. Both of these species are listed by the Massachusetts Division of Fisheries and Wildlife as "Species of Special Concern" under provisions of the Massachusetts Endangered Species Act.

The Northeastern population of the roseate tern is listed as "Endangered" by both the U.S. Fish and Wildlife Service under the U.S. Endangered Species Act of 1973 (U.S. Fish and Wildlife Service 1989), and the Massachusetts Division of Fisheries and Wildlife under provisions of the Massachusetts Endangered Species Act. Of an estimated 1,412 pairs in Massachusetts in 1992, 1,375 pairs (97%) nested on Bird Island in Buzzards Bay (Blodget 1992). The rest were scattered among large colonies of common terns.

These three species of larger terns prefer to nest on offshore islands and remote tips of barrier beaches. Unfortunately, gulls have usurped most optimal nesting sites since the 1950's, forcing terns to nest at a limited number of secondary inshore sites where they are more exposed to human disturbance and a host of land-based predators.

The life histories of these three species of terns are generally similar. Exemplifying the three, common terns select dune areas with moderate to dense stands of beach grass and other dune vegetation. Birds arrive from the south in early May and select colony sites before the end of May. Ritualized courtship and pair formation occur on the beach and sandflats adjacent to the colony site. Nesting colonies range from a few to over 4,000 pairs. Nests are usually scrapes in the sand lined with beach grass and seaweed. Clutches of 2-3 eggs are laid and both parents share incubation duties for about 23 days. Young are precocial but are fed and brooded by adults. Diets of these

terns are almost exclusively fish. As the young approach fledging at about 28 days, they congregate in rearing or "nursery" areas on broad expanses of beach and sand flats, where they loaf and are fed by adults. At some sites, thousands of young terns may be present in these nursery areas from late July through mid-August. After mid-August, most terns have fledged and all three species gather at staging areas prior to departing for winter quarters by the end of August.

Prolonged or repeated disturbance at nesting colonies or nursery areas of common, arctic, or roseate terns can lead to egg and chick loss from exposure, predation, or abandonment. Eggs and young chicks tend to be less subject to mortality from vehicles because they occur more often in dune areas, but older chicks are sometimes run over when they move onto the outer beach prior to fledging. Older chicks have also been found dead, tangled in kite string.

III. MASSACHUSETTS LAW

This section is provided to give a brief overview of provisions of the Massachusetts Wetlands Protection Act and Endangered Species Act that are pertinent to the management of piping plovers, terns, and their habitats. The reader is strongly advised to read the official texts of the current laws and regulations cited below.

Massachusetts Wetlands Protection Act (MGL c. 131 s. 40)

The Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife (the Program) acts as the scientific authority to determine what is actual habitat and to provide an opinion about whether proposed activities subject to the Wetlands Protection Act will have adverse effects on rare wetlands wildlife habitat. Opinions issued by the Program are presumed to be correct, although this presumption is rebuttable and may be overcome upon a clear showing to the contrary.

Massachusetts Endangered Species Act (MGL c. 131A)

The Massachusetts Endangered Species Act (MESA) and regulations (321 CMR 10.00) are administered by the Massachusetts Division of Fisheries and Wildlife. The Act prohibits the "taking" of any species of animal or plant listed as

"Endangered", "Threatened", or "Species of Special Concern" in Massachusetts. For animals, "taking" is defined as: "to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding, or migratory activity or attempt to engage in any such conduct, or to assist such conduct". Regulations implementing the Act state further that: "All state agencies shall utilize their authorities in furtherance of the purposes of MESA and these regulations; review, evaluate and determine the impact on Endangered, Threatened and Special Concern species or their habitats of all works, projects, or activities conducted by them; and use all practicable means and measures to avoid or minimize damage to such species or their habitats." This includes "any work, project, or activity either directly undertaken by a state agency, or if undertaken by a person, which seeks the provision of financial assistance by an agency or requires the issuance of permits by an agency".

IV. MANAGEMENT GUIDELINES

VEHICLE MANAGEMENT

Protection of Nests and Nesting Habitat

On beaches where vehicles will be driven, all areas of suitable piping plover nesting habitat, as determined by the Division, should be identified and delineated with posts and warning signs or symbolic fencing on or before April 1 each year. Suitable nesting habitat for all species of terns should be identified and so delineated on or before May 15 each year.

All vehicular access into or through delineated nesting habitat should be prohibited. However, prior to hatching, vehicles may pass by such areas along designated vehicle corridors established along the outside edge of plover and tern nesting habitat. Vehicles may also park outside delineated nesting habitat, if beach width and configuration and tidal conditions allow. Vehicle corridors or parking areas should be moved, constricted, or temporarily closed if territorial, courting, or nesting plovers or terns are disturbed by passing or parked vehicles, or if disturbance is anticipated because of unusual tides or expected increases in vehicle use during weekends, holidays, or special events.

Protection of Chicks and Chick Habitat

Sections of beaches where unfledged piping plover or tern chicks are present should be temporarily closed to all vehicles not deemed essential. (See the provisions for essential vehicles below.)

When unfledged plover chicks are present, vehicles should be prohibited from all dune, beach, and intertidal habitat within 100 yards of either side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting 200 yard-wide area of protected habitat for plover chicks should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally-occurring obstacles. If unfledged plover chicks move outside the original 200 yard-wide area of protected habitat, then the boundaries of the protected area should be adjusted to provide at least a 100 yard buffer between chicks and vehicles.

When unfledged least tern chicks are present, vehicles should be prohibited from all dune, beach, and intertidal habitat within 100 yards of either side of lines drawn through the outermost nests in the colony and perpendicular to the long axis of the beach. The resulting area of protected habitat for least tern chicks should extend from the ocean-side low water line to the bay-side low water line, or to the farthest extent of dune habitat if no bay-side intertidal zone exists. If unfledged chicks move outside the original protected area, then the boundaries of the protected area should be adjusted to provide at least a 100 yard-wide buffer between unfledged chicks and vehicles. However, vehicles may pass through any portions of the protected area considered inaccessible to least tern chicks because of distance, steep topography, dense vegetation, or other naturally-occurring obstacles. Because least tern chicks disperse from nests shorter distances and at older ages than piping plover chicks, under some circumstances it may be possible to allow passage of vehicles through portions of protected least tern chick habitat if, in the opinion of the Division, this can occur without substantially increasing threats to least tern chicks or their habitats.

Timing of Vehicle Restrictions in Chick Habitat

Restrictions on use of vehicles in areas where unfledged plover or tern chicks are present should begin on or before the

date that hatching begins and continue until chicks have fledged. For purposes of vehicle management, plover chicks are considered fledged at 35 days of age or when observed in flight, whichever occurs first. Tern chicks are considered fledged when they are capable of flight.

When piping plover nests are found before the last egg is laid, restrictions on vehicles should begin on the 28th day after the last egg is laid. This assumes an average incubation period of 27 days, and provides a 1 day margin of error.

When plover nests are found after the last egg has been laid, making it impossible to predict hatch date, restrictions on vehicles should begin on a date determined by 1 of 3 scenarios:

1) If a plover nest found with a complete clutch is monitored twice per day, at dawn and dusk (before 0800 hrs and after 1900 hrs), vehicle use may continue until hatching begins. Nests should be monitored at dawn and dusk to minimize the time that hatching may go undetected if it occurs after dark. Whenever possible, nests should be monitored from a distance with spotting scope or binoculars to minimize disturbance to incubating plovers.

2) If a plover nest is found with a complete clutch before May 22 (the earliest recorded hatch date for piping plovers in Massachusetts), and is not monitored twice per day, at dawn and dusk, then restrictions on vehicles should begin May 22.

3) If a plover nest is found with a complete clutch on or after May 22, and is not monitored twice per day, at dawn and dusk, then restrictions on vehicles should begin immediately.

If hatching occurs earlier than expected, or chicks are discovered from an unreported nest, restrictions on vehicles should begin immediately.

If, in the opinion of the Division, ruts are present that are deep enough to restrict movements of plover chicks, or vehicle impacts on wrack are so severe that wrack must be allowed to accumulate naturally prior to hatching, then restrictions on vehicles should begin at least 5 days prior to the anticipated hatching date of plover nests. If a plover nest is found with a complete clutch, precluding estimation of hatching date, and availability of wrack has been substantially reduced by vehicle passage, or deep ruts have been created that could reasonably be expected to impede chick movements, then restrictions on vehicles should begin immediately.

