

Chapter 2



USFWS

Pelican

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Chapter 2: Alternatives Considered

2.1 Introduction

In this chapter we present and compare a range of reasonable alternatives for the Comprehensive Conservation Plan (CCP) and its associated Environmental Impact Statement (EIS), as well as component actions identified by others. We also include information on the process by which we developed and evaluated alternatives, a description of the alternatives or components considered but dropped from further analysis, and the reasons such alternatives or components were dropped. Finally, we describe in detail the alternatives that were retained for detailed analysis in this CCP/EIS, including elements or actions common to all retained alternatives and those that are unique to each retained alternative. At the end of this chapter, we provide a table that enables the reader to compare each retained alternative.

The Council on Environmental Quality (CEQ) regulations that implement the National Environmental Policy Act (NEPA) of 1969 (40 CFR Parts 1500-1508) state that the alternatives section is the heart of an EIS. Those regulations and accompanying CEQ guidance, titled *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations* (CEQ 1981) require a Federal decision maker, in this case the USFWS, to:

- Develop and describe a range of alternatives capable of achieving the purpose and need (40 CFR 1505.1), including alternatives not within the jurisdiction of the lead agency (Question 2b of CEQ's Forty Questions) and the No Action Alternative [40 CFR 1502.14(d)]; and
- Rigorously explore and objectively evaluate all reasonable alternatives¹ and provide reasons why we eliminated certain alternatives from detailed study [40 CFR 1502.14 (a)].

2.2 Development of Alternatives

We developed alternatives to achieve the purpose of the CCP and to be reasonable, as required by the NEPA. Alternatives are different approaches or combinations of management objectives and strategies designed to achieve the purposes of the CCP, which are articulated in Section 1.4 of this CCP/EIS and described in subsequent sections of chapter 1. The alternatives were also designed to achieve the vision and goals of refuge, which are articulated in Section 1.13, as required by USFWS planning requirements.

¹ NEPA requires alternatives to be reasonable and in Question 2a of CEQ's Forty Questions, CEQ defines reasonable as feasible or practical from a technical and economic standpoint and using common sense.

The three alternatives carried forward in this CCP for detailed analysis (Section 2.5) have evolved through the planning process to date, and will likely be revised again after the public comment period and before finalization. In summer 2011, after 10 months of initial scoping and public involvement, the USFWS published a newsletter with descriptions of four preliminary draft alternatives. Although there were many common components among them, each of the preliminary draft alternatives had a different focus, which is described below.²

- **Preliminary Draft Alternative A** would continue current management strategies, and satisfies the NEPA requirement for a “no action” alternative. Consistent with the 1993 Master Plan, the refuge would allow NPS to maintain 8.5 acres (961 spaces) at the recreational beach. As sea level rise and natural forces reduce the land base capable of supporting current parking, the refuge would pursue alternative parking opportunities and institute a shuttle service to the current recreational beach.
- **Preliminary Draft Alternative B** would mostly continue established habitat and wildlife management strategies, and the refuge would also work with NPS to develop a new recreational beach, beach access, and nearby parking 1.5 miles north of the existing beach. The refuge would allow NPS to maintain 961 parking spaces near the new beach, but would also pursue alternative parking opportunities and institute a shuttle service to supplement the beach parking.
- **Preliminary Draft Alternative C** would allow for natural successional and coastal processes to take place on the refuge with little intervention. Refuge administration of programs would be minimized primarily through reduction of activities, partnerships, and use of volunteer staff. Consistent with the 1993 Master Plan, the refuge would allow NPS to maintain 8.5 acres for parking at the recreational beach, only as long as the land base exists. As sea level rise and natural forces reduce the land base capable of supporting parking, feasible repairs would be made but the number of spaces would be reduced accordingly. While beach users would be able to use all parking available on the refuge, new parking, and a shuttle system would not be pursued by the refuge.³
- **Preliminary Draft Alternative D** would direct staffing and funding towards maximizing habitat and wildlife management strategies. Thus, some public use activities would be eliminated, such as horseback riding and over-sand vehicle access, and the pony herd would be reduced. The refuge would work with NPS to relocate the recreational beach as

² More detailed descriptions of the preliminary draft alternatives can be found in a newsletter published in August 2011 and found at: http://www.fws.gov/northeast/planning/Chincoteague/PDF/Chincoteague_CCP_Newsletter_August2011_web.pdf.

³ Preliminary Draft Alternative C was eliminated as a result of this alternatives evaluation process described in this chapter, and Preliminary Draft Alternative D was refined and renamed alternative C. Thus, references to alternative C in this CCP/EIS outside of this section refer to a refined version of the alternative referred to as Preliminary Draft Alternative D in this chapter.

in alternative B; however, the capacity of the parking would be less than in alternative B and the refuge would pursue alternative parking opportunities and a shuttle service.

In addition, the newsletter described other components that were raised during the scoping process: elimination of hunting, elimination of the beach parking shuttle from all alternatives, and maintenance of the existing beach and parking through a program of beach nourishment activities and engineering solutions like jetties and groins. These components were considered for inclusion in the draft CCP/EIS, along with the four preliminary draft alternatives, as part of the initial scoping process.

2.3 Evaluation of Alternatives

NEPA requires that alternatives evaluated in an EIS be capable of achieving the purpose and need (40 CFR 1505.1). Table 2-1 provides a summary-level evaluation of how each of the preliminary draft alternatives, and components identified during scoping, contributes to each element of the CCP purpose (as described in detail in chapter 1). Each alternative or component was evaluated as follows: if it would make a positive contribution towards achieving each element of the purpose, would make no contribution (i.e., neutral), or would make a negative contribution (i.e., it would detract from achieving the purpose). The assessment is based on the descriptions of the purposes of this CCP provided in sections 1.5 through 1.9, and the vision and goals described in section 1.13.

As illustrated in Table 2-1, Preliminary Draft Alternative C, as well as various components (elimination of hunting and the shuttle, and beach nourishment/coastal engineering), would primarily detract from achieving the purpose of the CCP. Section 2.4 discusses in more detail the reasons why one preliminary draft alternative, and different components, were eliminated from further consideration.

