

Chapter 4

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Gull nest on the refuge

Environmental Consequences

- Introduction
- Effects on Air Quality
- Effects on Water Quality
- Effects on Soils
- Effects on Dune and Shoreline Habitat
- Effects on Public Access, Education, and Community Outreach
- Effects on Socioeconomic Resources
- Cumulative Impacts
- Relationship between Short-term Uses of the Human Environment and Enhancement of Long-term Productivity
- Unavoidable Adverse Effects
- Potential Irreversible and Irretrievable Commitments of Resources
- Environmental Justice
- Matrix of Environmental Consequences by Alternative

Introduction

This chapter describes the environmental consequences that we predict from implementing the three management alternatives presented in chapter 2. Where detailed information is available, we present a scientific and analytic comparison between alternatives and their anticipated consequences, which we describe as “impacts” or “effects.” In the absence of detailed information, we make comparisons based on our professional judgment and experience. Specifically, we predict the effects of implementing the management actions and strategies for each of the three alternatives: “Alternative A, Current Management,” which serves as the baseline for comparing “Alternative B, Enhanced Wildlife Management and Visitor Services (Service-preferred Alternative),” and “Alternative C, Wildlife Diversity and Natural Processes Emphasis.”

We organized this chapter by major resource headings. Under each heading, we discuss the beneficial and adverse effects likely to occur over the 15-year life span of the plan. Beyond the 15-year planning horizon, we give a more speculative description of the direct, indirect, and cumulative effects. At the end of this chapter, table 4.1 summarizes the effects predicted for each alternative and allows for a side-by-side comparison. Finally, this chapter identifies the irreversible and irretrievable commitment of resources from our proposed actions, as well as the relationship between short-term uses of the environment and long-term productivity, their cumulative effects, and the relationship to environmental justice.

As required by CEQ and Service regulations implementing the NEPA, we assessed the importance of the effects of the CCP alternatives based on their context and intensity. The context of the impacts ranges from local and site-specific to regional.

This chapter does not describe the consequences of certain types of actions described in chapter 2, “Alternatives Considered, Including the Service-preferred Alternative,” because they do not individually or cumulatively have any measurable environmental impacts and do not vary by alternative. Each could be categorically excluded if proposed as a stand-alone action. Those actions are:

- environmental education and interpretive programs (unless major construction is involved or significant increase in visitation is expected)
- research, resource inventories, and other resource information collection
- operations and maintenance of existing infrastructure and facilities (unless major renovation is involved)
- routine, recurring management activities and improvements
- small construction projects (e.g., fences, kiosk, interpretive signs)
- native vegetation planting
- minor changes in amounts and types of public use
- issuance of new or revised management plans when only minor changes are planned
- law enforcement activities

Effects on Air Quality

Air Quality Impacts That Would Not Vary By Alternative

Massachusetts' air quality is considered generally good, except for one pollutant—ozone. The nearest air quality monitoring stations to Nantucket are located in Fairhaven and Truro, Massachusetts. Neither of these stations was in violation of ozone levels over a 3-year average (MA DEP 2009). Given the location of the island, the air quality immediately around the refuge is good.

Treatment of invasive plant species to maintain quality habitat conditions would occasionally incorporate mechanical, chemical, or biological control as necessary by varying degrees, depending on the alternative. These actions may result in temporary site disturbance; however, any impacts to air quality would be localized and short-lived. If a prescribed burn were deemed necessary for vegetation management, it could cause some short-term, minor, localized impacts to air quality. No major ground-disturbing activities that would affect air quality are proposed under any of the alternatives.

None of our proposed management activities should adversely affect regional air quality. None would violate U.S. EPA standards for criteria air pollutants; each would comply with the Clean Air Act.

Air Quality Impacts of Alternative A (Current Management)

Current management activities neither substantially benefit nor adversely affect local and regional air quality. There is a small amount of hydrocarbon emissions caused by refuge activities including emissions from transportation to and from the refuge. The vehicle fleet at the refuge headquarters is becoming more efficient and cleaner as older vehicles are replaced by low emission hybrid cars and trucks. Staff requires the use of OSVs to access the refuge; however with only several site visits per year, any negative impacts to the refuge's air quality would be sporadic and temporary.

Though refuge staff only visit the refuge several times a year, the refuge and adjacent TTOR property receive a high volume of visitors; approximately 40,995 day visitors per year. TTOR sells approximately 3,000 vehicle permits per year, and up to 100 vehicles have been seen parked in the vicinity of the refuge at a given time. Such high volume of vehicles and associated emissions likely has a negative local impact on the refuge's air quality. This type and amount of use would not change under this alternative.

Air Quality Impacts of Alternative B (Service-preferred Alternative)

Proposed management activities would neither substantially benefit nor adversely affect local and regional air quality. Under this alternative, we would incorporate invasive plant treatment as necessary to maintain quality habitat and to promote biological integrity. This would be enacted through mechanical, chemical, or biological control.

If chemical application is deemed necessary, it would likely be through the use of backpack sprayers because they have optimal target specificity due to the close range of application. With this method, there is some potential to impact a relatively wider area than is targeted through spray drift (the movement of herbicides to non-target sites). However, the refuge effectively minimizes spray drift through careful calibration of spray nozzles to achieve the correct droplet size and rate of application (T. Eagle, personal communication, 2010). In addition, products used are EPA approved and labeled for the appropriate use. Herbicides are chosen based on low LD-50s, very short soil persistency and the least potential to migrate in the soil or in water (T. Eagle, personal communication, 2010).

Mechanical removal of invasive species would result in temporary site disturbance that would likely kick some amount of sand and soil into the air. This would last only as long as it was required to remove the targeted plants. We anticipate only short-term, minor, localized impacts to air quality from the treatment of invasive plants.

If a prescribed burn is deemed warranted on the refuge for vegetation management, there may be some localized and temporary decrease in air quality. During prescribed fires, there is a short-term decrease in local air quality due to smoke and smoke particulates. According to the Eastern Massachusetts NWR Complex Fire Management Plan (USFWS 2003b), “The goals of smoke management on the refuges will follow goals enumerated by the National Wildfire Coordinating Group (1985): reduce fire emissions, enhance the dispersal of smoke plumes, steer smoke plumes away from smoke-sensitive areas, and coordinate the ignitions of prescribed burns. Smoke management practices will include maximizing combustion efficiency (to reduce particulate emissions).” These practices would further minimize impacts to air quality.

An anticipated increase in visitors over time, including more OSVs, to the refuge would cause a minor increase in air emissions from current levels in the long term and contribute minimally to potential cumulative effects. This may be somewhat offset by a system of zone management under this alternative to institute temporary closures throughout the refuge, which would reduce the overall number of vehicles on the refuge at any given time during the busy summer months. However, because the refuge totals only approximately 21 acres in size, and these vehicles will be allowed immediately adjacent to the refuge, or to closed portions of the refuge, zone management may not result in any noticeable improvement in air quality.



Elizabeth Wunker/USFWS

Concentration of vehicles in open zone areas

The proposed shared visitor contact station, if it were to be built, would cause some local air quality impacts. Construction of the visitor facility would cause short-term, localized effects from construction vehicle and equipment exhausts. The purchase of an existing structure, if deemed more feasible than new construction, would likely warrant some renovations, and this too would result in some temporary localized air quality impacts. Operation of the facility would slightly increase stationary source emissions at the site.

Air Quality Impacts of Alternative C (Wildlife Diversity Emphasis)

Under alternative C, more restricted vehicular access to the refuge between the months of April and September would effectively negate the air quality impacts on the refuge associated with high volumes of vehicle use during typical summer months. However, at approximately 21 acres in size, and with vehicles allowed immediately adjacent to the closed portions of the refuge, there may still be some air quality impacts to the refuge by association.

Refuge staff would be required to access the refuge for biological monitoring and closure enforcement, however, OSV use by staff on the refuge would be used only when required. Otherwise, refuge staff would use OSVs to reach the refuge, and then access the refuge by foot whenever possible during the closure period.

All other impacts from refuge management would be the same as in alternative B.

Effects on Water Quality

Water Quality Impacts That Would Not Vary by Alternative

Nantucket Island is surrounded by the Atlantic Ocean and the refuge is located on a peninsula in the northeast corner of the island. The only source of fresh water on the refuge is from precipitation and infiltration. The waters immediately north of Nantucket, in Nantucket Sound, are designated as a NDA. Boats may not discharge any sewage, treated or otherwise, in these waters immediately adjacent to Nantucket Island, to protect this ecologically and recreationally important area. 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 water bodies, including encouraging algal blooms, decreasing dissolved oxygen content, and increasing turbidity, which can impact species reliant upon these coastal waters. Nantucket Sound has experienced a yearly trend of increasing nitrogen input. Under all three alternatives, none of the proposed management activities would contribute to this problem.

None of our proposed management activities would violate Federal or State standards for contributing pollutants to water sources; all three would comply with the Clean Water Act.

Water Quality Impacts of Alternative A (Current Management)

Refuge-related activities that could impact water quality are oil or gas leaks from OSVs, tour vans, refuge vehicles, or offshore boats. Although the impacts to water quality are likely to be negligible from these activities, under alternative A the incidence of trespass by OSV drivers is higher and the potential for accidental oil or gas spills in the dune habitat may be higher. This could result in greater adverse impacts to ground water quality.