Restrictions on use of vehicles in least tern chick habitat should begin as soon as hatching begins (as early as June 12). Restrictions may begin later if, in the opinion of the Division, tern chicks are not endangered by vehicles because of distance or intervening steep terrain, dense vegetation, or other naturally-occurring barriers.

Areas of dune, beach, or intertidal habitat used as nursery areas by unfledged or recently fledged tern chicks, as identified by the Division, should be delineated with posts, warning signs or symbolic fencing not later than June 21. All access by vehicles into posted tern nursery areas should be prohibited while unfledged or recently-fledged tern chicks are present in these areas, until it is determined that use of nursery areas by young terns has ended (i.e. young terns are no longer being fed by adult terns).

Essential Vehicles

Essential vehicles, as defined by municipal conservation commissions pursuant to the Guidelines for Barrier Beach Management in Massachusetts developed by the Massachusetts Barrier Beach Task Force, should only travel on sections of beaches where unfledged plover or tern chicks are present if such travel is absolutely necessary and no other reasonable travel routes are available. Essential vehicles should travel through chick habitat areas only during daylight hours, except in emergencies, and should be guided by a qualified monitor who has first determined the location of all unfledged plover and tern chicks. All steps should be taken to minimize number of trips by essential vehicles through chick habitat areas. Use of open, 3 or 4-wheel motorized all-terrain vehicles (ATVs) or non-motorized all-terrain bicycles is recommended whenever possible for monitoring and law enforcement because of the improved visibility afforded operators. Homeowners should consider other means of access, eg. by foot, water, or shuttle services, during periods when chicks are present. A log should be maintained by the beach manager of the date, time, vehicle number and operator, and purpose of each trip through areas where unfledged chicks are present. Personnel monitoring plovers and terns should maintain and regularly update a log of the numbers and locations of unfledged plover and tern chicks on each beach. Drivers of essential vehicles should review the log each day to determine the most recent number and location of unfledged chicks.

Travel by essential vehicles should avoid the wrack line and should be infrequent enough to avoid creating deep ruts that could impede chick movements. If essential vehicles are substantially reducing availability of wrack or are creating ruts

that could impede chick movements, use of essential vehicles should be further reduced and, if necessary, restricted to only emergency vehicles.

MANAGEMENT OF OTHER RECREATIONAL USES

The activities discussed in this section are not subject to the jurisdiction of the Wetlands Protection Act because they are not considered to be alterations of wetland resource areas. The following guidelines should only be applied in reference to the Massachusetts Endangered Species Act.

On beaches where pedestrians, joggers, sun-bathers, picnickers, fishermen, boaters, horseback riders, or other recreational users will be present in numbers that could harm or disturb incubating plovers or terns, their eggs, or chicks, refuge areas of at least 50 yard-radius around nests and above the high tide line should be delineated with warning signs and symbolic fencing. Only persons engaged in rare species monitoring, management, or research activities should enter refuge areas. Refuge areas should remain fenced as long as viable eggs or unfledged chicks are present.

Refuge areas around nests should be expanded if a 50 yard-radius is deemed inadequate to protect incubating adults or unfledged chicks from harm or disturbance. This may include situations where plovers or terns are especially intolerant of human presence, or where a 50 yard-radius refuge provides insufficient escape cover or alternative foraging opportunities for plover chicks. If nests are discovered outside fenced areas, fencing should be extended to create a sufficient buffer to prevent harm or disturbance to incubating adults, eggs, or unfledged chicks. On some beaches where plovers and terns have traditionally nested or where suitable habitat occurs, it may be necessary to symbolically fence portions of habitat during March or April, prior to plover nesting, or during May, prior to tern nesting, if, in the opinion of the Division, failure to do so could discourage plovers or terns from nesting as a result of disturbance from human use.

Rearing or nursery areas used by unfledged or recently fledged tern chicks, as identified by the Division, should be delineated with posts, warning signs, or symbolic fencing not later than June 21. Only persons engaged in rare species monitoring, management, or research should enter posted or fenced tern nursery areas while unfledged tern chicks or tern chicks being fed by adult terns are present, although individuals may pass by outside these areas. Such nursery areas may be re-opened

when all tern chicks have fledged and are not being fed by adult terns.

Pets should be leashed and under control of their owners at all times from April 1 to August 31 on beaches where piping plovers or terns are present or have traditionally nested. Pets should be prohibited on these beaches from April 1 through August 31 if, based on observations and experience, pet owners fail to keep pets leashed and under control.

Kite flying should be prohibited within 200 yards of nesting or territorial adult or unfledged juvenile piping plovers or terns, from April 1 to August 31.

Fireworks should be prohibited on beaches where plovers or terns nest from April 1 to August 31.

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Appendix J



Amanda Boyd/USFWS

Double-crested cormorants

Summary of Public Comments and Service Responses on the Draft Comprehensive Conservation Plan and Environmental Assessment for the Nantucket National Wildlife Refuge

- Introduction
- Summary of Comments Received

Introduction

In August 2011, we completed the "Nantucket National Wildlife Refuge Draft Comprehensive Conservation Plan and Environmental Assessment" (draft CCP/EA). That draft refuge plan outlined three alternatives for managing the refuge over the next 15 years, and identified alternative B as the "Service-preferred alternative."

We released the draft plan for 60 days of public review and comment from August 2 to October 1, 2011. The notice of availability of the draft CCP/EA was printed in the *Federal Register* on August 2, 2011. It indicated that there would be a 30-day comment period, which is the standard amount of time given to CCP reviews. Refuge staff knew that August was a difficult time to ensure that residents would be able to review and provide comments just prior to the Labor Day holiday, so the comment period was extended another month. We distributed a press release to local and regional newspapers on August 9, 2011 extending the comment period through October 1, 2011 and announcing that there would be two public meetings on September 15, 2011 at the Nantucket Inn. We sent a planning update via regular mail and e-mail to all the names on our mailing list, which included individuals and organizations that had attended our October 2008 scoping meetings. We also informed members of the Nantucket Anglers Club about the upcoming public meetings while at a September 8, 2011 meeting about seals held at the Nantucket Anglers Club. An article about the draft CCP/EA appeared in *The Inquirer and Mirror* on September 15, 2011. It appears that this was the first time a local newspaper provided information about the public meeting, and several comments were received in writing or at the meeting about insufficient meeting notice. We regret that there was not more timely notification in the newspaper, but we followed normal procedures for notifying the press through the issuance of a press release well before the public meeting dates, the general public through the *Federal Register* notice, and the public that had previously engaged in our planning process through the planning update.

The public meetings were held in Nantucket at the Nantucket Inn on September 15, 2011. The afternoon meeting had a total of 19 people and the evening meeting had a total of 26 people. We also received comments via e-mail or in writing separate from the public meetings. We evaluated all letters and e-mails sent to us during the comment period, along with comments recorded at our two public meetings. This document summarizes all comments received, and provides our responses to them.

Based on our analysis in the draft CCP/EA, and our evaluation of comments, we made minor modifications to alternative B, and recommended it to our Regional Director for implementation. It is that modified alternative B which is detailed in this CCP. Our modifications include additions, corrections, or clarifications of our preferred management actions. We have determined that none of these modifications warrants publishing a revised or amended draft CCP/EA before publishing the CCP.

The minor changes we made include the following:

- We provided updated information on numbers of seals, common terns, roseate terns, and habitat acreage on the refuge.
- We changed the dates for staging tern closures to mid- to late July thorough mid-September. This change reflects new information received during the past two summers of field observation by refuge staff.
- We provided updated information about visitor use numbers and activities.
- We removed the threshold for seal protection after consultation with the National Marine Fisheries Service.
- We provided updated socioeconomic information.

Our Regional Director selected alternative B for implementation. She also determined that a Finding of No Significant Impact (FONSI) is justified. She made the decision after:

- Reviewing all the comments received on the draft CCP/EA, and our response to those comments; and,
- Affirming that the CCP actions support the purpose and need for the CCP, the purposes for which the refuge was established, help fulfill the mission of the Refuge System, comply with all legal and policy mandates, and work best toward achieving the refuge's vision and goals.

Concurrent with release of the approved CCP, we are publishing a notice of the availability in the *Federal Register*. That notice will complete the planning phase of the CCP process, and we can begin its implementation phase.