Table 2-1. Summary Screening of Preliminary Draft Alternatives - Meeting the Purpose of the CCP

| CCP Purpose | | CCP/EIS Section | Preliminary Draft Alternatives | | | | Components from Scoping | | |
|-------------|--|-----------------|--------------------------------|---|----|----|-------------------------|---|------------------------|
| | | | A | B | C* | D* | Eliminate hunting | Beach Nourishment & Coastal Engineering | Elimination of Transit |
| 1 | Achieve refuge purposes | 1.4 | ○ | ● | ○ | ● | ○ | ○ | ○ |
| 2 | Fulfill the Refuge System mission | 1.5 | ● | ● | ○ | ● | ○ | ● | ○ |
| 3 | Maintain and, where appropriate, restore the ecological integrity of the refuge and Refuge System | 1.6 | ● | ● | ○ | ● | ○ | ○ | N/A |
| 4 | Help achieve goals of the National Wilderness Preservation System | 1.7 | ● | ● | ● | ● | N/A | N/A | N/A |
| 5 | Meet other mandates | 1.8 | ● | ● | ○ | ● | ○ | ○ | ○ |
| 6 | Address significant local concerns: climate change and sea level rise; regional conservation; balance between public use and wildlife conservation; public access to the refuge, in particular to the recreational beach; impact to visitor experience; and impact to local economy.** | 1.9 | ○ | ● | ○ | ○ | ○ | ○ | ○ |

- = positive contribution toward achieving purpose;
- = negative contribution (detract from achieving the purpose); and
- ◐ = no contribution (neutral).

* Preliminary Draft Alternative C was eliminated as a result of the alternatives evaluation process described in this section, and a refined version of Preliminary Draft Alternative D was renamed alternative C. Thus, all other references to alternative C in this CCP/EIS outside of this section refer to a refined version of the alternative originally referred to in this chapter as Preliminary Draft Alternative D.

** Preliminary Draft Alternative D would make a positive contribution to this factor except with regard to the local economy.

As a result of comments received as well as other deliberations among the refuge and the CCP/EIS Planning Team⁴, we refined the remaining three preliminary draft alternatives, including but not limited to the following changes:

- We expanded elements common to all to include provision of a recreational beach, access by personal vehicle, and coordination on hazard mitigation, among others;
- We removed a voluntary shuttle from Draft Alternative B; and
- We removed development of a marine sanctuary and restriction of shellfish bed leasing.

These refined alternatives are described in detail in Section 2.5.

2.4 Alternatives and Components Considered but Eliminated from Detailed Analysis

The process of developing alternatives under NEPA and the Improvement Act is designed to allow for consideration of the widest possible range of issues and potential management approaches that achieve the purpose of the CCP. During this process, many different solutions were considered. The following components were considered but not selected for detailed study in this CCP/EIS for the reason(s) described.

2.4.1 Beach Nourishment

Several public comments indicated a desire to maintain the current recreational beach and parking locations through beach nourishment activities and other engineering strategies, such as jetties and groins. As shown in Table 2-1, these components would not contribute to achieving the purpose of the CCP and would in fact, detract from achieving nearly all of the elements of the purpose. It is the position of USFWS that natural shoreline processes (including migration) are beneficial to maintain the biological integrity, diversity, and environmental health of barrier beach islands and salt marsh habitats in the face of rising rates of sea level and climate change. Infrequently, USFWS has utilized site-specific beach nourishment to accomplish other habitat goals, such as at Prime Hook NWR in Delaware to fill breaches as part of a broader marsh restoration project.

A beach nourishment “only” project is unlikely to persist over time. Assateague Island is strongly influenced by a net movement of sand from north to south. As evidenced by the formation of Toms

⁴ The CCP/EIS Planning Team met consistently throughout the planning process for this CCP/EIS and included: USFWS, National Park Service (NPS) Assateague Island National Seashore, town of Chincoteague, Accomack County, Accomack County Board of Supervisors, Accomack-Norhampton Planning District Commission, Virginia Marine Resources Commission, Virginia Division of Game and Inland Fisheries, and NASA. The Volpe National Transportation Systems Center served as facilitator.

Cove Hook over the past 150 years, any sand artificially placed along the ocean beach can be expected to rapidly mobilize and move south away from the placement site. There is also large scale movement of sand on and offshore, reflected by a network of shoals adjacent to the southern end of the island. Because of these processes, beach nourishment would need to be repeated on a regular, recurring basis to be effective in creating a wider and more stable beach, or to prevent the island from breaching during some future storm event.

Beyond the concerns about significantly adverse habitat and aesthetic impacts, it should be noted that beach nourishment is very costly. The U.S. Army Corps of Engineers (USACE) policy requires that 35 to 50 percent of planning, implementation, and maintenance costs be borne by a state or local government partner (USACE, “Continuing Authorities Program”). The USFWS investigated beach nourishment during the early stages of developing potential alternatives for the CCP, and contacted the USACE to obtain an estimate of the scope and cost of beach nourishment for a project this size. Using research and analysis undertaken for the Wallops Flight Facility (WFF) Shoreline Restoration and Infrastructure Protection Program as a model, the USACE provided an analysis and cost estimate for stabilizing the current recreational beach and parking lots. The resulting analysis estimated that a beach nourishment project of similar scope could require an initial estimated investment of \$24 million, with recurring maintenance costs of \$8.3 million necessary every 3 to 7 years, for a total cost of nearly \$49 million over the 15 year life of the CCP, not including wetland mitigation (USACE 2012; Appendix J). This is more than twice the cost of any of the other alternatives, which range in cost over 15 years from \$11.7 to 22.2 million. Adding this component to alternative A or substituting it for the development of a new beach and parking lot proposed in alternative B would result in costs of approximately \$54 million dollars, which is 240 percent more than alternative B, the most costly alternative. NEPA requires alternatives to be reasonable from a technical, economic, and common sense perspective⁵ and compared to other alternatives evaluated, an alternative that includes the beach nourishment and coastal engineering element is not reasonable from an economic or common sense perspective.

In light of these considerations, the NPS and USFWS do not believe that beach nourishment and engineering strategies would be a responsible and sustainable management tool for use on southern Assateague Island. As described in chapter 1, the purpose and need associated with this CCP requires alternatives to include strategies in accordance with the refuge goals and mission, which would uphold our long-term agreement with the NPS to provide recreational beach access, while also considering its long term sustainability. Because of the predicted short term viability, and environmental factors, in addition to significant estimated cost, the USFWS considers beach

⁵ Council on Environmental Quality, *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, Response to Question 2a, (46 Federal Register 18026, March 23, 1981, as amended).

nourishment to be outside the scope of the CCP, and will not be evaluating nourishment as part of the alternatives under consideration.

2.4.2 Elimination of Hunting

Refuges provide habitat for the conservation and protection of all native species of wildlife. Harvesting surplus animals through hunting is one tool used to manage wildlife populations at a level compatible with the environment, provide wildlife-dependent recreational opportunities, and permit the use of a valuable renewable resource. Closing the refuge to hunting would conflict with the Improvement Act, which lists hunting as an appropriate and priority use of the Refuge System; directs that hunting shall receive priority consideration in refuge planning and management; mandates that hunting opportunities should be facilitated when feasible; and directs USFWS to administer the Refuge System so as to “provide increased opportunities for families to experience compatible wildlife-dependent recreation, particularly opportunities for parents and their children to safely engage in traditional outdoor activities, such as fishing and hunting.” Furthermore, “no hunting” would conflict with Executive Order #13443: “Facilitation of Hunting Heritage and Wildlife Conservation.” The order directs the DOI and its component agencies, bureaus, and offices, “to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.” For all these reasons, the elimination of hunting would detract from achieving the purpose rather than contribute to meeting the purpose, and is not reasonable from a common sense perspective. Therefore, hunting will not be eliminated.