Some risks could occur to water quality from use of herbicides and mechanical methods by the refuge to control invasive plant species, but these risks are low (Shepard et al. 2004). We would use IPM to prevent or minimize any impacts from use of herbicides, and would only use herbicides that are safe for aquatic habitats when working near water bodies on the refuge.

Water Quality Impacts of Alternative B (Service-preferred Alternative)

Refuge-related activities that could impact water quality are oil or gas leaks from OSVs, tour vans, refuge vehicles, or offshore boats. The impacts to water quality are likely to be negligible from these activities. Under alternative B greater refuge staff presence would result in greater enforcement of public uses and therefore lessen the chance of accidental spills or leaks that could adversely impact water quality. In addition, the zone closures to vehicles would prevent specific areas on the refuge from being impacted by oil or gas leaks; however, this could also potentially result in a higher concentration of vehicles being parked in areas adjacent to the closures.

As in alternative A, the use of herbicides or mechanical methods by the refuge to control invasive plant species could incur some risk to water quality, but these risks are low (Shepard et al. 2004). We would use IPM to prevent or minimize any impacts from use of herbicides, and would only use herbicides that are safe for aquatic habitats when working near water bodies on the refuge.

Water Quality Impacts of Alternative C (Wildlife Diversity Emphasis)

Under alternative C, water quality impacts would be considerably lower than in the previous alternatives because of the more restricted vehicular access to the refuge between April and September, the months with the highest volume of visitors.

As in alternatives A and B, the use of herbicides or mechanical methods by the refuge to control invasive plant species could incur some risk to water quality, but these risks are low (Shepard et al. 2004). We would use IPM to prevent or minimize any impacts from use of herbicides, and would only use herbicides that are safe for aquatic habitats when working near water bodies on the refuge.

Effects on Soils

Soil Impacts That Would Not Vary By Alternative

The Coskata-Coatue Peninsula, which includes the refuge, is exposed to the natural coastal processes of accretion and erosion, or the deposition and removal, of sand along shorelines. Sand that is eroded, or removed, from one beach will be transported downdrift and will accrete, or be added, on another. These processes are influenced by many factors, some of which include 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. These movements of sand provide ever-changing coastlines and habitats for many species of wildlife. These coastal dunes and barrier beaches are important in preventing storm damage prevention and in flood control.

All three alternatives strive to maintain the dynamic nature of accretion and erosion and to adapt to the changing habitat conditions from these shifting sands.

Soil Impacts of Alternative A (Current Management)

Under alternative A the oversight of public access and uses on the refuge provided by TTOR provides some protection to refuge soils from excessive erosion and compaction. To protect soils and other resources, the rules and regulations on vehicle access include seasonal shifts in trail/road routes out to Great Point and requiring that tires be deflated on OSVs. OSVs are only allowed on the authorized trails and not anywhere else within dune habitats. Vehicles must have permits, and vehicles are allowed on the beach and intertidal areas, except in areas posted with symbolic fencing.

Despite these policies and this key support from a refuge partner to minimize impacts, impacts do still occur. Vehicles can cause adverse soil impacts through churning of tires, compacting substrate, and destroying vegetation and other features that help stabilize dunes. OSV tracks can also affect the geomorphology of the beach through sand displacement and compaction (Schlacher and Thompson 2007). 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 1987). Improper vehicle access and use can lead to abrupt rather than sloping dunes, leaving the dune susceptible to wave energy and wind erosion (Anders and Leatherman 1987). The greatest adverse impacts to soils likely would occur under alternative A given the level of public access and use coupled with the lack of enforcement and onsite Service presence to provide support to TTOR's efforts.

Soil Impacts of Alternative B (Service-preferred Alternative)

Under alternative B, the Service would continue to rely on TTOR to assist with regulating vehicle access to the refuge, by permitting OSVs at the gatehouse, providing rules and regulations to drivers, requiring that tires be deflated, and adjusting trail/road access to Great Point as necessary. Similar to alternative A, OSVs are only allowed on the authorized trails and not anywhere else within dune habitats. Alternative B would provide more onsite Service presence to manage visitor services and offer greater enforcement of unauthorized uses. This would help restore and protect dunes by designating authorized trails and directing foot and vehicular access away from sensitive areas to least sensitive and more stable

beach sandy areas. Increased visitor services staff and expanded environmental education and interpretation, including additional signage, under alternative B, would raise awareness among visitors about the sensitivity of the refuge habitats and potential effects of unauthorized uses.

Alternative B would continue to rely on symbolic fencing, although with greater use of adaptive management and onsite presence of Service staff to determine location and duration to protect habitat and dune processes. A system of zone management to protect habitat found suitable for species of conservation concern through closures would regulate OSV and pedestrian access between the months of April and September. OSV impacts described in alternative A would still be a concern, however, zone management would likely result in some areas of the refuge having little to no exposure to OSV use during the busy summer months.

The mechanical removal of invasive plant species has the potential to cause localized soil disturbance and erosion until new plant species establish. There could be more soil disturbance associated with higher levels of invasive species control, but any soil disturbed by the physical removal of plants will be tamped down and compacted. This is a standard aspect of any mechanical removal operation.

Any prescribed fires conducted by the refuge should benefit soils in the short-term by releasing nutrients bound up in plant biomass back into the soil (Dudley and Lajtha 1993), the degree to which this occurs is dependent upon fire intensity (USFWS 2003b). Maintaining native dune habitat and reducing invasive plant species would likely improve soil condition.



Karen Terwilliger/TCI

Tire tracks on refuge beach

The creation of a primitive refuge trail to access the beach on the eastern side of the refuge from the lighthouse parking area would result in soil compaction and sand displacement from repeated use. To mitigate these impacts, we would install a mat to provide better traction for visitors, and to provide a buffer between the soil and direct impacts from visitors. It is possible that the installation of this mat would require some amount of vegetation clearing to accommodate the width, and some sand displacement to provide an even substrate. These impacts are local, temporary for the duration of the presence of the mat, and are offset by the benefit the mat provides. In addition, the posting of refuge trail and interpretation signs and boundary markers would cause some soil displacement; however, these would be few in number. Overall, designating an authorized trail and directing foot and vehicular access away from sensitive areas

to least sensitive and more stable beach sandy areas would help restore and protect dunes.

The proposed shared visitor contact station, if it were to be built, would cause localized soil compaction and loss of soil productivity where soils are removed or surfaced for the building and associated parking area, and in immediately adjacent areas where vehicles and heavy equipment are used for site access and preparation work. Otherwise, an existing structure would be purchased, and any soil impacts would have already been established. This proposed joint center with partners, if realized, would be located off-refuge and would not impact the existing refuge resources.

Soil Impacts of Alternative C (Wildlife Diversity Emphasis)

Alternative C would provide the greatest protection of refuge soils through more focused public use and expanded seasonal closures. Much of the refuge would be closed to vehicular use during the bird nesting and migration/staging season (April 1-September 15). Similar to alternatives A and B, the Service would continue to rely on TTOR to assist with regulation vehicle access to the refuge, by permitting OSV at the gatehouse, providing rules and regulations to drivers, requiring that tires be deflated, and adjusting trail/road access to Great Point.

Enhanced dune protection (and therefore soils protection) would occur with more restrictive travel through and around dunes, with a proposed primitive trail to direct access. To mitigate impacts such as soil compaction and displacement from repeated use on the trail, we would install a mat to provide better traction for visitors, and to provide a buffer between the soil and direct impacts from visitors. It is possible that the installation of this mat would require some amount of vegetation clearing to accommodate the width, and some sand displacement to provide an even substrate. These impacts are local, temporary for the duration of the presence of the mat, and are offset by the benefit the mat provides. Similar to alternative B, more onsite refuge seasonal staff would provide greater protection to soils through increased public awareness, enforcement of closures, and additional signage. This signage would result in some negligible sand displacement where posted. Overall, designating an authorized trail and directing foot and vehicular access away from sensitive areas to least sensitive and more stable beach sandy areas would help restore and protect dunes.

The mechanical removal of invasive plant species has the potential to cause localized soil disturbance and erosion until new plant species establish. There could be more soil disturbance associated with higher levels of invasive species control, but any soil disturbed by the physical removal of plants will be tamped down and compacted. This is a standard aspect of any mechanical removal operation.

Any prescribed fires conducted by the refuge should benefit soils in the short-term by releasing nutrients bound up in plant biomass back into the soil (Dudley and Lajtha 1993), the degree to which this occurs is dependent upon fire intensity (USFWS 2003b). Maintaining native dune habitat and reducing invasive plant species would likely improve soil condition.

Similar to alternative B, the proposed shared visitor contact station, if it were to be built, would cause localized compaction and loss of soil productivity where soils are removed or surfaced for the building and associated parking area, and in immediately adjacent areas where vehicles and heavy equipment are used for site access and preparation work. Otherwise, an existing structure would be purchased, and any impacts to the soils would already have been established. This proposed joint center with partners, if realized, would be located off-refuge and would not impact the existing refuge resources.