Summary of Comments Received

The public comment period for the draft CCP/EA resulted in a total of 38 comment submissions including comments from the following organizations:

- Alliance to Protect Nantucket Sound
- County of Nantucket County Commissions
- Maria Mitchell Association
- Massachusetts Division of Fisheries and Wildlife
- Nantucket Conservation Foundation, Inc.
- Nantucket Island School of Design
- National Park Service
- The Trustees of Reservations
- Town of Nantucket Board of Selectmen

In the discussion below we address all substantive comments received. In our responses, we may refer the reader to other places in the document where we address the same comment. Directly beneath each subject heading, you will see a list of unique letter identification numbers that correspond to the person, agency, or organization that submitted the comment. The cross-reference list appears at the end of this appendix.

In several instances, we refer to specific text in the draft CCP/EA, and indicate how the CCP was changed in response to comments. Both the draft CCP/EA and final CCP are available online through a link at the refuge's Web site at: *http://www.fws.gov/northeast/nantucket/* (accessed June 2012) and the Northeast Regional CCP Web site at: *http://www.fws.gov/northeast/planning/refugeccps.html* (accessed June 2012). You may also request a CD-ROM or a print copy from refuge headquarters at:

Nantucket National Wildlife Refuge
c/o Eastern Massachusetts NWR Complex
73 Weir Hill Road
Sudbury, MA 01776
Email: *northeastplanning@fws.gov*

Habitat and Species Management

Current Seal Population (Letter ID# 5, 6, 26)

Comments: Commenters expressed concern about the impact of seal populations on biological diversity, environmental conditions, and fish stocks. Population numbers of seals are a concern to fishermen. The Seal Abatement Coalition has gathered over 500 signatures on a petition seeking relief from the protections afforded gray seals under the Marine Mammal Protection Act.

Response: We do not have any information to date that suggests the number of seals using the refuge are negatively impacting biological diversity, environmental conditions, or fish stocks, but we welcome the sharing of reports or data that address these concerns. Increasing seal numbers on the refuge are not necessarily indicative of an increasing population of seals in the Northeast, as local seal haul-out sites can change seasonally and between years. In 2011, the National Oceanic and Atmospheric Administration (NOAA) began including Nantucket NWR in their aerial flights that are used to track seal numbers and distribution, and this will provide a sense of overall importance of Nantucket NWR compared to other sites in Massachusetts. We also hope to continue monitoring seal use on the refuge.

We do not have specific diet information for seals that are using Nantucket NWR as a haul-out site. Seals are generalists however, and will consume a wide variety of prey items, focusing on abundant species. We have updated chapter 3 in the final CCP to provide additional information about seal diet.

Comment: Local fishermen note that the policy of encouraging seals to haul-out in the protected area on the refuge has resulted in an increase in seal population, which in turn, has had a socioeconomic impact on fishing.

Response: The Service does not have a policy of encouraging seals to haul-out on the refuge, but it is likely that management actions taken to ensure visitor safety and comply with the Marine Mammal Protection Act have resulted in more use of the refuge by seals. The closure for seals was first initiated in 2008, primarily because of concern for visitor's safety after visitors were repeatedly seen approaching the seals at an unsafe distance. It appears that more seals are generally using this site than in past years, though there is a strong seasonality component. Numbers of seals vary within and between years, and depend on a variety of other factors beyond the presence of a closure, including the availability of forage fish and habitat availability at other traditionally used sites.

There is no information available that indicates that the number of seals on the refuge has specifically had a socioeconomic impact on Nantucket or on the fishing industry. We have not conducted any controlled visitation counts to determine precisely what the impact of the seal and bird closures are on the number of anglers and angler days on the refuge, nor do we intend to as we do not have sufficient staff resources to conduct an evaluation of this type. In general, there does not appear to be a noticeable decrease in the number of anglers on the refuge on days when the refuge is accessible to oversand vehicles. The refuge and adjoining lands on the Coskata-Coatue Peninsula provides considerable access to anglers.

Comment: It is essential that the Service develop a management plan that balances the needs of wildlife with the traditional use of beaches for surfcasting.

Response: The Service will prepare a visitor services plan as a step-down management plan for the refuge. The plan will be written to clarify visitor access and use while maintaining wildlife closure areas for haul-out, nesting, feeding, and staging areas. It is the mission of the Service to provide wildlife-dependent recreation so long as it does not conflict with the needs of wildlife or habitat protection of Federal trust species. The CCP includes a set of compatibility determinations which detail the wildlife-dependent, recreational uses authorized on the refuge, as well as nonpriority public uses. It is the Service's intent to allow for these uses to occur as much as possible. However, some restrictions in the use seasonally or spatially, as outlined in the CCP, are necessary to minimize conflict with wildlife use of the refuge during certain times of the year. The Service will install visually aesthetic signage in 2012 to inform the public of areas that are closed seasonally to encourage minimizing wildlife disturbance.

Historic Seal Population (Letter ID# 33)

Comment: A comment was given by one participant regarding the existing and historical population of seals. "[Nantucket] NWR must point out that seals have historically been in much greater abundance, but were effectively extirpated from this range due to slaughter for bounty."

Response: Gray seals were found along the northwestern Atlantic coast until the 17th century, and were considered locally extinct until the 1980s. Chapter 3 has been amended to provide more information about seal populations.

Buffer Zone (Letter ID# 4, 18)

Comment: Commenters stated that there has not been a premier fishing location in 8 years because of seals. The closure has increased tern and seal populations. Perception is that access is being cut off because of growing seal and tern populations. One commenter asked, "Can [the Service] just create a buffer area around the terns?"

Response: The Service as an affirmative responsibility to protect wildlife and comply with Federal laws on the refuge. We started closing the haul-out site at the tip of Great Point in 2008 to protect both seals and visitors. The Service must maintain a 150-foot buffer around seals to comply with the Marine Mammal Protection Act. Buffers for terns and piping plovers follow Federal and State guidelines and are adjusted during the season depending on the presence or absence of these species. We have established a buffer for staging roseate terns so that reduced disturbance from people will enable the terns to forage and increase their fat supplies, increasing the likelihood that they will safely reach their wintering grounds.

Increased wildlife use often occurs when disturbance from humans is eliminated or decreased, but depends on other factors as well such as the availability of food, shelter, and safety from predators.

Piping Plovers (Letter ID# 15, 33)

Comment: The draft CCP/EA lists oversand vehicle (OSV) closure dates of April 1 through September 15 annually, yet plovers and other birds arrive earlier than that to scout for nesting habitat, possibly due to climate change. OSVs parked or moving through their habitat in March can interfere with their nesting choices, and possibly shunt them to less desirable sites. The Chatham Conservation Commission now routinely expands the nesting bird window to March 1 to 15. It is also likely that fall migration may run later than September 15.

Response: Refuge staff adhere to Federal guidelines for piping plover management and protection. In most years, we do not visit the site until late March, but suitable habitat may be closed prior to April if necessary when staffing schedules allow.

Comment: Removing people from beaches will increase predators. Terns and plovers have always been on the refuge, and perhaps the reason why plover populations are decreasing is because people have been removed which increases predators.

Response: There is much evidence that predator populations are generally increasing in the Northeast United States as a result of suburban sprawl and development. Many species that are well adapted to survive in human-dominated landscapes are the same species that often prey on nesting beach birds. Cumulative impacts of increased predator presence and increasing anthropogenic disturbance has resulted in reproductive failure of beach nesting birds throughout the Northeast, and minimizing disturbance through seasonal closures is an important step in assisting species' recovery. Predator management is another important action. We have not, nor do we propose, to restrict people from all of the beaches, but we do direct use away from sensitive nesting and staging areas during critical times of the year. On Nantucket NWR, there is no evidence that predators are increasing as a result of restricted, seasonal vehicular or pedestrian access. Rather, a review of piping plover numbers in the State of Massachusetts shows an increase in population which can be largely attributed to seasonal closures. This has been seen on Nantucket Island as well.

Invasive Species Management (Letter ID # 33)

Comment: Herbicides should never be used on the Refuge. At this point, since multiflora rose is the only invasive found on the refuge, herbicide is unwarranted. This species should be cut down and dug out by hand, before it flowers and goes to seed.

Response: There are currently two non-native, invasive species documented on the Refuge, multiflora rose and sea poppy. We practice integrated pest management, so therefore we try to manually remove invasive species whenever possible on all our refuges. While we prefer not to use herbicides, sometimes there is no feasible or practicable alternative, and we will use herbicides if, and when necessary, to meet our management objectives.