2.4.3 Preliminary Draft Alternative “C”

Preliminary Draft Alternative “C,” as described and illustrated in the August 2011 newsletter, would have utilized a habitat management strategy in which management actions and strategies would allow for natural succession and coastal processes to take place on the refuge with little intervention. Refuge administration of programs would have been minimized primarily through reduction of activities, increases in partnerships, and use of volunteer staff. Specifically, this alternative would only maintain the beach parking, Chincoteague pony units, and Toms Cove Visitor Center as long as the land base allows, would not develop a shuttle service or off-site parking, and would shift towards teacher and partner-led interpretive tours. This alternative does not contribute to achieving the purpose of the CCP; rather, it detracts from achieving the purpose. The public, in addition to key stakeholders, voiced strong opposition to this management alternative. Some comments stated that this alternative was a stop-gap management strategy that would not address longer-term needs, and we agree with this assessment. It was also voiced by the public that this alternative was seen as a solution that assumed limited funding, and therefore could not sustain long-term management. Furthermore, key stakeholders did not support allowing natural forces to reduce the land base for the recreational beach and parking, when there was no plan to replenish the area or to provide alternative off-site parking and access. Ultimately, it was determined that this alternative would not meet the purpose of the CCP and therefore, it was removed from further consideration.

2.4.4 Elimination of Transit

Transit was proposed to provide supplementary beach parking on Chincoteague Island and a shuttle when the parking is at capacity, and would provide access after catastrophic storm events that may temporarily eliminate or restrict beach parking. Some comments received during our planning process requested that transit not be considered in any of the alternatives.

It is the position of USFWS that transit is an important component of responsible management to provide visitors with an alternative option to driving along with bicycling and walking, to address high levels of demand on peak beach visitor use days, and to address impacts on current recreational beach parking resulting from rising rates of sea level and climate change effects. As such, transit is necessary for alternative A, not only to be consistent with the 1993 Master Plan, but also to ensure the same level of access in the future, given the uncertainty in being able to maintain the current level of parking. Transit is also necessary in alternative C due to the reduction in beach parking and the need to provide access during peak visitation. However, as a compromise to address public concerns, and in recognition that relocation of the beach and associated parking will greatly reduce risks to both, a voluntary shuttle was removed from the preferred alternative.

2.5 Alternatives Carried Forward for Detailed Analysis

The alternatives carried forward for detailed analysis are:

- Alternative A – (Current Management)
- Alternative B – (Balanced Approach)
- Alternative C – (Reduced Disturbance)

As an integrated CCP and EIS, details of the alternatives are described in terms of the main components of a CCP, namely measurable objectives and associated strategies to achieve each associated goal. The refuge goals, as listed in chapter 1, are common to all of the alternatives, but objectives and strategies may vary between alternatives. For each alternative, a rationale accompanies each objective to explain its context and why it is considered important. Strategies are also identified for each objective. The strategies are specific actions, tools, techniques, or a combination of these that may be used to achieve the objective. Respective lists of strategies under each objective represent a potential suite of actions to be implemented in step-down plans that will achieve the desired outcomes of the alternative selected.

These alternatives represent different management approaches for managing the refuge over a 15 year time frame. Features common to all three alternatives are summarized below, followed by descriptions, objectives, and strategies for each of the three alternatives. At the end of the chapter, Table 2-2 compares major elements of each alternative. Summary cost information for each alternative is provided in Appendix I.

2.5.1 Existing Management Actions that Continue Under All Alternatives

Although the alternatives differ in many ways, there are similarities among them as well. Throughout this chapter, appropriate references are made to other alternatives when there are similarities, but this section highlights those elements that all alternatives share and captures broader commonalities not captured in the detailed descriptions of each alternative. These are management actions that would not change under any of the alternatives. These commonalities are presented in the order of the CCP goals, not in order of importance.

Resource Protection

The refuge would continue current enforcement of all Federal and State laws applicable to the refuge to protect all known archaeological and historical sites, including any efforts to increase resource protection through education. Certain mandated responsibilities, such as protection of

Federal trust species and wetlands and prevention and control of invasive species, would be accomplished under all alternatives.

Habitat Management

The refuge would manage the following habitats and management structures the same, regardless of alternative: sea-level fen on Wallops Island NWR, maritime forest on Assateague Island, upland habitats on Wallops Island NWR, and natural coastal processes and habitats on Assawoman, Metompkin, and Cedar islands.

Marine Resource Management

In light of climate change and sea level rise, the refuge would recommend that the Commonwealth of Virginia protect and enhance newly submerged lands for the purpose of preserving wildlife habitat and recreational access. The refuge would encourage and support the Assateague Island National Seashore's Marine Research Reserve in Central Chincoteague Bay.

Threatened and Endangered Species

The refuge would continue to provide protective conservation measures for federally listed species and their habitats on the refuge as indicated in recovery plans and relevant regulations.

Exotic, Invasive, and Nuisance Species Management

The refuge would continue to conduct a number of strategies to address invasive species and their impacts. The refuge would continue to scout and remove invasive species such as Phragmites and Asiatic sand sedge by chemical, mechanical, or other means, using all current and future surveys to refine this strategy. The refuge would continue to map and track the changing acreage of invasive species, specifically Phragmites, on at least a bi-annual basis and use the results to prioritize treatments. The refuge would remove Asiatic sand sedge whenever it is found; patches of this highly invasive species are still small enough and occur infrequently to employ a zero tolerance policy. Finally, the refuge would continue to use refuge education programs and outreach efforts to educate visitors, hunters, and other groups about how they can help decrease the spread of invasive plants.

Regional Conservation

As indicated in Goal 5: Partnerships, the refuge would work with partners to conduct research, continue joint management of the southern barrier islands, and explore how best to establish a regional conservation network for the lower Delmarva Peninsula. This area is recognized globally for its remarkable estuarine, coastal, and marine habitats and substantial populations of migratory and breeding shorebirds, colonial waterbirds, landbirds, and raptors. Unfortunately, several real and growing challenges threaten the area's rich and diverse natural heritage and the many benefits humans derive from the region's intact habitats and natural systems. This partnership would seek to expand a resilient, productive, and connected network of protected lands to facilitate adaptation of native species, natural communities, and ecological systems and processes across a full range of representative habitats from tidal salt marshes to upland forests.