Effects on Dune and Shoreline Habitat

Dune and Shoreline Habitat Impacts That Would Not Vary by Alternative

Coastal beach and dune habitat continues to be some of the most threatened habitats in the U.S. The habitats are part of a naturally unstable, dynamic ecosystem that is subject to erosion and accretion processes due to wind and wave action. Development, beach stabilization projects, and heavy recreational use affect the quality of this habitat for wildlife species of conservation concern. The approximately 21 acres on Nantucket NWR are part of the larger barrier beach ecosystem on the Coskata-Coatue Peninsula.

The Service has the responsibility for protecting migratory birds under international migratory bird treaties with Mexico and Canada. Providing habitat for declining coastal plain and beach birds is an important contribution to the region. Many species of conservation concern use Great Point, including the refuge, during the breeding season, in migration, or during winter.

Piping plovers are beach-nesting shorebirds that are found only in North America, and have suffered declines over the last century due to hunting, and most recently, the degradation and loss of coastal habitat as a result of increased human modification and use. They serve as an umbrella species, because protection of available nesting, foraging, and staging habitat for piping plovers also provides habitat for other shorebird species.

Since the piping plover was federally listed in 1986 and specific management guidelines were developed in 1994, both the Service and State (MassWildlife) have worked to coordinate consistent implementation and enforcement of these guidelines on all private and public coastal landowners in Massachusetts. The management guidelines for piping plover also protect the other focal species identified in BCR 30, PIF Physiographic Area 09, MA CWCS, and ACJV that share this important and declining beach habitat. The protection of species of conservation concern, including those that are State-listed and/or federally listed, is a responsibility and an opportunity for the Nantucket NWR.

In addition to the piping plover, other species of conservation concern include American oystercatcher, common, least and roseate terns, seaside (*Ammodramus maritimus*) and saltmarsh (*Ammodramus caudacutus*) sparrows, northern harrier, and wintering waterfowl. Roseate terns are also a federally listed species that are thought to have bred in common tern colonies on Nantucket in the 19th century. Gray seals use Great Point as a haul-out site. Recently delisted from special concern status in Massachusetts in 2000, they continue to be protected under the MMPA.

Under all three alternatives the refuge strives to protect and manage for migratory birds, as stated in the refuge purpose. The level of protection and management of the barrier beach ecosystem varies by alternative.

Due to the dynamic nature of coastal habitats, there is a continuous fluctuation in the geographic distribution of resources. Therefore, it is necessary to view coastal habitat protection and management in a regional ecosystem context. The ability of the Nantucket NWR to meet its purpose as a wildlife sanctuary for migratory birds 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 refuge 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.

**Dune and Shoreline Habitat
Impacts of Alternative A
(Current Management)**

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 physical alterations and direct impacts to wildlife that result.

Studies have shown that beach use including use of OSVs negatively impacts productivity of beach-nesting birds, particularly piping plovers. Vehicle use has 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. Flemming (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 vehicle's 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).

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. Due to limitations in staffing and funding, refuge staff are unable to conduct site visits and biological management more than several times per year.

This results in passively coordinating with TTOR for piping plover management on the refuge, including fencing and OSV access.

Under the current level of Service participation, the land acreage, and the volume of visitors each year, it is presently uncertain if there is more the refuge can do to be fully in compliance with all applicable laws and guidelines, including for piping plover, despite the key support from onsite partners. Despite the efforts of TTOR to delineate and enforce closures, there are occasions where these closures are violated both by pedestrian and OSV traffic. Under this alternative, our level of involvement would remain the same, and we would continue to rely on TTOR to adaptively manage the refuge to meet the requirements of the piping plover recovery guidelines.

The ability of the Nantucket NWR to meet its purpose is currently limited by its small area and popularity as a tourist and fishing destination. Under the current alternative, we would only consider other land acquisition opportunities if the Service were notified of availabilities in Federal excess properties in Nantucket County in the future, but would not actively pursue these lands or opportunities.

**Dune and Shoreline Habitat
Impacts of Alternative
B (Service-preferred
Alternative)**

Under alternative B we would increase Service involvement in protection and management of the approximately 21 acres of dune, beach, and intertidal habitats along 3,000 feet of shoreline to benefit nesting and migrating shorebirds, colonial water birds, neotropical migrant land birds, raptors of conservation concern, and marine mammals. We would provide greater protection of coastal dune and shoreline habitats in balance with priority public uses. More onsite refuge seasonal staff would provide greater protection to habitat through increased public awareness, enforcement of closures, and additional signage.

In addition to its importance to coastal bird species for nesting, coastal dune and beach berm habitats provide necessary resting and staging habitat for migrating birds. Many species of shorebirds (*Charadrii*) 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 (Helmert 1992, Myers et al. 1987, Senner and 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 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 and sanderlings 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). 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 2000). We have not quantified migrating shorebird use of

Nantucket NWR, but data on species use and potential disturbance may be collected in future years.



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String fencing

We would increase Service involvement and onsite presence from current levels to maintain or enhance existing piping plover populations with a minimum of two plover pairs at a productivity level of 1.5 chicks fledged /pair in accordance with the Piping Plover Recovery Plan guidelines. To achieve this goal, the refuge would be divided into five zones that would be fenced off at appropriate times to protect suitable habitat for breeding piping plover, and also for staging terns, and hauled-out seals. Adaptive management would be used to guide zone closures depending on time of year and species presence (see chapter 2). Zone management would be active beginning April 1, but go no later than September 15. New research and inventory and monitoring would also allow greater use of adaptive management to better protect habitat and better respond to shifting coastal habitat dynamics.

Greater public education and outreach and law enforcement by refuge staff would increase awareness that would be intended to increase

protection to nesting plovers. Predator control measures would be employed as needed to protect plovers. In addition, biological integrity of dune habitat would be maintained through invasive species monitoring and control as needed, and the use of prescribed fire if warranted.

The Service would also work with partners on partner lands to increase local and regional conservation efforts to protect species of concern, including beach-nesting and staging avian species as well as New England cottontail. New England cottontail specimens have been documented from both Martha's Vineyard and Nantucket Islands (Godin 1977), and this species was present on Tuckernuck Island (Nantucket) prior to the release of eastern cottontails in the early 20th century (T. French, personal communication, 2010). New England cottontails are currently present on Cape Cod. These islands were at one time connected with Cape Cod when sea levels were low following the last glacial maximum (approximately 21,000-18,000 BP).

The Service's New England Field Office would provide leadership, coordination, and technical expertise to survey, monitor, and assess habitat condition for New England cottontail on Nantucket as appropriate under this alternative. It is possible that New England cottontail would be released in suitable habitat on partner lands on Nantucket, however, many factors would need to be assessed first including habitat availability and connectivity, the feasibility of such an introduction and the subsequent management program, and the viability of such a population on the island.

Successfully releasing rabbits on coastal islands has occurred for over a century. Nantucket was the first of Massachusetts' coastal islands to be stocked with eastern cottontails prior to 1900 (Johnston 1972). Nantucket then became a stocking source for other coastal islands including Martha's Vineyard, beginning in 1920. Approximately 79 individuals from Vermont, "out-of-state," and the mainland were translocated to Penikese Island in 1925, with no prior record of rabbits present; the individuals from Vermont were likely New England cottontail

while the others were likely eastern cottontail (Johnston 1972, T. French, personal communication, 2010). This became the source population of a stocking program by the State, and over 4,600 rabbits were transferred to the mainland over the next 15 years.

Recently, the State of Massachusetts has established an objective “to establish self-sustaining refuge populations of New England cottontails on selected coastal islands of Massachusetts” (MA DFG 2006). To date, New England cottontail was released on Grape Island in Massachusetts in 1985, and by 1996 over 40 individuals were estimated (Cardoza 1998). Collaboration with MassWildlife to release New England cottontails on Nantucket would help fulfill this objective for the State, and provide additional support for ongoing monitoring and management of this species should it be released on Nantucket.

Through land acquisition and implementation of the North Atlantic LCC, the Service would be able to set aside additional coastal lands for conservation, share resources and scientific information with partners, and collaborate on management activities to protect a greater amount of beach berm and dune habitat under this alternative.

More proactive land protection efforts with partners would provide opportunities to permanently protect more coastal dune and shoreline habitats. The Service has identified approximately 1,790 acres in land acquisition, conservation easements, and management agreements in Nantucket County. Conservation easements and/or management agreements with our partners on the Coskata-Coatue Peninsula, TTOR and NCF, would enhance protection of these barrier beach resources through more consistent and coordinated management across properties, sharing of management resources, and increased long-term protection of these lands.

Under this alternative, we would also seek to acquire the one-acre Coast Guard inholding with the lighthouse, as well as other private inholdings on the peninsula given their proximity to the refuge. Acquisition of these properties would ensure their protection in perpetuity, contribute to the goal of a seamless management paradigm on the peninsula, and would ensure prioritization of natural resources management on these lands. This would include string fencing, monitoring and other management considerations for piping plover and other beach-nesting species, predator and invasive species control, and inclusion in proposed access restrictions as appropriate and required. Additionally, existing houses could provide much-needed seasonal facilities for refuge staff and equipment storage.