New England Cottontail Management (Letter ID # 33)

Comment: We support the reintroduction of New England cottontail as long as it has been established that they historically occurred on the island and that predator levels have been adequately addressed.

Response: Any decision to reintroduce New England cottontail will be made in consultation with conservation partners on Nantucket Island and with the Massachusetts Division of Fisheries and Wildlife and after communication with town of Nantucket officials.

Great White Sharks (Letter ID # 33)

Comment: Since 2008, great white sharks have been seen following and feeding on seals near shoreline swimming areas in Chatham, Massachusetts. The refuge might want to plan for this issue, should they be seen off Great Point.

Response: We have noted this comment. We do not plan on closing the refuge if great white sharks are present, but will coordinate with local officials if a real safety threat to swimmers is identified. Outreach will be conducted as needed.

Public Use and Community Relations

Beach Permits and Fees (Letter ID # 10, 20)

Comment: One commenter stated that beach permits are too expensive.

Response: We currently do not charge a fee to access Nantucket NWR, but have the authority to do so in the future. If we decide that access fees should be considered as a way to raise revenues for refuge management, we will develop a proposal that will be subject to public review and comment prior to any final decision being made. The OSV permit that is issued by The Trustees of Reservations (TTOR) is for access to the Coskata-Coatue Wildlife Refuge, which is adjacent to Nantucket NWR. Visitors wishing to arrive at the Nantucket NWR by OSV must have the permit to drive through TTOR and Nantucket Conservation Fund (NCF) property to get to the refuge. There is no fee charged for people to walk through NCF and TTOR property to the refuge or for those wishing to visit the refuge by boat.

Comment: When Great Point is closed for a significant length of time, locals should receive a rebate of some sort the next year for the beach sticker.

Response: Please see the response to the comment above. The Service does not charge a fee for access to the Nantucket NWR.

General Comments on Restriction of Access (Letter ID # 7, 27)

Comment: Restricting public access is in direct opposition to mission. Continued public access is favored.

Response: Providing opportunities for compatible, wildlife-dependent recreation is part of our core mission. In order for a public use to be compatible, however, it must not materially interfere with or detract from the purpose of the refuge or the National Wildlife Refuge System (Refuge System). Allowing public uses at times and in areas that creates significant disturbance to wildlife is not compatible and would violate our responsibilities. Most refuges restrict public uses, either spatially or temporally, in order to protect wildlife populations and their habitat while giving people an opportunity to engage in wildlife-dependent public uses.

Comment: Concern that closed access is too restrictive, bird population will increase and more areas will be unavailable to public who will go elsewhere.

Response: Since this is a national wildlife refuge, it is our legal requirement to protect wildlife species and their habitats. At times, this requires closure to areas that visitors may wish to enter. Bird populations are seasonal, and the number, species, and timing of bird use on the refuge is dependent upon many factors, with the availability of a disturbance-free area being just one of these factors. It is our intention, as described in the CCP, to always have some level of visitation, so that the public can experience the unique natural resources of this area while maintaining wildlife and habitat protection. If parts of the refuge are seasonally closed, there are hundreds of acres of similar habitat on TTOR and NCF property which is generally open to provide opportunities for public use.

Fishing Access (Letter ID # 5, 6, 7, 10, 30)

Comment: Several people were concerned about the preservation of Great Point as a premier place for fishing and the Service's plan to restrict that through closures and restrictions on OSVs.

Response: The Service fully recognizes the importance of fishing the rip at the tip of Great Point to the seasonal and permanent residents of Nantucket, in particular, and to some visitors to Nantucket. We understand that closure of the tip of Great Point is a significant disappointment to anglers who remember this as the premiere fishing spot on Great Point. However, we must maintain a 150-foot buffer around all seals in compliance with the Marine Mammal Protection Act and we must comply with State and Federal tern and plover guidelines which leads to closures. Since Nantucket NWR is so small, and the rip attracts seals as a feeding and resting site, there are inherent conflicts with balancing wildlife and habitat protection and providing public use opportunities. During the times of the year when closures are necessary to protect wildlife, the ability of anglers to fish the tip will be limited.

Comment: The town of Nantucket would like to be able to ensure access in perpetuity to the entire complex to maintain the island's history of fishing and shellfishing. The town of Nantucket feels strongly that having this land to provide recreational opportunities to the public is necessary for the success of any management plan or management activities for this property.

Response: The Service is in support of and will maintain fishing access wherever possible. However, due to the wildlife priorities of the refuge, the Service cannot ensure access to the entire area. It can ensure access whenever possible so long as disturbance to trust species is minimized. We have no plans to restrict access permanently.

Vehicular Access (Letter ID # 6, 8, 10, 12, 24, 33)

Comment: There were several comments regarding vehicle access and OSV use both supporting restrictions and not supporting restrictions. Some people expressed a desire for alternative means of transportation to accommodate increased populations and increased elderly and young people.

Response: It is the intent of the Service to allow OSV access to the lighthouse parking area year-round. However, during plover nesting season TTOR typically closes the the Galls area of their property to OSVs to protect nesting birds. Pedestrian access is authorized during this time. Alternative forms of transportation, such as boats, may need to be used to reach the refuge during these closure periods. Boat service to the refuge could be a possibility in the *future.We* are proposing to seek funding to conduct an alternative transportation study for the refuge that could provide recommendations on alternative ways for public access to the refuge.

Partnerships

TTOR and Memorandum of Understanding

Support of Renewal of the MOU with TTOR (Letter ID # 17, 36)

Comment: An updated memorandum of understanding (MOU) between the Service and TTOR is needed to formalize the good working partnership demonstrated over the past 10 years. Priority issues to address in this MOU include improved coordination of staffing and contingency plans for changes in staffing patterns as well as specific authority for Trustees staff to enforce Service and Endangered Species Act regulations within the Great Point Refuge.

Response: We value our working relationship with TTOR, and have found that there are many aspects of refuge management that can be done cooperatively with TTOR. There is considerable overlap of responsibilities and expertise, and while our missions are not identical, there are many aspects of managing refuge and TTOR lands that are similar. We are beginning the process of updating our MOU with TTOR. However, it will not include giving TTOR the authority to enforce Federal regulations, as that is not allowed by Federal law or statute.

Comment: TTOR commented that alternative B recommends that Service issue special use permits for certain activities and that these would be issued at the discretion of the refuge manager. We ask that the TTOR be included in this review and approval process to ensure that any such uses would not negatively impact TTOR and NCF's adjacent property or its visitors.

Response: We will consult as necessary with TTOR and NCF to ensure any permitted use of the refuge is not detrimental to the management of their lands.

Additional Outreach (Letter ID# 14, 32, 36)

Comment: Commenters expressed a desire for additional outreach to the homeowners, anglers clubs, and fishing groups to foster additional fishing opportunities and commercial fishing tours. Support was expressed with the intent of permitting commercial fishing tours and guides.

Response: We have noted this comment. We are cognizant of the value of additional outreach, especially around fishing, and look forward to beginning a dialogue with individuals or companies able to provide commercial fishing tours and guides.

Refuge Administration

Support of Alternative A with continued TTOR/NCF Management (Letter ID# 13, 16, 17, 25, 30, 36)

Comment: Commenters support alternative B with understanding that NCF and TTOR have been doing that management already (Letter ID# 3, 9, 35, 36)

Response: We have selected alternative B as our preferred management alternative as we have an affirmative responsibility to manage Federal lands. We will continue to maintain a close relationship with TTOR and develop a stronger conservation partnership with NCF. We will continue to rely on our conservation partners to help identify landscape level priorities and provide us with valuable feedback regarding management priorities for the refuge.

Comment: TTOR has actively managed several of its coastal properties to address proven predator threats, including feral cats at Coskata-Coatue, and would welcome Service efforts to strengthen this program. Alternative B recommends that the Service develop a separate step-down integrated pest management plan for the refuge. TTOR would be eager to work closely with refuge staff on this to determine acceptable levels of pest damage and control strategies.

Response: We have noted this comment. We look forward to working with TTOR on this important issue.

Funding for Management (Letter ID# 32)

Comment: There is little need for the Service to commit to and spend the funds on personnel, equipment, supplies, and the like, as Islanders have done a remarkable job to this point.