Economic Development

The refuge would work with its gateway coastal community, the town of Chincoteague, and regional organizations to support economic development. Continued partnerships with the surrounding community and local businesses, and consideration of economic impacts and

opportunities for the town of Chincoteague in future management practices, would be maintained to support and improve the surrounding economy.

Community Resiliency

The refuge would work with the town of Chincoteague to explore potential impacts and identify protective methods to address hazard mitigation, in coordination with others, such as Accomack County, Commonwealth of Virginia, NPS, National Aeronautics and Space Administration (NASA), Federal Emergency Management Agency (FEMA), and USACE. The refuge would also work with partners to explore how best to advance the study, information exchange, and project resources for adaptive management practices that sustain the resiliency of this unique barrier island system including but not limited to Assateague, Wallops, Assawoman, and Metompkin islands in the face of dynamic coastal processes and climate change.

Visitor Survey

The refuge would seek approval from the Office of Management and Budget to develop and conduct a visitor survey every 5 years to assess visitor experience and measure level of satisfaction with visitor service programs.

Parking and Access to the Beach

A 1-mile recreational beach with some level of parking nearby would be maintained on the refuge by NPS as long as funding allows. Personal motor vehicle access to Assateague Island would continue to be permitted. The refuge would coordinate with the town of Chincoteague to allow alternative vehicles, such as golf carts, on town and refuge roads and, thereby, increase parking capacity at the recreational beach parking lots.

The refuge considers a well-planned transportation system, in multiple forms (walking, biking, shuttle system, and automobiles) between the town of Chincoteague and Assateague Island essential to meet the expectations of current and future generations of refuge visitors.

Pony Management and Viewing

Chincoteague ponies would continue to inhabit Assateague Island, and management would be specified in the agreement with the Chincoteague Volunteer Fire Company. In light of sea level rise, the refuge would work with the Chincoteague Volunteer Fire Company to manage the ponies, including providing public viewing opportunities.

Access for Space Tourism Viewing

The refuge would work with the tourism industry, NASA, and the Virginia Commercial Space Flight Authority and Mid-Atlantic Regional Spaceport to provide access to the refuge for public viewing of rocket launches from the NASA-Wallops Island launch complex. The carrying capacity of parking areas for this purpose would need to be defined once the alternative decision is made.

Bilingual/Multilingual Material

The refuge would include the development of bilingual/multilingual information for regulations and environmental education.

Commercial Uses

In consultation and cooperation with the NPS and the Virginia Marine Resources Commission, the commercial harvest of horseshoe crabs that takes place on refuge lands does not contribute to

the refuge's migratory bird purpose, does not contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, and is not beneficial to refuge resources; consequently, the use cannot be permitted.

Facilities and Infrastructure

Universal access, including standards of the Americans with Disabilities Act, would be incorporated into the design of any new or significantly renovated facilities. Safety considerations, such as shelters, would also be included. In addition, impacts on natural resources and visitor satisfaction would be considered in design and construction to minimize any adverse effects.

Climate Change and Sea Level Rise

Each alternative anticipates future conditions as they pertain to climate change and anticipated sea level rise over the next 100 years and proposes a range of adaptation measures. A guiding principle is that sea level rise is a continuous, ongoing process, which along with coastal storms and other natural processes and man-made infrastructure (e.g., jetties and groins), reshapes coastal landscapes. The refuge has several facilities and resources that may be vulnerable to sea level rise and storm surge, including the NPS recreational beach parking area. To minimize facility damage, maintenance costs, and access disruptions in the future, in all alternatives the refuge would consider potential risks and strategies when making decisions about infrastructure that would last beyond the 15 year period covered by the CCP. Also, each alternative would provide for data gathering to measure and monitor the effects of accelerated climate change and sea level rise.

Wilderness

As part of implementation of *Conserving the Future* and in recognition for the 50th Anniversary of the National Wilderness Preservation System in 2014, USFWS is recommending the chartering of a Refuge System Wilderness Council to evaluate the 21 proposed wilderness areas and wilderness study areas and prepare a national strategy to advance priority wilderness proposals to Congress for designation. One of the 21 proposed wilderness areas to be evaluated is located within Chincoteague NWR. USFWS will complete a nationwide identification of potential wilderness areas throughout the Refuge System by 2025.

Implementation of the Selected Alternative

Refuge management would continue as established by the Final EIS for the Chincoteague NWR Master Plan approved in 1992, with a phased implementation of the approved alternative from the Final EIS/CCP, which will be dependent upon future budget approvals and available funding.

2.5.2 Alternative A (Current Management)

Alternative A is the status quo (current management) alternative and satisfies the requirements of NEPA for a no action alternative. This alternative describes the refuge's existing management priorities and activities established by 1992/1993 Master Plan and EIS, and serves as a baseline for comparing alternatives B and C. Figure 2-1 and Figure 2-2 provides an illustration of major spatial elements of the alternative.

Natural Resource Management. Under this alternative, the refuge would continue to protect and maintain all lands it administers, primarily focusing on the needs of threatened and endangered species, with additional emphasis on the needs of migratory birds and resident wildlife. The refuge would continue to preserve approximately 2,650 acres of wetland impoundments based on priority species needs. Natural coastal processes would continue to be the primary force that shapes habitat on the southern barrier islands. There would be no change in the size or location of the 1,300-acre proposed wilderness area within the refuge, and the refuge would continue to protect and enhance its enhanced wilderness character through actions to eliminate incompatible features and activities.

Beach Access and Parking. Consistent with the 1992/1993 Master Plan and EIS, the refuge would continue to allow NPS to maintain 961 automobile parking spaces (8.5 acres) at the recreational beach as long as suitable land base directly behind the recreational beach remains (USFWS 1992a, USFWS 1993a), and as long as funding is available. As sea level rise and natural forces reduce the land base capable of supporting current parking, the refuge would reduce the number of parking spaces accordingly, and would work with the town of Chincoteague and the NPS to identify suitable off-site parking and to implement an alternate means of transportation such as a shuttle system. The refuge would continue pursuit of bicycle trail development via Beach Road to the recreational beach to replace the temporary Swan Cove Trail.

Partnerships. Refuge staff would continue to work with the USDA to reduce the non-migrant Canada goose population. The refuge would continue existing partnerships, including those with the NASA and the U.S. Navy for monitoring and recovery of native species.

Visitor Use and Experience. Existing public uses, including wildlife observation, environmental education, interpretation, walking and bicycling access, fishing, wildlife photography, and hunting of sika, resident white-tailed deer, and off-island migratory birds, would continue with the current facilities, programs, and policies. The OSV closure schedule and vehicle limits would continue as in current management practices. The refuge would continue to manage opportunities for recreational shellfish and crab harvest.