Portions of Muskeget Island are also of interest for acquisition given the island’s historical role as a common and roseate tern colony site. The island also supports 62 species on the regional bird list. In 2008, 6 pairs of piping plovers nested and fledged 12 young plovers. Twenty-three species of wading birds, shorebirds, waterfowl, and passerines have nested on the island in the past. The shallow waters and shoals of Muskeget Channel are highly productive for marine fish and shellfish. Muskeget Island is also a potential reintroduction site for the Northeastern beach tiger beetle (*Cicindela dorsalis*), and supports the largest group of breeding gray seals in the United States. We would work with the town of Nantucket and private landowners to facilitate conservation of these important coastal resources in perpetuity.

Incorporating these acres into the Nantucket NWR would enable consistent and coordinated beach and dune management with other Service-owned property on lands previously utilized for other purposes. Reintroduction of the Northeastern beach tiger beetle, habitat restoration for terns or other beach-nesting species, and control of invasive species and predators when necessary are all potential

management actions that would benefit coastal species of concern. These actions may not be occurring at all now, or if they are, they may not be to the extent necessary to reach intended conservation goals. When present, piping plover and roseate tern would benefit in particular because the Service is mandated to ensure that their respective species recovery guidelines are met or exceeded.

Other lands on Nantucket Island include additional Federal excess properties (e.g., FAA and LORAN sites). The FAA site contains coastal shrubland habitat that may be suitable for New England cottontail, and also hosts several federally listed and State-listed plants (sandplain blue-eyed grass (*Sisyrinchium fuscatum*), bushy rockrose (*Crocanthemum dumosum*), and Nantucket shadbush (*Amelanchier nantucketensis*)). The former LORAN station is composed of beach and dune habitat on the southern portion of the property. The adjacent beach areas are very sparsely developed with limited human activity. This area is critical habitat for piping plovers as defined in the Piping Plover Recovery Plan. It is also used by many other species of shorebirds and wading birds. We would request no-cost transfers for these properties.

Though these properties are currently in Federal ownership and are thus protected from development and other potentially deleterious occurrences, the FAA and Coast Guard have vastly different agency missions than the Service. By including these properties into the Nantucket NWR, not only are these lands ensured protection in perpetuity (whereas currently as Federal excess properties they are not), but also natural resource management becomes prioritized to promote healthy beach and dune ecosystem function and provide suitable habitat for piping plover and other beach-nesting species of concern. Consistent management of similar habitats throughout the island by the agency mandated to protect public trust resources cannot be overstated in its importance and its benefit to local conservation goals.

Maintenance and/or recovery of rare and other species of concern would also be a management priority. Service ownership of the FAA site would eliminate the need to acquire permission to release New England cottontail, and would moreover facilitate any habitat maintenance and monitoring efforts necessitated by such a release.

The combination of these properties, if acquired, would provide extensive conservation of beach habitat in and around Nantucket Island. It would ensure that these properties remain available to species of conservation concern, including the federally listed piping plover.

**Dune and Shoreline Habitat
Impacts of Alternative C
(Wildlife Diversity
Emphasis)**

Similar to alternative B, we would increase Service involvement in protection and management of the approximately 21 acres of dune, beach, and intertidal habitats along 3,000 feet of shoreline to benefit nesting and migrating shorebirds, colonial water birds, neotropical migrant land birds, raptors of conservation concern, and marine mammals.

Some portion of the refuge (at least Zone 6) would be closed to vehicular and pedestrian use during the bird nesting and migration/staging season (April 1-Sept. 15). This would allow the plovers undisturbed access to the refuge's entire available habitat, and would allow us to evaluate any changes in abundance and distribution in the absence of human activity. As stated in the Piping Plover Recovery Plan, disturbance by vehicles, pedestrians, and pets adversely affects plover productivity. Vehicles in particular pose threats since they can reach remote stretches of beach and can easily crush eggs, chicks, and adults. Plover chicks frequently move between the foredune, beach, wrack line, and intertidal areas. They also can get stuck in tire ruts and are slow to get out of the way of

Elizabeth Wunker/USFWS



Seabirds on refuge beach at low tide

moving vehicles. Dogs, kite-flying, and fireworks also adversely affect plover productivity (USFWS 1996).

Similar to alternative B, increased Service involvement and onsite presence would help maintain or enhance existing piping plover populations with a minimum of two plover pairs at a productivity level of 1.5 chicks fledged / pair in accordance with the Piping Plover Recovery Plan guidelines. Alternative C would provide the greatest protection and active management for plovers and other beach-nesting birds by symbolically fencing all suitable habitat prior to April 1, increasing enforcement of piping plover guidelines to protect suitable habitat and maximize protection of nests and chicks, and more aggressive predator control to protect nesting plovers. The Service would ensure that the refuge is managed to comply with piping plover guidelines.

Further protection of the dunes would occur with more restrictive OSV and pedestrian travel through and around dunes during the busy summer months by implementing a new system of zone management on the refuge. Because of these increased access restrictions, we would provide a primitive trail to allow access to the refuge's eastern beaches and to direct access through the dunes to minimize impacts. Impacts from such a trail and the use of a trail mat, as well as the associated signage would be the same as described in alternative B.

We would maintain an undisturbed wrack line through adaptive management using research and monitoring of OSV impacts to wrack. Invasive species monitoring and control as needed would further protect habitat conditions.

Similar to alternative B, we would seek to expand the Nantucket NWR through acquisition of Federal excess properties located on Nantucket. More proactive land protection efforts compared to current levels with partners would provide opportunities to permanently protect more coastal dune and shoreline habitats and emphasize the protection of, and management for, coastal species of concern, including piping plover.

Effects on Public Access, Education, and Community Outreach

Public Access, Education, and Community Outreach Impacts That Would Not Vary by Alternative

Tourism is the basis of Nantucket's economy. The Coskata-Coatue Peninsula, including the refuge, attracts 40,995 day visitors a year. Five priority public uses are allowed on the refuge: fishing, wildlife observation, photography, interpretation, and environmental education. Access to Nantucket NWR is usually via OSV and by boat. Foot access from the Wauwinet Gatehouse is permissible, but is generally undesirable as it involves a 5-mile walk. OSV use is not a priority public use, but greatly facilitates the five priority public uses on the refuge. Key adjacent landowners (NCF, TTOR) also provide opportunities for the five priority public uses offered on the refuge, as well as hunting.

The five priority public uses would continue under all three alternatives. The location and timing of public use varies by alternative, as well as the ability of the refuge to monitor and manage such uses.

Public Access and Use Impacts of Alternative A (Current Management)

The distance of the refuge from the refuge complex headquarters and current levels of staffing and funding limit the Service's ability to develop and deliver the programming content and messaging that fulfills the Service's educational goals and priority use mandates. Currently, any environmental education or interpretation that occurs on the refuge is through partners. Under alternative

A the Service would continue to rely on the interest and availability of Service partners to provide programming as staffing and funding allow.

The limited outreach, interpretation, and enforcement by the Service under this alternative does not ensure that existing levels of public use and daily activities comply with Federal, State, and local endangered species or dune protection laws. The Service is only able to provide minimal oversight of vehicular and pedestrian traffic on the dunes and beach. Lack of outreach and interpretation limits the ability to educate a wider audience about Nantucket's coastal ecosystem, the dynamic, ever-changing barrier beach-dune, and the sensitivity of habitats and associated wildlife. This lack of interpretation and enforcement leads to improper public use of and access to sensitive areas on the refuge. The lack of interpretation and enforcement also results in lack of awareness in general of the presence of a NWR on the Coskata-Coatue Peninsula, and a lack of awareness of refuge policies and how they might differ from those of the adjacent landowners.

Under alternative A the refuge would continue to be open daily from a ½ hour before sunrise to a ½ hour after sunset for the five priority public uses allowed on the refuge. Use of symbolic fencing with signs, and some seasonal closures would limit public use in some areas of the refuge for specific periods during the nesting season.

**Public Access and Use
Impacts of Alternative
B (Service-preferred
Alternative)**

Alternative B would provide greater protection of coastal dune and shoreline habitats in balance with expanded opportunities for the five priority public uses. Expanded opportunities for the priority public uses, with an emphasis on fishing and wildlife observation and interpretation would be provided through a more coordinated environmental education program with partners, expanded refuge tours, weekly interpretive programs, increased participation in annual fishing events, and more interpretive materials.

Public access would still be guided by symbolic fencing during the breeding season, and greater use of adaptive management and onsite presence to determine zone closures and openings would result in shifting areas that would be accessible to OSVs and/or pedestrians. OSV traffic would be directed to less sensitive areas and around nesting and/or migrating wildlife to avoid adverse impacts or conflicts. Closures would be continuously updated on the refuge Web site to alleviate confusion and to keep visitors notified of latest information. Despite the lack of recreational use during the nesting and migration seasons to much of the refuge, there would be opportunities to participate in refuge activities conducted by refuge staff, such as through interpretive programs, refuge-organized tours, and the proposed Web cam at the lighthouse.

The Service would seek to partner with TTOR and NCF to establish a shared visitor contact facility. A visitor center and welcome area at a strategic location would allow the Service to better fulfill its mission and provide refuge staff with an office and storage area. A new kiosk at the Wauwinet gatehouse and more Service signs would increase visibility and awareness of refuge policies and educate visitors to Coskata-Coatue Wildlife Refuge and Nantucket NWR about fish and wildlife and their conservation. Signage throughout the refuge would be augmented to include interpretive panels and these would need to be maintained. All signage or additional infrastructure placed on the refuge would be built to maintain the aesthetics of the property.