Response: We are very appreciative of the assistance we have received over the years from TTOR on the refuge, and we fully appreciate the additional conservation work done by NCF, MassAudubon, Maria Mitchell Association, local land trusts, and others. We agree there is a strong conservation ethic on Nantucket Island, and we are excited to be part of this collective effort. As landowners on the island, we have an affirmative responsibility to manage our lands. We also bring a unique, national perspective to conservation and we have wildlife and habitat management expertise that some organizations may wish to tap in to. We see ourselves as value added and will not interfere with other conservation efforts where our participation is not needed or wanted. Furthermore, our ability to increase our involvement with Nantucket conservation will be a direct reflection of our fiscal and personnel resources. Nantucket NWR is one of eight refuges that are part of the Eastern Massachusetts NWR Complex, so our conservation work on Nantucket NWR is prioritized within the refuge complex as well. With that being said, it is our intention that over the course of the next 15 years, we will have the resources necessary that will result in a more active presence on Nantucket Island.

Visitor Services

Alternatives for Visitor Services (Letter ID# 1)

Comment: One commenter is in support of visitor services portion of the plan which would create opportunities in town and to teach.

Response: We have noted this comment.

Signage, Kiosks, Outreach Center (Letter ID# 2, 17, 33)

Comment: Commenters had concern over signage at the refuge and felt that additional signs not needed (excluding flags and banners). Some also felt that any signage on the refuge should be direct; for example, signs that say "Keep off dune."

Response: The refuge is in need of some additional signage and a kiosk in order to properly relay its wildlife messages to visitors in the absence of year-round onsite staffing. We acknowledge the importance of aesthetically pleasing signage that blend in with the natural landscape. Some of the signs that we have or will be erecting must meet standardized signage requirements established by the Service. We will do everything we can to minimize the number and location of signs and make them as tasteful as possible, recognizing that we need to convey certain information to visitors to ensure public safety and the protection of wildlife.

Request to Update Signage as Alternative to Developing a Separate Kiosk (Letter ID # 36)

Comment: To be effective, the Service, TTOR, and NCF will need to work cooperatively to develop a unified education program. For example, as an alternative to developing a separate Service kiosk at the gate house, it would make sense to update the current signage to give visitors one clear message as they enter this jointly managed landscape.

Response: We work collaboratively to educate the public about all partnerships missions and intend to install a kiosk with refuge specific information by the lighthouse.

Support of an On-Site Facility (Letter ID # 36)

Comment: While we are grateful for the utility of the contact station that the NCF's land enables at the Wauwinet Gate House, our collective ability to engage and educate the public would certainly increase with an onsite facility. The Wauwinet Gate House footprint is effectively maxed out.

Response: The development of a partnership building which can engage and educate the public is also of considerable interest to the Service. Such a facility is a long-term project which will require a significant amount of time and effort by all the conservation partners.

Climate Change and Sustainability (Letter ID #11, 33, 36)

Comment: Climate change and sustainability should be a targeted theme in the full suite of education and communication strategies with visitors to the refuge.

Response: We have noted this comment.

Trail Systems (Letter ID # 36)

Comment: We caution against the establishment of new trails. Trail decisions should be looked at in the full context of the entire landscape. Together with TTOR and NCF land, the existing trail system offers ample and diverse opportunities for visitors to use and enjoy this place. More trails would increase the impact on the property's natural communities as well as the costs in managing these trails and their use.

Response: Please refer to map which delineates where the "proposed" trail would be. It is already a well-defined foot path. By making this an official trail, we would close down the other unofficial trails with the intention of minimizing further degradation of the dune habitat. We also intend to install a matted type of base which can be covered by sand in order to address future erosion issues.

Staffing

Additional Staffing (Letter ID # 25)

Comment: I would love to see you provide a biologist for the reservation as you put forward in your plan and I appreciate the need for a law enforcement person who can be available on the reservation.

Response: We have noted this comment. Please also see our proposed staffing chart in appendix E of the final CCP.

Land Acquisition/Protection

Lack of Support for Land Acquisition (Letter ID # 5, 6, 32)

Comment: Commenters indicated a lack of support for additional land acquisition.

Response: We have noted this comment. Comments on this issue varied significantly. Many commenters do not believe the Service should acquire additional lands, some believe that this is not the best time for additional acquisition, and others support additional land acquisition. The Service is developing a national strategy for the strategic growth of the Refuge System, and only acquires land that is of national significance to wildlife management. Additionally, land acquisition as a climate change adaptation tool is growing increasingly important and relevant. Please refer to Appendix G, "Land Protection Plan," in the final CCP to learn more about the importance of additional land acquisition to help achieve national conservation goals.

Support for Land Acquisition (Letter ID # 3, 24, 33, 36)

Comment: We welcome Services' proposed role in protecting this landscape more broadly, especially through the negotiation and acquisition of a conservation easement over the entirety of the Trustees property. Such a conservation easement must provide for a balanced approach to stewardship of the Trustees' property that encourages public use and enjoyment of this stunning natural place.

Response: We have noted this comment.

Comment: In addition to our support for a Service-held conservation restriction on the TTOR's Coskata-Coatue property, we recommend that you consider the 40-acre Bigelow Point on Tuckernuck Island in the proposed land conservation program. This ecologically significant site provides high quality habitat for short-eared owls as well as shorebirds and may be threatened by residential development in the future as a term restriction on the property has lapsed.

Response: The Service has finalized a land protection plan that identifies land acquisition priorities that focus on federally listed threatened, endangered, and candidate species. The Bigelow Point tract is not part of the land protection plan for Nantucket NWR. The Service is undertaking a separate initiative which is evaluating the importance of coastal islands from the Massachusetts/New Hampshire border to Long Island Sound. We will pass information on about Bigelow Point to the staff working on that project.

Comment: The draft CCP/EA's recommendation to expand the Nantucket NWR's boundary could provide an opportunity to have discussions with conservation partners that would result in enhanced management cooperation or additional land protection. The uncommon, and sometimes globally rare natural resources which occur on Nantucket do not respect artificial, man-made property lines and it may be that there are benefits to be gained in safeguarding these rarities through yet to be identified collaborations.

Response: We have noted this comment. We welcome additional discussions with conservation partners and stakeholders.

Light House Stewardship (Letter ID # 36)

Comment: Since March 2000, TTOR has enjoyed a positive, cooperative management agreement with the U.S. Coast Guard, and has managed and cared for the Nantucket Lighthouse (not including the light itself) on behalf of the U.S. Coast Guard. Should the U.S. Coast Guard decide to surplus this property, TTOR supports its transfer to the Service with the understanding that the TTOR will continue its maintenance of the structure. Transfer of the lighthouse to the Service would contribute to more closely integrated, collaborative stewardship of the refuge as a whole.

Response: We have noted this comment.

Socioeconomic Impact (Letter ID #4, 5, 11)

Comment: The fisherman are leaving and taking their money elsewhere.

Response: While it does appear that some local fishermen are either no longer fishing on the refuge or are not fishing there as frequently as they had in the past, there is still considerable amount of fishing occurring on the refuge when it is accessible by vehicle. Additionally, there are now people coming to the refuge to see seals and there are local captains who have started running seal tours. While the primary reason some people might come to the refuge is undoubtedly changing somewhat, all visitors contribute to the Island and its businesses in some manner.

Comment: The socioeconomic ramifications of the virtual closing of Great Point, Nantucket's most prominent natural feature are far reaching. The Service needs to seriously understand and measure this impact on the principle industry of this small island. There is growing evidence that traditional visitors are turning away from Nantucket both because of the blocked access to Great Point and the depletion of fish stocks, likely due at least in part to seal overpopulation. One commenter asked, "Has anyone looked at socioeconomic impacts in last 2 to 3 years with beach closures and closure of point?"

Response: We have updated chapter 3 in the final CCP to provide additional information about visitor use in the past few years, as well as to include socioeconomic information from a study that was conducted in 2000, which was before the refuge was managed as proactively for wildlife as it is today. All visitors to the refuge provide some economic benefit to some local businesses, although who is benefitting from this business may have changed in the last 10 to 12 years. The refuge is still very popular for fishing, and wildlife observation appears to be increasing. It is true that the number of OSV issued in the past few years has been declining. It would be very difficult to develop a site-specific, rigorous economic study that could tease through the multitude of factors that influence use of the refuge, including those that are outside the control of the Service, in order to determine the nature and extent of any economic impact on the Nantucket community as a result of the restricted vehicular access on the refuge and the closure, specifically, of the point to fishing.