Cultural Resource Management. The refuge would continue its responsibilities for the archaeological, cultural and historical sites on the refuge in compliance with all applicable Federal and State laws. Refuge staff would continue to allow the Chincoteague Natural History Association (CNHA) and refuge volunteers to conduct tours of the Assateague Lighthouse and would continue restoration of the Lighthouse. The refuge would allow grazing of the current Chincoteague pony population, with a maximum herd size of 150 ponies, consistent with the pony management agreement with the Chincoteague Volunteer Fire Company.

Figure 2-1. Alternative A – Chincoteague NWR

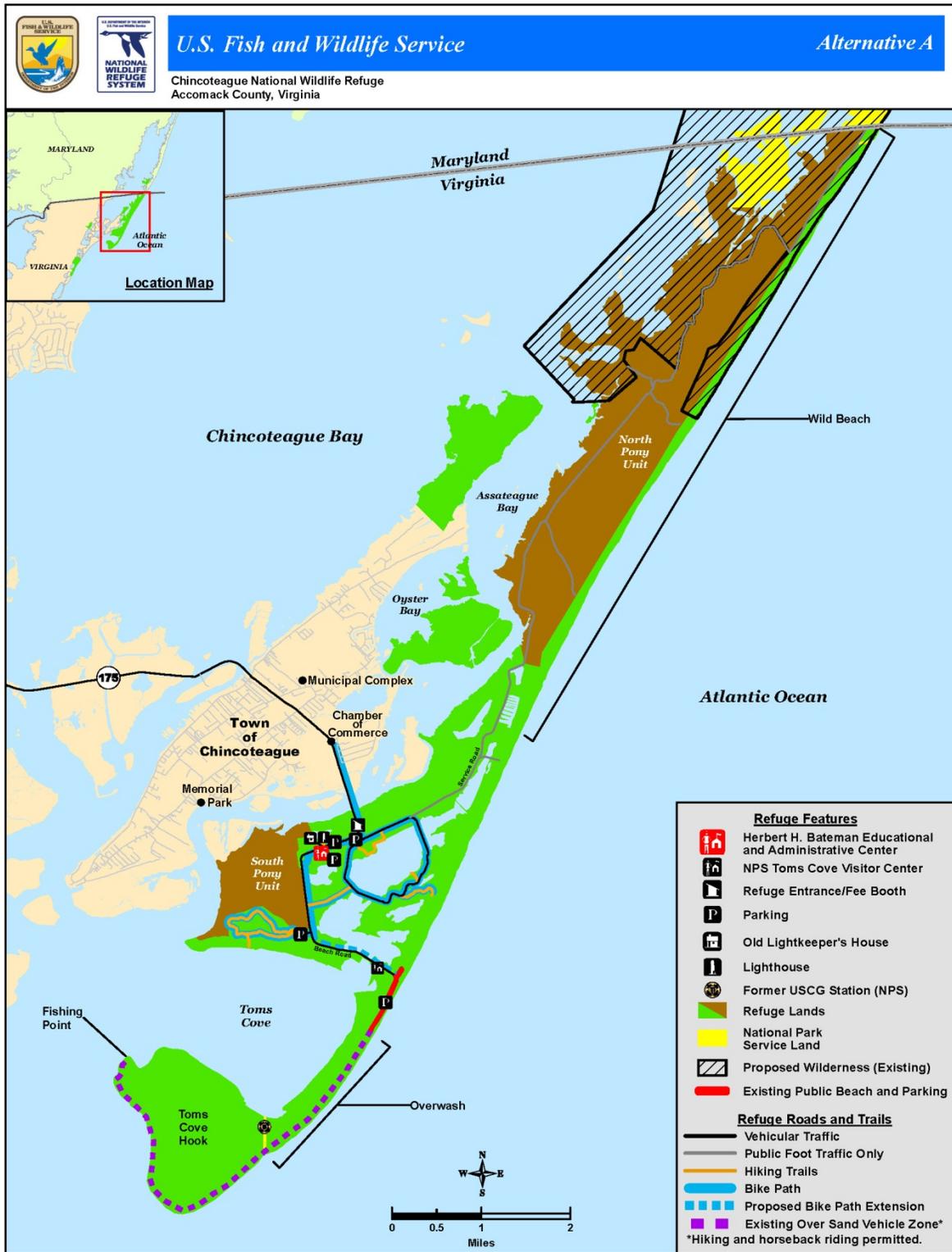
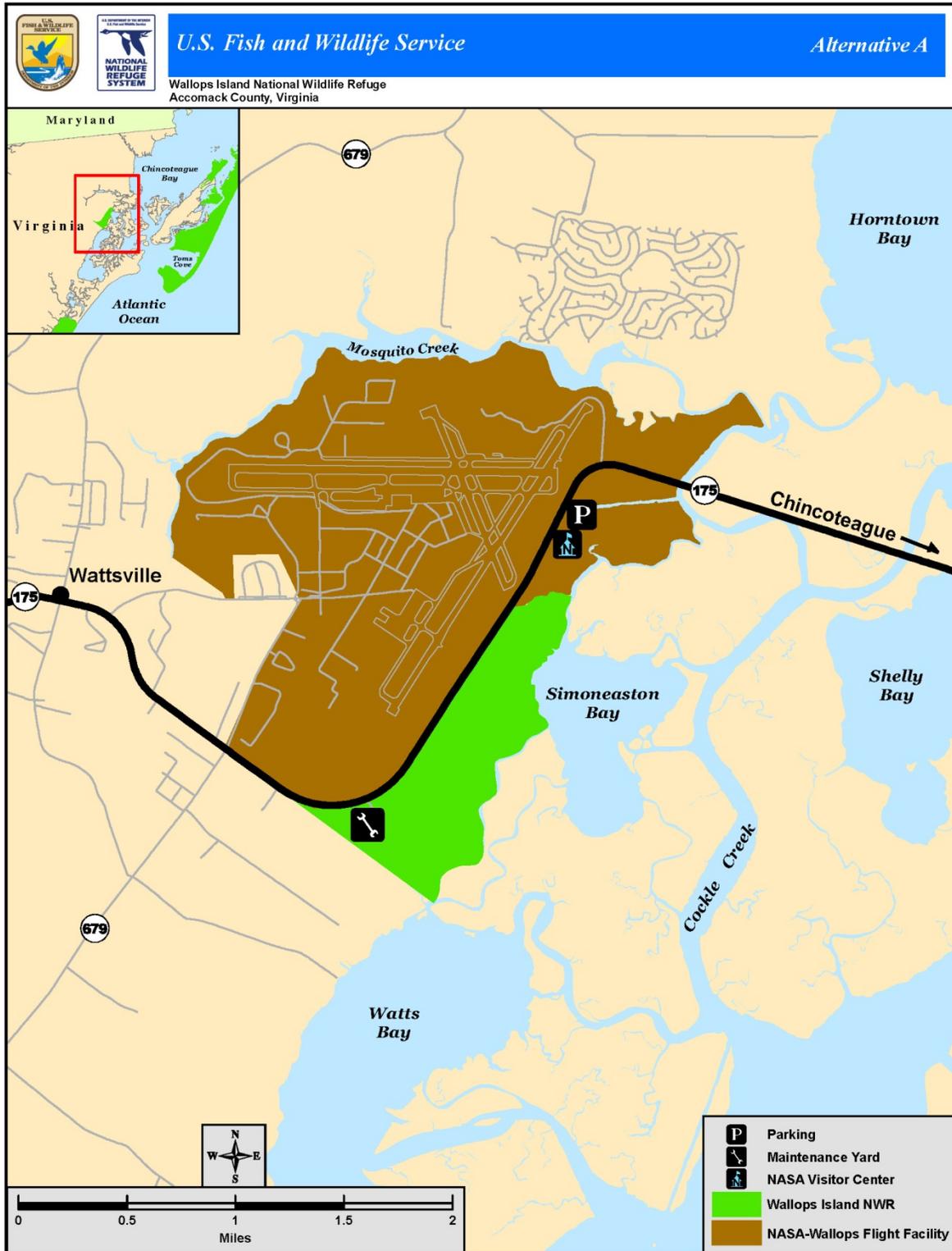