The Service would 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 distributing printed materials describing local sport fish of interest and applicable fishing regulations. We would explore partnerships with the Nantucket Anglers Club and other groups to ensure quality fishing opportunities and experiences on the refuge.

These endeavors would be enacted to increase awareness of the presence of a NWR on the Cuskata-Coatue Peninsula, educate visitors about the importance of coastal resources, human impacts on wildlife and the function of beach closures, and increase awareness about refuge policies while continuing to provide access to some portions of the refuge throughout the busy summer months.

The additional acreage gained by the acquisition of Federal excess and purchased properties would also provide more refuge points-of-contact to islanders and island visitors. Whereas Nantucket NWR currently is solely located at the tip of the Cuskata-Coatue Peninsula and must therefore be accessed through adjacent landowners, other Service-owned properties scattered throughout Nantucket Island would provide additional opportunities for signage to increase awareness of the refuge. Though the availability of additional refuge property would not likely result in a noticeable decrease in visitation to the current Great Point location of the refuge, it would provide additional opportunities for recreation and interpretation, and allow for the expansion of proposed environmental education programs when feasible and appropriate.

**Public Access and Use
Impacts of Alternative
C (Wildlife Diversity
Emphasis)**

Under alternative C, the priority public uses allowed on Nantucket NWR would be accommodated only when they are not in conflict with biological priorities. Recreational use of the refuge would be restricted to a small portion allowing OSV access from April 1 through September 15 to provide adequate habitat availability for migrating and nesting birds and seals, or until such time as it no longer poses a disturbance to those species. The Service would collaborate with partners to disseminate information on the seasonal closures and restricted uses of the refuge.

Despite the lack of recreational use during the nesting and migration seasons to much of the refuge, similar to alternative B, there would be opportunities to participate in refuge activities conducted by refuge staff, such as through interpretive programs, refuge-organized tours, and the Web cam at the lighthouse. Wildlife photography and observation would be enhanced through the availability of refuge brochures and interpretive signs highlighting refuge species and habitats and would indicate opportunistic places to view wildlife on the refuge. Environmental education on the refuge would be conducted through the help of partners and local schools to create materials, programs, and field trips in compliance with State curriculum guidelines. Outreach efforts would include activities such as community beach grass planting work days to help stabilize dunes and restore previously used foot trails.

Similar to alternative B, the Service would seek to partner with TTOR and NCF to establish a shared visitor contact facility, as well as the installation of a kiosk at the gatehouse and interpretive panels on the refuge. A refuge trail would provide directed pedestrian access to parts of the refuge closed to OSVs. We also would evaluate the possibility of contracting with a concessionaire to provide guided fishing tours for the general public. In addition, we would post seasonal harvest information on the refuge kiosk and Web site. The increase in staffing support would ensure that opportunities for fishing remain a refuge priority, and that these opportunities comply with Federal, State, and local endangered species or dune protection laws.

Any additional property acquired as no-cost fee title transfers from other Federal agencies would provide additional opportunities to increase general awareness of the refuge through signage and provide some additional opportunity for recreation and interpretation.

Effects on Socioeconomic Resources

Socioeconomic Impacts That Would Not Vary By Alternative

In analyzing the socioeconomic consequences of the actions under the three alternatives, we evaluated our refuge revenue sharing, tax revenue impacts, refuge visitor expenditures in the local economy, and refuge staff and work-related expenditures in the local economy.

Under provisions of the Refuge Revenue Sharing Act local towns receive an annual payment for lands that have been purchased in full fee simple acquisition by the Service. In Massachusetts, the payments are based on three-quarters of one percent of the appraised market value. The exact amount of the annual payment depends on the Congressional appropriation, which in recent years have tended to be less than the amount to fully fund the authorized level of payments. In 2009, the payment to the town of Nantucket was \$346. We do not expect any major changes in the level of revenue sharing payments, unless Congress changes its annual appropriation for revenue sharing. The alternatives differ in the potential for new land acquisitions from interested landowners; new fee acquisitions would result in concomitant increases in revenue sharing.



Great Point Lighthouse

USFWS

Tourism is the basis of Nantucket's economy. Visitation to the Coskata-Coatue Peninsula, which includes the TTOR and refuge properties, attracts 40,995 day visitors a year, contributing to Nantucket's overall visitation and local economy. Research has also shown that by offering places where visitors can enjoy watching birds and other wildlife, local economies benefit from increased sales at local businesses for food, lodging, fuel, and supplies and from associated tax revenues. Under all three alternatives the access to the refuge will remain via the abutting TTOR land and will continue to remain open for five priority public uses: fishing, wildlife observation, photography, interpretation, and environmental education. The alternatives differ in the duration and location of these public uses.

Socioeconomic Effects of Alternative A (Current Management)

Refuge Visitor Expenditures

Nantucket NWR is located on Great Point on the Coskata-Coatue Peninsula and, as such, is a major destination of visitors to the peninsula. Access to Coskata-Coatue is limited to those who have purchased TTOR permits. While permits provide a significant revenue source to TTOR, they are negligible to the overall regional economy. The Service does not collect or use funds from permit fees. In recent years, TTOR and NCF have averaged approximately 3,000 permits a year and generated over \$300,000 from permit fees collected at the gatehouse. Public use is estimated to be nearly one percent of the baseline output to lodging, grocers, restaurants, and sporting and outdoor stores in the region (Nantucket and Barnstable Counties). The primary uses of the refuge are beach activities like picnicking, sunbathing, and fishing (USFWS 2000).

Impacts from Refuge Administration

Administratively, the Nantucket NWR is an unstaffed satellite station of the Eastern Massachusetts NWR Complex, headquartered in Sudbury,

Massachusetts. There are no staff stationed on Nantucket Island, however, refuge complex biologists conduct site visits several times a year. The refuge maintains no facilities on the island. Since there are no onsite staff and only minor active management activities, we contribute negligibly to the local economy in terms of refuge staff jobs, income, expenditures, and purchases of goods and services for refuge activities.

Socioeconomic Effects of Alternative B (Service-preferred Alternative)

Refuge Visitor Expenditures

Alternative B would expand existing opportunities for five priority public uses, with an emphasis on fishing, wildlife observation, and interpretation. Specifically new programs would include a more coordinated environmental education program with partners, expanded refuge tours, weekly interpretive programs, increased participation in annual fishing events, a Web cam at the lighthouse, and more interpretive materials. This would likely result in greater numbers of visitors to the refuge and an associated increase in expenditures in the local community by these visitors. This would also generate more income from permit fees, collected by TTOR and NCF at the gatehouse (the entrance to the Coskata-Coatue Peninsula).



Amanda Boyd/USFWS

Fishing

Impacts from Refuge Administration

Alternative B proposes an increase in the level of staffing at the Eastern Massachusetts NWR complex to address management issues and visitor services.

Three proposed positions for the refuge complex include: a half-time, year-round visitor services specialist; a full-time biologist; and a law enforcement officer that would also monitor Monomoy, Mashpee, and Nomans Land Island NWRs. Although only a portion of staff time of these new positions would be spent on Nantucket, there would be an increase in local expenditures from refuge administration. More goods and services would be purchased locally with an increase in onsite staffing and the creation of interpretive materials (e.g., kiosk). An increase in refuge tours and the possible addition of a refuge van would likewise contribute to the local economy. If plans for a proposed visitor contact station shared by multiple partners comes to fruition this could provide a larger economic boost to the local community. Any new fee acquisitions by the Service as proposed under alternative B would be acquired through a no-cost fee title transfer or would likely occur with assistance from other non-profit agencies. Therefore, outright costs would remain relatively low for property acquisition, yet would result in a concomitant increase in refuge revenue sharing payments to minimize any losses in tax revenue to the town.

Socioeconomic Effects of Alternative C (Wildlife Diversity Emphasis)

Refuge Visitor Expenditures

Under alternative C the priority public uses allowed on Nantucket NWR would be accommodated only when they are not in conflict with biological priorities. Recreational use of Great Point would be restricted to a small portion of the refuge from April 1 through September 15 to provide adequate habitat availability for migrating and nesting birds and seals, or until such time as it no longer poses a disturbance to those species. Despite the limited recreational use during the nesting and migration seasons, there would be opportunities to participate in refuge activities, such as through refuge-organized tours and interpretive programs, environmental education with partners upon request, and the Web cam. Despite increased programming from current management, the limited access to the refuge in alternative C could potentially result in a decrease

in onsite refuge visitors, and this may result in the refuge no longer being the tourism draw that it currently is on Nantucket.

Impacts from Refuge Administration

Impacts from refuge administration under alternative C would be similar to alternative B, except for the potential purchase of a refuge van and increases in year-round van tours, which is not part of this alternative. Property acquisitions through fee title transfers from other Federal agencies would be at minimal or no cost to the Service; however, refuge revenue sharing payments would increase concomitantly with the acquisition of additional land.