NEPA and Process

Additional Outreach Needed for Better Attendance (Letter ID #4, 5)

Comment: Commenters requested additional outreach for public meetings.

Response: The news release was dated August 5, 2011, and was sent out to the following newspapers on August 9, 2011 via e-mail:

- Cape Cod Chronicle
- Nantucket Inquirer and Mirror
- Martha's Vineyard Gazette
- Martha's Vineyard Times
- Community Newspapers
- Provincetown Banner

Below is a list of e-mail addresses for newspaper and media contacts that received notifications to the public:

- *abrennan@capecodonline.com*
- *concord@cnc.com*
- *dleggett@cnc.com*
- *editor@provincetownbanner.com*
- *info@ccmnh.org*
- *jbasile@cnc.com*
- *kbrosnan@plumtv.com*
- *mgoodwin@cnc.com*
- *nelson@mvtimes.com*
- *news@capecodbroadcasting.com*
- *news@capecodonline.com*
- *news@mvgazette.com*
- *psa@capecodbroadcasting.com*
- *sudbury@cnc.com*
- *tduenas@cape.com*
- *twood@capecodchronicle.com*
- *walford@capenews.net*
- *newsroom@inkym.com*
- *mskala@wickedlocal.com*
- *genemahon@comcast.net*
- *mstanton@inkym.com*

The number of people attending the public meetings was consistent with what we often get at our public meetings and we believe we heard the full array of comments from the attendees in both sessions as well as those who submitted comments in writing. We know there are more people who share these concerns than were present.

Cape Wind and National Environmental Policy Act (Letter ID #34)

Comment: The CCP needs to take into account the impacts of the Cape Wind Project on the Nantucket NWR. The CCP also incorrectly states that there is insufficient information to consider. The CCP is not satisfying National Environmental Policy Act (NEPA) compliance requirements if it fails to address this important issue. There are data to consider, and the CCP must take this information into account. The Alliance requests that the CCP be revised before final action is taken to fully consider the impact of the proposed Cape Wind project.

Response: We stand by our position Cape Wind Project is outside the scope and jurisdiction of this plan. The Service has provided official correspondence to the State and U.S. Army Corps of Engineers, and the Secretary of the Interior has approved the project.

Alternative B and Funding (Letter ID # 26, 29)

Comment: Commenters stated that alternative B would increase funding, staff, and increased financial burden. There should be a cost-benefit analysis.

Response: The Service will not be conducting a cost-benefit analysis for our selected management option. Most of the land acquisitions will be at no cost to the government. It is true that more involvement with the management of Nantucket NWR will entail an increase in operational costs. However, many of our proposed activities will cost little to implement, and some may be eligible for funding support from conservation partners or other governmental agencies. An increase of staff by one and one-half position over the next 15 years is a modest increase. The cost of managing these lands over time will be cost effective once permanent staff who live on Nantucket Island can be hired. We will not implement new actions if we do not have sufficient funding to conduct the activities in an efficient and effective manner.

Letter ID Numbers and Respondents

Letter Number	Name	Organization/Affiliation
1	Janet Schulte	Maria Mitchell Association
2	Curtis Barnes	
3	James Lentowski	Nantucket Conservation Foundation, Inc.
4	Ken Kassan	
5	Peter Krogh	Seal Abatement Coalition
6	Guy Snowden	Seal Abatement Coalition
7	Bob DeCosta	Town of Nantucket Selectman, Nantucket Anglers Club
8	Bill Cooper	Nantucket Anglers Club
9	Stephen Nicolle	The Trustees of Reservations
10	Jody Paterson	
11	Peter Brace	
12	Edith Ray	
13	Diane Lang	The Trustees of Reservations
14	Meghan Blair-Valero	
15	Daniel Cassano	Nantucket Masons
16	Bob Lang	

Letter Number	Name	Organization/Affiliation
17	Kristina Jelleme	Nantucket Anglers Club
18	Peter Kaizer	Charter Fishing Boat Captain
19	Kathy Kelm	Nantucket Island School of Design Arts
20	Mark Manchester	Nantucket Inn
21	Haynes Currie	National Park Service
22	Bill Kuppert	
23	Pamela Lohman	Nantucket Civic League
24	Patricia Pastuszak	
25	Kathy Butterworth	
26	Robert Grass	
27	Jeremy Slavitz	Nantucket Anglers Club
28	Amy Coman-Hoenig	Massachusetts Division of Fisheries and Wildlife
29	Patricia Stolte	
30	Rick Atherton	Town of Nantucket, Board of Selectmen
31	Charlotte Maison Kastner	
32	Karen Werner	
33	Billie Bates	Cape Cod & Islands Group Sierra Club
34	Audra Parker	Save our Sound-Alliance to Protect Nantucket Sound
35	Robert Inglis	
36	Lisa Vernegaard	The Trustees of Reservations
37	Edward Bell	Massachusetts Historical Commission
38	USA Citizen 1	

Appendix K



Amanda Boyd/USFWS

Seals at Nantucket National Wildlife Refuge

Compliance with Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act, and the Coastal Zone Management Act

eA/eB, FWS 11-TA-0098, due 3/30

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Stephanie Koch
Wildlife Biologist, Eastern Massachusetts National Wildlife Refuge Complex V

Telephone Number: 978-443-4661, x24

Date: 25 February, 2011

I. Service Program and Proposed Activity: Region 5, Refuges.
We are proposing management and monitoring to benefit piping plovers and roseate terns on Nantucket Refuge, as described in the Comprehensive Conservation Plan (CCP).

II. Pertinent Species within the Area:
Though numbers are consistently low on Nantucket Refuge, piping plovers have regularly nested just south of the Refuge and along other areas of the Coskata-Coatue Peninsula for decades. Since 1983, the number of nesting piping plover pairs has ranged from zero (1999) to a high of 12 (1996) along the Coskata-Coatue Peninsula. Pairs nested on Nantucket Refuge in 1996 and 2006. In 2007, there was a pair on the Refuge displaying territorial behavior in late May, but no nest was ever found and the birds were no longer seen after June 12. No piping plovers have nested on the Refuge since then.

Roseate terns do not nest on Nantucket Refuge, but the very northern tip of the Refuge has been used extensively as a staging area in recent years (and perhaps less recently as well, before monitoring began) from mid July – early September. High counts of roseate terns on Nantucket Refuge in 2010 approached 200.

III. Station Name and Action:
The proposed actions are surveys, monitoring, and management for piping plovers and roseate terns on Nantucket Refuge, as described in the CCP. The biological objective for dune and shoreline habitat which addresses piping plovers and roseate terns is:

> Over the next 15 years, work cooperatively with partners (The Trustees of Reservations, Nantucket Conservation Foundation, Massachusetts Audubon Society) to protect from disturbance and degradation 22 +/- acres of marine intertidal beach, beach berm, and dune habitat to preserve biological integrity and to benefit: nesting piping plovers, least terns and common terns; staging and migrating terns; migrating shorebirds, and; marine mammals. Through seasonal closures, predator management, and public education, maintain a minimum productivity of 1.5 chicks per nesting pair of piping plovers and 1.0 chicks per nesting pair of terns over a 5-year period. Maintain approximately 4.4 acres of intertidal beach habitat with a public viewing distance of 50 yards to benefit migrating shorebirds, staging terns, and seals by regulating and directing public use to less sensitive areas especially during peak times of use (late summer and early fall for shorebirds and terns).

Specific strategies and monitoring elements related to this objective and relevant to piping plovers and roseate terns are listed below. Locations of management actions are depicted on the attached map. All monitoring and management would be conducted in accordance with state and federal guidelines.

Piping Plovers

1. Annually protect existing piping plover habitat Refuge-wide by establishing and maintaining symbolic fencing preventing vehicular and pedestrian access through historic nesting habitat in accordance with federal guidelines by April 1. Additionally manage vehicle access according to the Service guidelines for managing piping plover beaches for recreational use (Appendix G of the 1996 Revised Piping Plover Recovery Plan) from April 1 to at least July1, or until nesting piping plovers have fledged chicks (see No. 3 below).

2. Conduct annual surveys for piping plovers during the breeding season (April – August) throughout the life of the CCP and monitor productivity according to MADFW and Service guidelines recommendations.