Figure 2-2. Alternative A – Wallops Island NWR



Goal 1: Coastal Habitats

Manage quality coastal habitats for biological integrity, diversity and environmental health of refuge barrier beach and dunes in concert with natural processes as part of the Delmarva Peninsula coastal barrier island system to provide habitat for species of conservation concern.

Objective 1.1 Barrier Beach and Dune Habitat – Coastal Nesting Birds

Manage sandy beach, dune edge, overwash, and intertidal areas on Assateague, Assawoman, Metompkin, and Cedar Islands, and reduce mortality factors, to maintain a refugewide piping plover fledge rate between 1.2 and 1.5 chicks per pair as averaged over a 10-year period. If fledging rate drops below 1.0 chick per pair over a 10-year period, management strategies and prescriptions would be re-evaluated using a formal process and outside expertise.

Rationale:

Management of the Federal and State-listed threatened piping plover is a high priority for the refuge, with management actions to be outlined by the HMP to maintain an acceptable fledge rate. The CCP fledge rate goal of 1.2 to 1.5 chicks per pair is based on Hecht and Melvin's (2009) recent analysis of 1989 to 2006 regionwide productivity data and the Piping Plover Recovery Plan (USFWS 1995). This management target allows for population growth necessary to meet recovery goals. Using 1.0 rather than a previous 0.93 chicks per pair as the trigger to re-evaluate management allows more time to find solutions and implement them. These management actions, though directed specifically at the piping plover, would also benefit other high ranking species such as the least tern, American oystercatcher, black skimmer, Wilson's plover, and gull-billed tern due to their similar habitat needs.

Management Strategies

- Restrict public access to reduce mortality and disturbance on Assateague, Assawoman, Metompkin, and Cedar beach, dune, and overwash areas during the breeding season: March 15 through August 31 or thereafter, until the last chick fledges.
- Continue to implement OSV and pedestrian closures as outlined in the 2008 Biological Opinion (USFWS 2008b; Appendix F): the OSV zone on Toms Cove Hook will be closed from March 15 to August 31 or thereafter, until the last shorebird fledges. The overwash portion of the OSV zone will close 256 feet (200 meters) north of any shorebird brood, and remain closed till the last shorebird fledges. Public use above the high tide zone on Wild Beach will be closed March 15 till August 31 or thereafter, until the last shorebird fledges.
- Erect "Area Closed" signs and symbolic fencing (rope strung between signs) in a buffer zone (minimum 25-foot radius) around nests within Public Beach, and maintain these protective measures until the nest hatches or is determined to be unviable.
- Erect exclosures around individual plover nests where necessary and logistically feasible. (Costs in terms of staff effort outweigh benefits on nesting islands accessible only by boat, where predation levels are low or nil such as on Cedar and Metompkin).
- Remove mammalian nest predators (primarily foxes and raccoons) from nesting habitat and nearby areas and travel corridors prior to and during the breeding season.
- Remove avian predators, such as gulls and corvids, from nesting areas when chicks are present, at other times of the breeding cycle, when needed.
- Conduct an analysis of the refuge's predator control efforts and results to develop recommendations to improve its effectiveness. The analysis would be done in conjunction

with other partners' analyses of predator management results on other islands to better understand system-wide responses to reductions in island predator populations.

- Continue interagency agreement between the USFWS and USDA which authorizes USDA to assist the refuge with threatened and endangered species recovery and migratory bird management.
- Continue working with coastal geologists to model the impacts of storm flooding events and other dune breaching scenarios on Assateague Island to evaluate potential effects that erosion of the artificial dunes may have on natural and manmade habitats, refuge infrastructure, and flood control for the town of Chincoteague.
- Allow natural geologic processes to restore overwash to a northern portion of Wild Beach (e.g., the North Wash Flats (NWF) Impoundment) on Assateague Island in order to increase nesting habitat for plover, least terns, sea turtles, and other nesting shorebirds that were lost when the artificial dune system was created. This would also allow natural island movement. The refuge would allow natural and artificial dune breaches in locations that would provide overwash as determined by working with coastal geologists as stated above.
- Continue to work with NPS to replace existing trash bins in parking lots around public beach areas on Assateague Island with a design that excludes bird and mammal predators and scavengers.
- Continue to develop interpretation programs that foster a public appreciation of nesting shorebirds (Shoreline Steward Program) and inspire refuge visitors to reduce their impacts on these species.
- Continue an active role in the Virginia Coastal Avian Partnership (VCAP) to conduct scientific research and education and outreach programs. As an example, the partners developed and distributed an informational brochure targeted for visitors to the barrier islands on how to minimize their disturbance to colonial and other ground-nesting birds.

Biological Monitoring

- Continue to annually monitor reproductive success of piping plover pairs on all islands, which includes determining the number of breeding pairs, nests, and chicks fledged.
- Determine the number of American oystercatcher pairs and fledge rate for all islands. Conduct more intensive monitoring of oystercatchers (e.g. number of nests, hatch success, cause of failure) on one island per year on a rotating basis.
- Annually monitor the number of nesting pairs/nests of least terns, common terns, Forster's terns, and black skimmers on all islands using methods outlined by the Atlantic Coast Least Tern Adult Window Count and Virginia Colonial Waterbird Coastal Plain Survey.
- Annually conduct scouting for invasive plant species on all islands in conjunction with bird monitoring; train interns and bio techs on how to identify invasive plant species of concern. Evaluate the success of refuge treatment programs using periodic aerial Phragmites mapping by the Virginia Department of Conservation and Recreation (DCR).
- Continue to conduct annual predator scent station monitoring in November to determine predator trends and guide predator pre-breeding season control activities.