Cumulative Impacts

Cumulative impacts on the physical, biological, and human environment result from the combined effects of the proposed actions added to those of other past, present, and reasonably foreseeable future actions. They can result from individually minor but collectively significant actions taking place over a period of time.

This assessment of cumulative impacts includes other agencies' or organizations' actions if they are interrelated and influence the same environment. Thus, it considers the interaction of activities at the refuge with others occurring in a larger spatial and temporal frame of reference.

Air Quality

Air quality is generally good in the region. Some areas in Massachusetts periodically experience high ozone levels; however, the island location of the refuge ensures relatively good air quality. We expect none of the activities on the refuge to contribute to any measurable incremental increase in ozone levels or other negative air quality parameters. We expect none of the alternatives to cause any greater than negligible cumulative adverse impacts on air quality locally or regionally. With our partners, we would continue to contribute to improving air quality through cooperative land conservation and management of natural habitats.

Water Quality and Soils

There would be no significant cumulative adverse effects to water quality or soils under any of the alternatives. We would continue to manage public access and uses to minimize adverse impacts to water quality and soils. Vehicle use, which can impact water quality and soils if improperly used, would continue to be controlled through a gatehouse, permitting, and deflating of tires while on sand.

The Coskata-Coatue Peninsula, which includes the refuge, is exposed to the natural coastal processes of accretion and erosion, or the deposition and removal, of sand along shorelines. Sand that is eroded, or removed, from one beach will be transported downdrift and will accrete, or be added, on another. These processes are influenced by many factors, some of which include 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. These movements of sand provide ever changing coastlines and habitats for many species of wildlife. These coastal dunes and barrier beaches are important in preventing storm damage prevention and in flood control. Working collaboratively to maintain this dynamic system is important to achieve cumulative benefits to water quality and soils.

Nantucket Island is surrounded by the Atlantic Ocean and the refuge is located on a peninsula in the northeast corner of the island. The only source of fresh water on the island is from precipitation and infiltration. The waters immediately north of Nantucket, in Nantucket Sound, are designated as a NDA. Boats may not discharge any sewage, treated or otherwise, in these waters immediately

adjacent to Nantucket Island, to protect this ecologically and recreationally important area. Enforcing this restriction will continue to be important to protect quality of near-shore waters.

Biological Resources

All alternatives would strive to maintain or improve biological resources on the refuge. The combination of our management actions with those of our key partners results in beneficial cumulative effects. Key partners and adjacent landowners on the Coskata-Coatue Peninsula, TTOR, and NCF, also manage their large beach properties for wildlife conservation and recreation in compliance with Federal and State threatened and endangered species laws, including the piping plover guidelines (MA NHESP 1993). This provides contiguous, extensive potential habitat for many of these species of conservation concern, and we would work closely with these partners to coordinate management and monitoring of these important species and habitats. Biological resources, such as invasive plant species, that we would manage to prevent introduction, limit, or eliminate, are not natural components of the refuge; their losses where they occur would not be considered adverse. Collaborating on land conservation would protect additional barrier-beach ecosystems that are severally threatened by land development and intense human recreational activities. Collectively we can provide consistent messages about the sensitivity of habitats and wildlife on the peninsula.

The Commonwealth of Massachusetts released an Ocean Management Plan in 2009, which identified locations off the Massachusetts coast where wind energy development sites would potentially be allowed. In addition, a large-scale development, the Cape Wind Project, is proposed on Horseshoe Shoal in Nantucket Sound. Of particular concern is the impact that offshore wind turbines will have on bats, birds, and marine resources. The Cape Wind Project would be located an estimated 14 miles from the town of Nantucket; since the full extent of the impacts an offshore wind farm will have on local biological resources is not known, it remains to be seen what if any impacts such a development will have on the wildlife that use Nantucket NWR.

The Service's land management jurisdiction on the refuge ends at the low water line. Therefore, any proposed developments in waters off of Nantucket Island do not fall under the jurisdiction of refuge staff but are subject to Service review because the Service is mandated to protect migratory birds and species listed under the ESA. Because of this, the Service has a responsibility to review wind energy proposals on a case-by-case basis, to evaluate any deleterious impacts to terrestrial and marine wildlife, make recommendations to minimize impacts, and/or provide guidelines within which proposals can avoid violation of Federal wildlife laws. This responsibility is conducted by the Service's New England Field Office in Concord, New Hampshire. Refuge staff will work with other Service staff to recommend environmental studies to fill known data gaps.

Socioeconomic Environment

We expect none of the three proposed alternatives to have a significant adverse cumulative impact on the economy of the town or county in which refuge lies. We would expect none of the alternatives to alter the demographic or economic characteristics of the local community. The actions we propose would neither disproportionately affect any communities nor damage or undermine any businesses or community organizations. Implementing any of the alternatives would result in minor beneficial impacts on the communities nearest the refuge.

More emphasis on education and outreach in alternatives B and C should foster more understanding and appreciation of resource issues and needs, and could lead to increased political support and funding, which could positively affect fish and wildlife resources on the refuge and on Nantucket Island. The increased



Elizabeth Wunke/USFWS

Sunset at the tip of Great Point

outreach of these alternatives could also positively affect land use decisions outside the refuge by local governments and private landowners, and thus, lead to increased fish and wildlife populations over a broader area.

Cultural 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. 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, including the refuge, as such.

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. 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 offers the potential that similar items of archaeological importance could be found on the refuge. 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.

We expect none of the alternatives to have significant adverse cumulative impact on cultural resources. Under all three alternatives we would work to prevent the loss of cultural and archaeological resources and work collaboratively with our partners to protect these resources. Under all three alternatives, we would initiate an archaeological survey prior to any ground-disturbing activities.

Climate Change

Department of the Interior Secretarial Order 3226 states that "there is a consensus in the international community that global climate change is occurring and that it should be addressed in governmental decision making. This Order

ensures that climate change impacts are taken into account in connection with Departmental planning and decision making.” Additionally, it calls for the incorporation of climate change considerations into long-term planning documents such as the CCP.

The Wildlife Society published an informative technical review report in 2004 titled “Global Climate Change and Wildlife in North America” (Inkley et al. 2004). It interprets results and details from such publications as the IPCC reports (1996-2002) and describes the potential impacts and implications on wildlife and habitats. It mentions that projecting the impacts of climate change is hugely complex because not only is it important to predict changing precipitation and temperature patterns, but more importantly, to predict their rate of change, as well as the exacerbated effects of other stressors on the ecosystems. Those stressors include loss of wildlife habitat to urban sprawl and other developed land uses, pollution, ozone depletion, exotic species, disease, and other factors.

The effects of climate change on populations and range distributions of wildlife are expected to be species-specific and highly variable, with some effects considered negative and others considered positive. Generally, the prediction in North America is that the ranges of habitats and wildlife will generally move upwards in elevation and northward as temperature rises (Inkley et al. 2004). The Wildlife Society report, however, emphasizes that developing precise predictions for local areas is not possible due to the scale and accuracy of current climate models, which is further confounded by the lack of information concerning species-level responses and to ecosystem changes, their interactions with other species, and the impacts from other stressors in the environment. In other words, only imprecise generalizations can be made about the implications of our refuge management on regional climate change.

Our review of proposed actions in this CCP suggest that only one activity may contribute negligibly, but incrementally, to stressors affecting regional climate change: the use of vehicles by visitors and by staff to travel to and on the refuge from the complex headquarters in Sudbury, Massachusetts. We discuss the direct and indirect impacts of those activities elsewhere in chapter 4. With regards to our travel logistics, we are trying to reduce our carbon footprint wherever possible by driving hybrid vehicles, and using recycled or recyclable materials, along with reduced travel and other conservation measures.

In our professional judgment, most of the management actions we propose would not exacerbate climate change in the region or project area, and in fact, some might incrementally prevent or slow down local impacts. The Wildlife Society report provides 18 recommendations to assist land and resource managers in meeting the challenges of climate change when working to conserve wildlife resources (Inkley et al. 2004). Their position is that if land and resource managers collectively implement these recommendations, then cumulatively there would be a positive impact of addressing climate change. We discuss our actions relative to addressing some of these recommendations:

■ ***Recognize climate change as a factor in wildlife conservation.***

The Service is taking a major role among Federal agencies in distributing and interpreting information on climate change. There is a dedicated webpage to this issue at <http://www.fws.gov/home/climatechange/> (accessed March 2011). The Service’s Northeast Region co-hosted a workshop, attended by all refuge supervisors, in June 2008 titled “Climate Change in the Northeast: Preparing for the Future.”

- ***Manage for diverse conditions.***

Our proposed habitat management actions described in chapter 3 is intended to promote healthy, functioning shrub, wetland, and beach communities. We will implement an adaptive management approach as new information becomes available.

- ***Do not rely solely on historical weather and species data for future projections without taking into account climate change.***

This recommendation relates to the point that historical climate, habitat and wildlife conditions are less reliable predictors as climate changes. For example, there may be a need to adjust breeding bird survey dates if migratory birds are returning earlier to breed than occurred historically. A 3-week difference in timing has already been documented by some bird researchers. We are aware of these implications and plan to build these considerations into our IMP so that we can make adjustments accordingly. Our results and reports, and those of other researchers on the refuge, will be shared within the conservation community.