3. If piping plover chicks hatch, maintain a vehicle-free area extending 1000 meters on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. Maintain closures in areas with piping plover chicks until chicks are at least 35 days old, or capable of at least 15m of sustained flight.

4. If no territorial piping plovers have established by July1, and areas are not part of other zoning closures (see attached map), areas may be opened for vehicular and/or pedestrian access.

5. Determine impacts of predators (feral cats, rats, gulls, and others) to nesting piping plovers and terns, and implement predator control (lethal and non-lethal) if necessary.

Roseate Terns

1. Annually protect common and least tern nesting habitat (that will also benefit roseate terns) Refuge-wide by establishing and maintaining symbolic fencing preventing vehicular and pedestrian access through suitable habitat by May 15 and until at least July 1. If nesting terns are not established by this date, access restrictions may be lifted. Maintain a buffer of 50 meters around nesting areas.

2. Conduct annual surveys during the breeding season (June) throughout the life of the CCP and annually monitor productivity according to State and Federal recommendations.

3. Establish a seasonal closure to vehicles and pedestrians on the northwest tip of the refuge where staging terns have occurred in recent years. This closure will generally be from August 1 - September 15. We will use the principles of adaptive management to determine if closures are warranted, where, and for what period of time. Generally,

location will be dependent on shifting habitat suitability and bird use and dates of closures will be dependent on nesting and migration chronology. We will use adaptive management to determine appropriate management and make decisions that result from monitoring. Closure dates and locations will be correlated with staging tern use so that the effectiveness of the closures can be assessed and modifications made to protect birds while minimizing restrictions to refuge visitors.

4. Collaborate with partners to initiate a study of staging terns to determine the relative importance of Nantucket Refuge and quantify potential disturbance impacts. Work with partners to ensure that data can be incorporated in larger landscape studies. Implement additional beach management /fencing where scientific data exist to demonstrate the need for any changes in management.

IV. Location

Nantucket NWR is located at the northern-most point of the Coskata-Coatue Peninsula on the eastern side of Nantucket Island (see attached map). Bound by Nantucket Sound to the north and the Atlantic Ocean to the south, Nantucket Island is heavily influenced by maritime processes. The Refuge is subject to an ever-changing coastline resulting from continual erosion and deposition. Wind and wave energy, and storms can alter the size and shape of the land due to sand movements.

V. Determination of Effects

A. Explanation of effects of action on species and critical habitats listed in II.

The proposed actions will generally take place intermittently from April 1 – September 15, which encompasses the piping plover nesting season and tern staging season in Massachusetts. The proposed actions will be conducted by Refuge biological staff or interns that are trained and familiar with nesting and staging ecology. We expect our proposed actions are not likely to adversely affect or result in beneficial effects. Effects from management to avoid impacts from recreational use of the Refuge are anticipated to be insignificant and discountable since we will be adhering to Service guidelines for managing piping plovers.

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

Not applicable.

VI. Effect determination and response requested: [* optional]

A. Listed species/critical habitat:

Determination	Response requested
no effect (species: _____)	___*Concurrence
is not likely to adversely affect (species: piping plover, roseate tern) Consultation	X Concurrence ___*Formal
is likely to adversely affect (species: _____)	___Formal consultation
may affect; beneficial effect (species: piping plover, roseate tern)	X Concurrence

Thomas E. Chapman 2/28/11

signature date

[Deputy Project Leader, Eastern Massachusetts NWR Complex]

VII. Reviewing ESO Evaluation:

A. Concurrence ✓ Noncurrence _____

B. Formal consultation required _____

C. Conference required _____

D. Remarks (attach additional pages as needed):

01 Mar 2011

signature date

[Title/office of reviewing official]

Supervisor NEFO - ES


Nantucket National Wildlife Refuge - Comprehensive Conservation Plan
Coskata-Coatue Peninsula, Great Point and Nantucket NWR
Nantucket NWR
Great Point
Trustees of Reservations Land
Nantucket Conservation Foundation Land
Head of the Harbor
Coskata
Coatue


Nantucket National Wildlife Refuge - Comprehensive Conservation Plan
Public Use - Alternative B - Adaptive Management
Zone 3
Usually closed due to seals on the point.
No pedestrians, no vehicles
Zone 5
Cross hatched area.
Closed to vehicles due to staging terns, Aug 1st to Sept. 15th
Restricted pedestrian access
Zone 4
Closed April to July 1st, for OSV's then open if no plovers or terns.
Always open to foot traffic, subject to wildlife
Zone 1
Always closed, dune restoration except for primitive trail
Trail
Parking
Zone 2
Always open subject to wildlife and state and federal guidelines
Zone 1
Always closed, dune restoration
Parking
Zone 2
Always open subject to wildlife and state and federal guidelines
Meters
Feet

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

October 25, 2011

Carl Melberg
Natural Resource Planner
US Fish & Wildlife Service
Eastern Mass. NWR Complex
73 Weir Hill Road
Sudbury MA 01776-1420

RE: Nantucket National Wildlife Refuge, Great Point, Nantucket, MA. MHC #RC.45163.

Dear Mr. Melberg:

Thank you for providing the Massachusetts Historical Commission (MHC), office of the State Historic Preservation Officer, with a copy of the *Nantucket National Wildlife Refuge Environmental Assessment and Draft Comprehensive Conservation Plan* (EA/DCCP)

Nantucket Island is a National Historic Landmark. Review of the Inventory of Historic and Archaeological Assets of the Commonwealth indicates that there are no recorded historical or archaeological individual properties within the refuge. The historical Native American place name for the general locale of this part of Nantucket is reported to be "Meeshown." Resource gathering activities by Native Americans such as marine fishing, harvesting beached marine mammals, hunting, and plant gathering may have occurred in this area in ancient and historical times. Ancient and historical period Native American sites would be most likely located in close proximity to areas that once had fresh water springs or ponds, although the EA/DCCP indicates that presently there are no fresh water sources. Temporary campsites could have been located in sloughs between dunes. Nantucket's road system extended to Great Point in the Colonial Period (ca. 1675-1775). More research would be required to learn about the Colonial Period activities in the refuge, but livestock grazing areas, fishing camps or whaling stations could have been present. The dynamic sand dune topography of the refuge would periodically expose then bury any archaeological deposits and features that may be present.

The MHC agrees that the typical activities involved in the management and interpretation of the refuge are undertakings that have "no potential to cause effects" (36 CFR 800.3(a)(1)) to historical and archaeological properties. If the US Fish & Wildlife Service proposes any projects that involve new construction, demolition, or other activities that impact the ground surface or subsurface, please provide information to the MHC for review and comment in compliance with 36 CFR 800, as outlined in the EA/DCCP.

Thank you again for the opportunity to provide comments. Please contact me if you have any questions.

Sincerely,

Edward L. Bell
Senior Archaeologist
Massachusetts Historical Commission

xc: John Wilson, USFW

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.sec.state.ma.us/mhc

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

August 8, 2012

Carl Melberg
U.S. Department of the Interior
Fish and Wildlife Service
Eastern Massachusetts National Wildlife Refuge Complex
73 Weir Hill Road
Sudbury, MA 01776-1420

RE: CZM Federal Consistency Review of a 15 year Comprehensive Conservation Plan (CCP) for the Nantucket National Wildlife Refuge; Nantucket.

Dear Mr. Melberg:

The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the initial 15 year Comprehensive Conservation Plan (CCP) for the Nantucket National Wildlife Refuge.

Based upon our review of applicable information, we concur with your certification and find that the activity's effects on resources and uses in Massachusetts coastal zone as proposed are consistent with the CZM enforceable program policies.

If the above-referenced project is modified in any manner, including any changes resulting from permit, license or certification revisions, including those ensuing from an appeal, or the project is noted to be having effects on coastal resources or uses that are different than originally proposed, it is incumbent upon the proponent to notify CZM, submit an explanation of the nature of the change pursuant to 15 CFR 930, and submit any modified state permits, licenses, or certifications. CZM will use this information to determine if further federal consistency review is required.

Thank you for your cooperation with CZM.