Objective 1.2 Barrier Beach and Dune Habitat - Migrating and Wintering Shorebirds and Migrating Monarch Butterflies

Manage sandy beach, overwash, and dune grassland habitat along the approximately 17 miles of Assateague Island (Hook, Overwash, Wild Beach) and tidal flats along Toms Cove to benefit red knots, species of conservation concern, and other migrating/wintering shorebirds.

Rationale:

In 1990, the Virginia and Maryland barrier islands were designated as a Western Hemisphere Shorebird Network Site due to the number of shorebirds using the area during migration, with tens of thousands of shorebirds stopping at Assateague Island between the months of April and September. Protecting and enhancing this habitat would benefit these shorebirds such as red knots, sanderlings, and other migrating/ wintering shorebirds of conservation concern, by regulating and directing public use to less sensitive areas, away from roosting and feeding areas during peak migration.

Shorebirds using the Overwash and Hook are subject to human disturbance during a portion of peak fall migration (September, and sometimes parts of August in the Overwash). Forgues (2010) found that abundance of sanderlings, ruddy turnstones, willets, black-bellied plovers, and whimbrels on Assateague Island during spring and fall migration significantly declined with higher OSV frequency, and concluded that OSVs can interfere with the ability of shorebirds to accumulate fuel stores for migration. OSV use caused shorebirds on Assateague Island to spend less time foraging, and to avoid areas where OSVs were present (Forgues 2010). Five miles of the refuge's 16.8 miles of beach on Assateague Island are open to OSV use during the fall and winter (September 1 – March 14). Morton's (1996) studies of Assateague's wintering shorebirds found that human activity, both pedestrian and vehicular, negatively impacted sanderling use of beach areas, foraging activity, and energetics. Human disturbance caused sanderlings to avoid areas which were otherwise suitable (i.e., had good food resources), flush more, and feed less. This could result in the birds being less fit to make their migration (Morton 1996).

Assateague Island is a critical stopover point for southbound migrating monarchs that use the refuge's resources to rest, refuel, and roost for the night. The migration and wintering biology of the eastern population of the monarch butterfly has been labeled an "endangered biological phenomenon" (Gibbs 2008). The insect makes a journey of up to 2,200 miles, from summer breeding areas in New England and Canada to wintering grounds in Mexico's central mountains, in the State of Michoacán. Nectar source plants are located in various refuge habitats including Beach Road adjacent to Toms Cove, the Overwash, and tip of the Hook, blooming in succession during the migration period. Stands of seaside goldenrod, the most important nectar source on the refuge, can be lost or thinned from natural causes (salt-spray, overwash, storms), or management activities (roadside mowing, parking lot maintenance, facilities maintenance). Recent experiments with seed collection and planting seedlings have been successful in re-establishing/enhancing goldenrod stands.

Management Strategies

- Conduct education and outreach programs to educate visitors, particularly pedestrians on the beach, on how to reduce their disturbance impact on birds. For example, increase understanding of the impacts of people's behavior on wildlife, such as proximity.
- Continue an active role in the VCAP to conduct scientific research and education and outreach programs. As an example, the partners developed and distributed an

informational brochure targeted for visitors to the barrier islands on how to minimize their disturbance to colonial and other ground-nesting birds.

- Continue the partnership with monarch researchers/volunteers whereby refuge volunteers collect seaside goldenrod seeds in November for propagation, and seedlings are planted the following spring or fall.
- As opportunities arise, use volunteers to plant seaside goldenrod seedlings in spring or fall on Toms Cove Hook, small dunes that dot the Overwash area, the north end of Toms Cove (including the causeway west of the NPS Toms Cove Visitor Center), and the backsides of dunes along Wild Beach. Planting should occur on no greater than 5 percent of the Overwash area so as not to conflict with beach nesting birds, which prefer open un-vegetated beaches and shell flats.
- Establish annual temporary fencing (August-October) at dunes adjacent to overwash and public beach locations to aid in monarch nectaring and roosting locations.

Biological Monitoring

- Continue weekly shorebird surveys April through May and July through September, and every-other-week surveys October through March and in June. Since patterns of shorebird use of impoundments are related to the tidal cycle and beachfront is only accessible at low tide, adjust protocol to obtain the most complete count of all surveyed units on Assateague. This can best be accomplished by starting the shorebird survey one hour before low tide on Toms Cove/Hook, then proceeding north on Wild Beach to the beach access road north of Old Fields, and continuing south after surveying Old Fields to complete the remainder of the impoundments. Surveys on the impoundments would thus occur during mid and high tide, when shorebird activity was found to be the highest (Haines 1999).
- Continue re-sight surveys for tagged red knots in fall and spring in conjunction with weekly shorebird surveys and plover/oystercatcher breeding surveys, and using protocols consistent with partners involved with red knot monitoring and research.
- Continue bi-weekly re-sight Chincoteague Bay boat surveys for color-banded American oystercatchers in fall and winter in partnership with Virginia Department of Game and Inland Fisheries (VDGIF) and The Nature Conservancy (TNC). Prior to 2015, re-evaluate the resources available for this survey, which takes place off-refuge, and the information gained to determine if surveys would continue.
- Encourage partners and volunteers to monitor monarch migration on the refuge through monarchwatch.org or other cooperative efforts outlined in the North American Monarch Conservation Plan.

Objective 1.3 Barrier Beach and Dune Habitat - Turtles

Manage approximately 17 linear miles of sandy beach habitat on Assateague Island for nesting loggerhead sea turtles. Continue *in situ* nest protection such that no more than three nests over any 5 year period, and no more than one in any given year, are lost to human or predator-related causes.