- ***Expect surprises, including extreme events.***

Refuge managers have flexibility within their operations funds to deal with emergencies. Other regional operations funds would also be re-directed as needed to deal with an emergency.

- ***Prevent and control invasive species.***

This recommendation emphasizes the increased opportunities for invasive species to spread because of their adaptability to disturbance. Invasive species control will be essential, including extensive monitoring and control to preclude larger impacts. The Northeast Region, in particular, has taken a very active stand. In chapter 3, we describe our plans on the refuge to control invasive plants.

- ***Ensure ecosystem processes.***

This recommendation suggests that managers may need to enhance or replace diminished or lost ecosystem processes. Manually dispersing seed, reintroducing pollinators, and treating invasive plants and pests are examples used. While we plan to take an aggressive approach to treating invasive plants, we do not believe at this time there is any need to enhance or replace ecosystem processes. Further, none of our proposed management actions will diminish natural ecosystems processes underway. Should our monitoring results reveal that we should take a more active role in enhancing or replacing those processes, we will re-evaluate and/or refine our management objectives and strategies. This is particularly important on Nantucket Island, where the refuge is exposed to the effects of sea level rise and where dynamic processes are constantly changing refuge conditions.

- ***Employ monitoring and adaptive management.***

This recommendation states that we should monitor climate and its effects on wildlife and their habitats and use this information to adjust management techniques and strategies. Given the uncertainty with climate change and its impacts on the environment, relying on traditional methods of management may become less effective. We agree that an effective and well-planned monitoring program, coupled with an adaptive management approach, is essential to dealing with the future uncertainty of climate change. We have built both actions into our CCP. We will develop a detailed step-down IMP designed to test our assumptions and management effectiveness in light of on-going changes. With that information in hand, we will either adapt our management techniques, or re-evaluate or refine our objectives as needed.

Relationship between Short-term Uses of the Human Environment and Enhancement of Long-term Productivity

All of the alternatives strive to maintain or enhance the long-term productivity and sustainability of natural resources and migratory birds across all landscape scales on the refuge and in the region. The alternatives strive to conserve our Federal trust species and the habitats they depend on. Outreach and environmental education are a priority in each alternative to encourage visitors to be better stewards of our environment. In summary, we predict that all alternatives would contribute positively to maintaining or enhancing the long-term productivity of the environment.

Unavoidable Adverse Effects

Unavoidable adverse effects are the effects of those actions that could cause significant harm to the human environment and that cannot be avoided, even with mitigation measures. There would be some minor, localized unavoidable adverse effects under all the alternatives. For example, constructing a visitor's center under alternatives B and C would produce minor, localized, adverse effects. Installing fencing, signs, and kiosk has negligible adverse effects, which are more than off-set by the benefits of protecting resources and guiding public uses. Land acquisition entails an unavoidable impact on local governments due to the loss of tax revenues as ownership changes from private to public. This loss is off-set by refuge revenue sharing payments. None of the unavoidable adverse effects rise to the level of significance. All would be mitigated, so there would in fact be no significant unavoidable adverse impacts under any of the alternatives.

Potential Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those which cannot be reversed, except perhaps in the extreme long term or under unpredictable circumstances. An example of an irreversible commitment is an action which contributes to a species' extinction. Once extinct, it can never be replaced. We would anticipate no irreversible commitments of resources under any of the alternatives.

In comparison, irretrievable commitments of resources are those which can be reversed, given sufficient time and resources, but represent a loss in production or use for a period of time. We could consider kiosks and educational signs built in collaboration with the partners, irretrievable commitment of resources. However, we can dismantle those facilities and restore the sites if resource damage is occurring. The construction of an offsite visitor center under alternatives B and C would result in irretrievable commitment of resources; however given the limited footprint of such a facility, coupled with the benefits from engaging the community and visitors in learning about barrier-beach ecosystems, we do not believe a significant cumulative impact would result.

Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (February 11, 1994), requires that Federal Agencies consider as part of their action, any disproportionately high and adverse human health or environmental effects to minority and low income populations. Agencies are required to ensure that these potential effects are identified and addressed.

The EPA defines environmental justice as; "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." In this context, fair treatment means that no group of people should bear a disproportionate share of negative environmental consequences resulting from the action.

Overall, we expect none of the alternatives to place disproportionately high, adverse environmental, economic, social, or health effects on minority or low-income persons. Our programs and facilities are open to all who are willing to adhere to the established refuge rules and regulations, we acquire land only from willing sellers, and we do not discriminate in our responses for technical assistance in managing private lands.

Table 4.1. Matrix of Environmental Consequences by Alternative.

Nantucket NWR Resources	Alternative A Current Management	Alternative B Enhanced Wildlife Management and Visitor Services (Service-preferred Alternative)	Alternative C Wildlife Diversity and Natural Processes Emphasis
Air Quality	<p>Current management activities neither substantially benefit nor adversely affect local and regional air quality, and staff conduct site visits only several times a year.</p> <p>The high volume of visitors and OSV use on and adjacent to the refuge likely has some negative impacts to local air quality during the busy summer months, however, in general, air quality at the refuge and on Nantucket is good.</p> <p>No major ground-disturbing activities that would affect air quality are proposed.</p>	<p>An anticipated increase in visitors to the refuge over time would result in an increase in OSV use; this would cause a minor increase in air emissions in the long term and contribute minimally to potential cumulative effects.</p> <p>Implementation of a zone management system that would close portions of the refuge to OSV use during the summer would help alleviate immediate air quality impacts from increased visitation.</p> <p>The proposed shared visitor contact station, if it were to be built, would cause some local air quality impacts. Construction of the visitor facility would cause short-term, localized effects from construction vehicle and equipment exhausts. Operation of the facility would slightly increase stationary source emissions at the site.</p>	<p>We anticipate fewer visitors to the refuge during the breeding season under alternative C due to increased restrictions compared to alternative B through a system of zone management, which would reduce the local effects of air emissions from visitor vehicles below what is expected in alternative B.</p> <p>Air quality impacts from a proposed visitor center similar to alternative B.</p>
<p>None of our proposed management activities should adversely affect regional air quality. None would violate EPA standards for criteria air pollutants; each would comply with the Clean Air Act.</p>			
Water Quality	<p>Refuge-related activities that could impact water quality are oil or gas leaks from OSVs, tour vans, refuge vehicles, or offshore boats. Although the impacts to water quality are likely to be negligible from these activities, under alternative A the incidence of trespass by OSV drivers is higher and the potential for accidental oil or gas spills in the dune habitat may be higher. This could result in greater adverse impacts to ground water quality.</p>	<p>Refuge-related activities that could impact water quality are oil or gas leaks from OSVs, tour vans, refuge vehicles, or offshore boats. The impacts to water quality are likely to be negligible from these activities. Under alternative B greater refuge staff presence and more restricted access to portions of the refuge during the summer months would result in greater enforcement of public uses and would lessen the chance of accidental spills or leaks on the refuge that could adversely impact water quality.</p>	<p>Increased protection from alternative B due to more OSV access restrictions through the summer months. Onsite staff and law enforcement would be the same as alternative B.</p>
<p>None of our proposed management activities would violate Federal or State standards for contributing pollutants to water sources; all three would comply with the Clean Water Act.</p>			

Nantucket NWR Resources	Alternative A Current Management	Alternative B Enhanced Wildlife Management and Visitor Services (Service-preferred Alternative)	Alternative C Wildlife Diversity and Natural Processes Emphasis
<p>Soils</p>	<p>Oversight of public access and uses on the refuge provided by TTOR helps protect refuge soils from excessive erosion and compaction.</p> <p>Despite this key support from a refuge partner, the lack of Service staff and presence to provide support to TTOR’s efforts results in some unauthorized uses and access in dune habitats that lead to soil (sand) erosion and compaction. Vehicles can cause adverse soil impacts through churning of tires, compacting substrate, and destroying vegetation and other features that help stabilize dunes.</p> <p>The greatest adverse impacts to soils likely would occur under alternative A given the level of public access and use coupled with the lack of enforcement and onsite Service presence.</p> <p>No major ground disturbing activities by the Service are proposed.</p>	<p>The Service would continue to rely on the TTOR to assist with regulating vehicle access to the refuge.</p> <p>Similar to alternative A, OSVs would be allowed on the authorized trails and nowhere else within dune habitats.</p> <p>Greater onsite Service presence to manage visitor services and offer greater enforcement of unauthorized uses. This would help direct foot and vehicular access away from sensitive areas to least sensitive and more stable beach sandy areas. A primitive foot trail would direct visitor access. Increased visitor services staff would raise awareness among visitors about the sensitivity of the refuge habitats and potential adverse impacts from unauthorized uses.</p> <p>We would continue to rely on symbolic fencing, although with greater use of adaptive management and onsite presence to determine location and duration to protect habitat and dune processes. A system of zone management would provide greater protection to refuge habitats by restricting access to portions of the refuge to OSVs during summer months.</p> <p>The level of OSV use is likely to remain the same or increase under alternative A, and access to the beach and intertidal areas with the potential to cause some compaction and sand displacement.</p>	<p>Alternative C would likely provide the greatest protection of the soils, through more focused public use and expanded seasonal closures.</p> <p>Most of the refuge would be closed to vehicular and pedestrian use during the bird nesting and migration/staging season (April 1 through September 15) and also closed in summer/fall to provide haul-out sites for gray seals.</p> <p>Enhanced dune protection (and therefore soils protection) would occur with more restrictive travel through and around dunes, with potential for a primitive trail to direct access.</p> <p>Similar to alternative B, more onsite refuge seasonal staff would provide greater protection to soils through increased public awareness, enforcement of closures, and additional signage.</p> <p>Soil impacts from a proposed visitor center similar to alternative B.</p>

Nantucket NWR Resources	Alternative A Current Management	Alternative B Enhanced Wildlife Management and Visitor Services (Service- preferred Alternative)	Alternative C Wildlife Diversity and Natural Processes Emphasis
Soils <i>(continued)</i>		The proposed shared visitor contact station, if it were to be built, would cause localized soil compaction and loss of soil productivity where soils are removed or surfaced for the building and associated parking area and in immediately adjacent areas where vehicles and heavy equipment are used for site access and preparation work. Otherwise an existing structure would be purchased and would have negligible impacts. This proposed joint center with partners, if realized, would be built off-refuge and would not impact the existing refuge resources.	
Under all three alternatives we would strive to maintain the dynamic nature of accretion and erosion and to adapt to the changing habitat conditions from these shifting sands.			