Sincerely,

Bruce K. Carlisle
Director

CZM# 11619

DEVAL L. PATRICK GOVERNOR TIMOTHY P. MURRAY LIEUTENANT GOVERNOR RICHARD K. SULLIVAN JR. SECRETARY BRUCE K. CARLISLE DIRECTOR
www.mass.gov/czm

Appendix L



Amanda Boyd/USFWS

Spotted sandpiper

Finding of No Significant Impact (FONSI)

Finding of No Significant Impact (FONSI)

In August 2011, the U.S. Fish and Wildlife Service (Service) published the Draft Comprehensive Conservation Plan and Environmental Assessment (draft CCP/EA) for Nantucket National Wildlife Refuge (refuge, NWR). The refuge currently covers approximately 21 acres of barrier beach dunes on Nantucket Island, located in the Atlantic Ocean approximately 25 miles south of Cape Cod. This refuge is part of the Eastern Massachusetts National Wildlife Refuge Complex (refuge complex) headquartered in Sudbury, Massachusetts.

The Nantucket NWR draft CCP/EA evaluates three alternatives for managing the refuge over the next 15 years. It carefully considers each alternative's direct, indirect, and cumulative impacts on the environment and their potential contribution to the mission of the National Wildlife Refuge System (Refuge System).

The draft CCP/EA restates the refuge's purposes, creates a vision for the next 15 years, and proposes three goals to be achieved through plan implementation. Alternative B is identified as the Service-preferred alternative. Chapter 2 in the draft plan details the respective goals, objectives, and strategies for each of the three alternatives. Chapter 4 describes the consequences of implementing those actions under each alternative. The draft CCP/EA plan's appendices provide additional information supporting the assessment and specific proposals in alternative B. A brief overview of each alternative follows.

Alternative A (Current Management): The Council of Environmental Quality regulations on implementing the National Environmental Policy Act (NEPA) require this "No Action" alternative, which we define as continuing current management. Alternative A includes our existing programs and activities and serves as the baseline against which to compare the other alternatives. Under alternative A, we would maintain the status quo in managing this 21-acre refuge for the next 15 years, including actions which do not strictly follow Service guidance documents, because these management decisions and activities were established prior to recent guidance documents. No major changes would be made to current management practices. We would continue to rely on The Trustees of Reservations to provide information to the public regarding the refuge and its resources, conduct piping plover and seal management, and monitor the beaches for public compliance with piping plover and seal management.

Alternative B (Enhanced Wildlife Management and Visitor Services; the Service-preferred Alternative): This alternative includes an array of management actions that, in our professional judgment, works best toward achieving the purposes of the refuge, our vision and goals for those lands, the Refuge System mission, and the goals in State and regional conservation plans. Alternative B seeks a balance between wildlife protection (through beach closure and symbolic fencing for key habitats) and access for the compatible, wildlife-dependent priority public uses at the refuge. In addition, this alternative emphasizes larger landscape-level conservation of coastal dune and beach habitat for priority avian and marine mammal species through the protection of additional lands on Nantucket and associated islands. Management would be consistent with State and Federal piping plover and tern guidelines, and would also afford protection to staging terns in the late summer and fall. It establishes adaptive beach closure zones designed to allow compatible beach recreation while protecting important wildlife habitat. It proposes management on the refuge, but also looks beyond the 21-acre refuge to larger scale conservation and land protection throughout Nantucket. We propose to achieve this through partnerships, cooperative management, and a 2,036-acre expansion to the refuge (see appendix G, Land Protection Plan (LPP)). It calls for a coordinated regional study of bird use (specifically roseate and common terns) to help determine future refuge management and beach access to provide protection for key species and habitat while attempting to allow for compatible, wildlife recreation into the future. This alternative would also enhance our current level of visitor services, research, inventory and monitoring, law enforcement, and partnerships, all within the context of landscape-level conservation.

Alternative C (Wildlife Diversity and Natural Processes Emphasis): Alternative C seeks to enhance biodiversity and environmental health, so that existing, traditional recreational uses would be restricted in favor of increased protection of focal waterbird species and seals. It is similar to alternative B but takes protection one step further by proposing to extend seasonal closures to vehicle access over most of the refuge between April 1 and September 15 each year to minimize disturbance to dynamic beach habitat. Under alternative C, we would expand our visitor services program. However, these efforts would be more focused

on providing opportunities on the refuge and less on working with partners off of the refuge. We distributed the draft CCP/EA for a 60-day period of public review and comment from August 2 to October 1, 2011. We held two public meetings on September 15, 2011, in Nantucket, Massachusetts: one in the afternoon and one in the evening. Throughout the 60-day comment period, we received 38 comment submissions representing individuals, organizations, and State and Federal agencies. Appendix J in the final CCP includes a summary of those comments and our responses to them.

After reviewing the proposed management actions, and considering all public comments and our responses to them, I have determined that the analysis in the EA is sufficient to support my findings. I am selecting alternative B, as presented in the draft CCP/EA with the minor changes listed below, to implement as the final CCP. The following are the changes we made in the final CCP:

- We provided updated information on the numbers of seals, common terns, and roseate terns using the refuge.
- We changed the dates for staging tern closures to mid- to late July through mid-September. This change reflects new information received during the past two summers of field observation by refuge staff.
- We provided updated information about visitor use numbers and activities.
- We removed the threshold for seal protection after consulting with the National Marine Fisheries Service.
- We provided updated socioeconomic information.

I concur that alternative B, with the above changes and in comparison to the other two alternatives, will:

- Best fulfill the mission of the Refuge System.
- Best achieve the refuge's purposes, vision, and goals.
- Best maintain and, where appropriate, restore the refuge's ecological integrity.
- Best address the major issues identified during the planning process.
- Is most consistent with the principles of sound fish and wildlife management.

Specifically, in comparison to the other two alternatives, alternative B would make an important contribution to conserving Federal trust resources of concern in southern New England coastal habitats by providing key nesting and staging habitat for piping plover and roseate terns. The plans to increase collaboration with partners to enhance biological and visitor services programs are reasonable, practicable, and will result in the most efficient management of the refuge and best serve the American public. Our ability to achieve conservation goals is further enhanced with the LPP, approved by the Service's Director on January 15, 2013. This Finding of No Significant Impact (FONSI) includes the EA by reference.

I have reviewed the predicted beneficial and adverse impacts associated with alternative B that are presented in chapter 4 of the draft CCP/EA, and compared them to the other alternatives. I specifically reviewed the context and intensity of those predicted impacts over the short and long term, and considered cumulative effects. I believe socioeconomic, natural and cultural resource, and visitor impacts would be generally positive or negligible over the long term. In addition, refuge revenue sharing payments would continue, and possibly increase with any addition of lands to the Nantucket NWR. The addition of refuge staff on Nantucket Island, and increased visitation by staff due to increased biological and visitor services efforts on the refuge, may provide a net benefit to the local economy over the next 15 years through the use of local goods and services. The potential land acquisitions to Nantucket NWR may also increase visitation to the area, and visitors are expected to make local purchases in conjunction with their visit.

Regarding natural resources, minor and temporary impacts are expected to soils and vegetation from any monitoring and management, including invasive species management. The addition of refuge staff and seasonal zone closures would ensure greater protection of soils and vegetation through better regulation of visitor access to sensitive nesting, staging, and seal haul-out areas. An access trail would funnel foot traffic on a designated path, and away from sensitive dune habitat. Increased visitor services, including interpretation and educational programs, will increase awareness and understanding of refuge resources and management. Other visitor services programs would focus on recreational activities, including fishing, to continue to provide opportunities for recreational use of the refuge and to minimize conflicts with user groups.

In summary, my evaluation concludes that implementing alternative B would not result in any concerns with public health or safety, nor result in adverse implications to any unique cultural or natural characteristics of the geographic areas, including wetlands or federally listed species. I have considered how the proposed actions would interact with other past, present, or reasonably foreseeable future actions to determine there is no major cumulative impact. I find that implementing alternative B adheres to all legal mandates and Service policies, and will not have a significant impact on the quality of the human environment, in accordance with Section 102(2)(c) of NEPA. Therefore, I have concluded that an Environmental Impact Statement is not required, and this FONSI is appropriate and warranted.

ACTING

Wendi Weber
Regional Director, Region 5
U.S. Fish and Wildlife Service
Hadley, Massachusetts

18 FEB 2013
Date

Nantucket National Wildlife Refuge
c/o Eastern Massachusetts National Wildlife Refuge Complex
73 Weir Hill Road
Sudbury, MA 01776
978/443 4661
http://www.fws.gov/northeast/nantucket/

Federal Relay Service
for the deaf and hard-of-hearing
1 800/877 8339

U.S. Fish & Wildlife Service
http://www.fws.gov

For Refuge Information
1 800/344 WILD

February 2013