Nantucket NWR Resources	Alternative A Current Management	Alternative B Enhanced Wildlife Management and Visitor Services (Service-preferred Alternative)	Alternative C Wildlife Diversity and Natural Processes Emphasis
<p>Dune and Shoreline Habitat</p>	<p>Minimal oversight by refuge staff of approximately 21 acres of dune, beach and intertidal habitat along 3,000 feet of shoreline; relies on TTOR to protect and manage the habitat. Minimal oversight of vehicular and pedestrian traffic on the dunes and beach.</p> <p>Alternative A would provide the least protection of the coastal dune and shoreline habitats.</p> <p>Lack of research and minimal inventory and monitoring would limit the ability to use adaptive management.</p> <p>The Service would acquire new property in Nantucket County if notified of opportunities for Federal excess lands, and as funding and staff allow.</p>	<p>Increased Service involvement in protection and management of the approximately 21 acres of dune, beach, and intertidal habitats along 3,000 feet of shoreline to benefit nesting and migrating shorebirds, colonial water birds, neotropical migrant land birds, raptors of conservation concern, and marine mammals.</p> <p>Alternative B would provide greater protection of coastal dune and shoreline habitats in balance with priority public uses.</p> <p>Continues to rely on symbolic fencing, but with greater use of adaptive management and onsite presence to determine location and duration to protect habitat and dune processes.</p> <p>New research and inventory and monitoring would allow greater use of adaptive management to better protect habitat and respond to shifting coastal habitat dynamics.</p> <p>Restores and protects dunes by designating an authorized trail and directing foot and vehicular access away from sensitive areas to least sensitive and more stable beach sandy areas to allow beach to fill in naturally.</p> <p>Invasive species monitoring and control as needed would further protect habitat conditions.</p> <p>More onsite refuge seasonal staff would provide greater protection to habitat through increased public awareness, enforcement of closures, and additional signage.</p> <p>More proactive land protection efforts with partners would provide opportunities to permanently protect more coastal dune and shoreline habitats.</p>	<p>Increased Service involvement in protection and management of the approximately 21 acres of dune, beach, and intertidal habitats along 3,000 feet of shoreline to benefit nesting and migrating shorebirds, colonial water birds, neotropical migrant land birds, raptors of conservation concern, and marine mammals.</p> <p>Alternative C would provide the greatest protection of the coastal dune and shoreline habitats, through more focused public use and expanded seasonal closures.</p> <p>Most of the refuge would be closed to vehicular and pedestrian use during the bird nesting and migration/staging season (April 1 through September 15) and also closed in summer/fall to provide haul-out sites for gray seals.</p> <p>Enhanced dune protection would occur with more restrictive travel through and around dunes, with potential for a primitive trail to direct access.</p> <p>Would maintain an undisturbed wrack line through adaptive management using research and monitoring of OSV impacts to wrack.</p> <p>Invasive species monitoring and control as needed would further protect habitat conditions.</p> <p>Similar to alternative B, more onsite refuge seasonal staff would provide greater protection to habitat through increased public awareness, enforcement of closures, and additional signage.</p> <p>Similar to alternative B, More proactive land protection efforts compared to alternative A with partners would provide opportunities to permanently protect more coastal dune and shoreline habitats.</p>

Nantucket NWR Resources	Alternative A Current Management	Alternative B Enhanced Wildlife Management and Visitor Services (Service- preferred Alternative)	Alternative C Wildlife Diversity and Natural Processes Emphasis
<p>Dune and Shoreline Habitat <i>(continued)</i></p>		<p>Conservation easements or management agreements between the Service, TTOR, and NCF for properties on the Coskata-Coatue Peninsula would mean greater coordination and collaboration for habitat protection and management.</p> <p>Acquisition of the Coast Guard inholding, and the private inholdings on the peninsula would ensure the protection of these places in perpetuity, as well as provide the Service with much-needed facilities for refuge staff.</p> <p>Acquisition of all proposed properties would add another 1,790 acres of conserved land in Nantucket County, throughout Nantucket Island and including Muskeget Island. It would provide a mosaic of additional protected habitat for species of conservation concern to utilize for breeding, staging and foraging.</p>	

Nantucket NWR Resources	Alternative A Current Management	Alternative B Enhanced Wildlife Management and Visitor Services (Service-preferred Alternative)	Alternative C Wildlife Diversity and Natural Processes Emphasis
<p>Public Use and Access</p>	<p>Minimal Service oversight and presence on refuge; visitor services implemented by partners, primarily TTOR. Under this alternative, there are limited resources to adequately transmit the Service's role in the partnership, and many visitors remain unaware that the tip of Great Point is a National Wildlife Refuge. Minimal signage.</p> <p>The five compatible priority uses (fishing, wildlife observation, interpretation, photography, and environmental education) would continue to be available to the public on the refuge where beach access is permitted and through partners. Hunting is allowed on both TTOR and NCF properties, and other surrounding private properties, but not on the refuge.</p>	<p>Similar to alternative A, the five priority public uses will continue to occur on the refuge and hunting would continue to be prohibited.</p> <p>Provides greater protection of coastal dune and shoreline habitats in balance with expanded opportunities for the five priority public uses.</p> <p>Expanded opportunities provided through a more coordinated environmental education program with partners, expanded refuge tours, weekly interpretive programs, annual fishing events, and more interpretive materials.</p> <p>A shared offsite visitor center with partners, more signage, a Web cam, and onsite interpretive materials would allow the Service to better fulfill its outreach mission and increase visibility and awareness of refuge policies.</p>	<p>Similar to alternative A, the five priority public uses will continue to occur on the refuge and hunting would continue to be prohibited.</p> <p>The priority public uses would be accommodated only when not in conflict with biological priorities. Much of the recreational use of the refuge would be prohibited or heavily restricted from April 1 through September 15 to provide adequate habitat availability for migrating and nesting birds and seals. The Service would collaborate with partners to disseminate information on the seasonal closures and restricted uses of the refuge.</p> <p>There would be opportunities to participate in refuge activities, such as through greater interpretive programs, onsite environmental education programs with partners upon request, refuge-organized tours, and a Web cam.</p> <p>Similar to alternative B regarding a shared visitor's center.</p>
<p>Socioeconomic</p>	<p>Nantucket NWR located on Great Point is a major destination of visitors to the Coskata-Coatue Peninsula. In recent years, TTOR and NCF have generated over \$300,000 from permit fees collected at the gatehouse.</p> <p>The Service maintains no facilities on the island. Since there are no onsite staff and only minor active management activities, we contribute negligibly to the local economy in terms of refuge staff jobs, income, expenditures, and purchases of goods and services for refuge activities.</p>	<p>Expanded opportunities for five priority public uses would likely result in greater numbers of visitors to the refuge and an associated increase in permit fees collected by TTOR and NCF and greater expenditures in the regional economy by these visitors.</p> <p>Increases in the level of staffing would result in more goods and services purchased locally with an increase in onsite staffing and the creation of interpretive materials (e.g., kiosk). An increase in refuge tours and the possible addition of a refuge van, would likewise contribute to the local economy. Finally, if a proposed visitor contact station shared by multiple partners comes to fruition this could provide a larger economic boost to the local community.</p> <p>Any new fee acquisition of land by the Service would be at minimal to no cost to the Service and would provide a concomitant increase in refuge revenue sharing payments.</p>	<p>The priority public uses allowed on Nantucket NWR would be accommodated only when they are not in conflict with biological priorities. Recreational use of the refuge would be restricted from April 1 through September 15. Alternative C, therefore, could result in a decrease in onsite refuge visitors and a related decline in refuge-related visitor expenditures.</p> <p>Proposed increases in staffing and related socioeconomic benefits similar to B, except for the potential purchase of a refuge van and increases in year-round van tours, which is not part of alternative C.</p> <p>Similar to B, any new fee acquisition of land by the Service would be at minimal to no cost to the Service and would provide a concomitant increase in refuge revenue sharing payments.</p>