Rationale:

The loggerhead sea turtle is a Federal and State-listed threatened animal with habitat found on the refuge, the management actions of which would benefit other species such as the diamondback terrapin. The three major threats towards these species on the refuge are predation, human

activities, and weather. Currently, no sea turtle nests have known to be lost to predators. Management actions, such as mammalian and avian predator removal directed primarily for piping plover production, and placing protective screening over sea turtle nests, may have prevented predation. Human use of nesting beaches, particularly at night or early morning when females come ashore to nest, can disturb nesting females, prevent egg-laying, and indirectly harm hatchlings. Flashlights, headlights, campfires, or lighting on buildings can cause females to abort nesting attempts and interfere with sea-finding behavior by hatchlings. Beach driving, pedestrian traffic, and beach cleaning poses a risk of injury to nesting females and live stranded turtles and can leave ruts that trap hatchlings attempting to reach the ocean (NOAA and USFWS 1991). Driving directly above incubating egg clutches can cause sand compaction, which may decrease hatching and emergence success and directly kill pre-emergent hatchlings (National Marine Fisheries Service and USFWS 2007). The most recent Biological Opinion (USFWS 2008b; Appendix F) determined that an incidental take of up to three sea turtle nests over a 5-year period, and no more than one per year, would not jeopardize the loggerhead sea turtle population. Management activities have kept mortality far below this so far. However, if turtle nesting increases on the refuge, there may be more overlap between human disturbance factors and turtle nesting.

Management Strategies

- Control human disturbance along 17 miles of Assateague Island during the turtle nesting season.
- Continue implementing OSV and pedestrian closures on the Hook, Overwash, and Wild Beach from March 15 through August 31 or thereafter, until the last shorebird fledges, as outlined in the 2008 Biological Opinion (USFWS 2008b; Appendix F).
- Erect “Area Closed” signs and symbolic fencing (rope strung between signs) in a buffer zone (minimum 5-foot radius) around all nests, and maintain these protective measures until the nest hatches or is determined to be unviable.
- Protect sea turtle nests from predators by placing predator screens over all nests and conducting mammalian and avian predator control for piping plovers which would indirectly help sea turtle production.
- Restore dynamic beach and overwash system on Assateague Island by allowing natural geologic processes to restore overwash to a northern portion of Wild Beach in order to increase nesting habitat for sea turtles lost when the artificial dune system was created.

Biological Monitoring

- Conduct sea turtle crawl and nest searches of Assateague beaches at least three times per week June through August, in conjunction with shorebird monitoring activities whenever possible.
- Deploy properly trained staff to determine whether sea turtle crawls resulted in a nest, and monitor all confirmed nests for hatching and emergence as described in the Biological Opinion (USFWS 2008b; Appendix F).

Objective 1.4 Federally Endangered Plants and Rare Plant Communities

Protect the integrity of rare plant communities and maintain or expand 970 acres of sandy beach and washover habitat for the federally endangered seabeach amaranth along Assateague Island

shoreline by allowing natural processes to occur with a goal of increasing the current population of 1 to 5 plants, as averages over a 5 year period.

Rationale:

Seabeach amaranth is a Federal endangered plant native to barrier islands beaches and inlets from Massachusetts to South Carolina; the population has been greatly reduced on the refuge due to beach stabilization efforts, increased recreational use, and herbivory. “Soft” stabilization methods such as placement of sand fences and planting vegetation like beachgrass can be detrimental; seabeach amaranth rarely persists where vegetative stabilization efforts have taken place (Weakley et al. 1996). Sika, resident white-tailed deer, cottontail, and Chincoteague ponies are documented herbivores of amaranth found on the refuge.

Seabeach amaranth generally occurs in a sparse to very sparse distribution. A typical density is 62 plants per linear mile of beach (100 plants per linear km) (Weakley et al. 1996). Current density of the one existing population at the north end of Wild Beach is much lower than this - less than 6 plants per mile (10 plants per km). Investigations regarding active management such as propagation/ transplanting, re-seeding, or removing artificial dunes that prevent suitable habitat from forming at the north end of Assateague Island are needed to re-populate the species. Suitable habitat is defined as overwash flats at accreting spits or ends of barrier islands and the lower foredunes and upper strands of non-eroding beaches. This native plant acts as an important habitat for nesting birds such as plovers, terns, and skimmers.

Lucky Boy Fen is a type of rare habitat that is only found in five different areas of the east coast. A fen is a unique and extremely rare type of freshwater wetland located at the upland edge of a wide, ocean-side tidal marsh. A fen is distinguished from a marsh or a bog by unique hydrological regimes and vegetation that is an unusual combination of northern bog plants and southern tidal freshwater wetlands plants. The number of rare species documented in Lucky Boy Fen is high in proportion to its size. It contains two plant species (brown-fruited rush and few-flowered beakrush) considered “critically imperiled” and four plant species (southern bladderwort, ten-angle pipewort, white beakrush, and white-topped fleabane) considered “imperiled” by the Virginia DCR Natural Heritage Division.

The greatest threat to sea-level fens in general is groundwater pollution. Possible movement of fertilizers and wastes into the groundwater from nearby developments or agricultural fields can lead to increased nutrient levels in the fen. Increased nutrient levels can disrupt soil characteristics and affect the plant species that naturally exist in fen conditions. Nearby developed areas include Highway 175 and the NASA WFF, both within one-half mile of Lucky Boy Fen. Other potential threats to the Lucky Boy Fen include encroachment of invasive species and trampling by grazing animals or visitors (Buffa 2009).

Contained within Assateague Island’s 1,600 acres of forested uplands are roughly 400 acres of maritime forest (Berman and Berquist 2007), located primarily in White Hills, Lighthouse, and Woodland Trail areas. This community type is considered globally rare because of restricted range and narrow habitat requirement (Fleming and Patterson 2010). Only 4,093 acres of maritime forest are found in Virginia, 855 acres of this in Accomack County (Berman and Berquist 2007). More recently, the Virginia DCR developed a list of the Commonwealth’s natural communities ranked according to their conservation priority. Maritime Mixed Deciduous Forest is ranked as “critically imperiled”, both globally (G1) and in Virginia (S1). Maritime Loblolly Pine Forest and Loblolly/Beach Heather Dune Woodland are ranked “Imperiled” globally (G2) and in

Virginia (S2) (Fleming and Patterson 2010). Three hundred acres of loblolly pine/mixed hardwood habitat in the White Hills, Woodland Trail, and Lighthouse compartments are possibly the globally significant Maritime Mixed Deciduous Forest community type. Other forested uplands may be part of the Maritime Loblolly Pine Forest or Loblolly/Beach Heather Dune Woodland communities (Buffa 2009). Additional field studies are needed to delineate the boundaries and amount of these important vegetation communities. Silvicultural practices to maintain or enhance the hardwood overstory, sub-canopy, and shrub/herbaceous understory can then be developed to maintain the integrity of maritime forest.

Seabeach Amaranth Management Strategies

- Continue to erect protective cages around amaranth plants each year.

Seabeach Amaranth Biological Monitoring

- Continue the annual August inventory of Assateague Island beaches for amaranth, in cooperation with NPS personnel whenever possible. Conduct inventories on Assawoman Island every 3 to 5 years.

Lucky Boy Fen Management Strategies

- Annually in early November, prior to the deer hunt, check closed area signs around fen and re-post with closed area signs and symbolic fencing (rope strung between posts) if necessary.
- Collaborate with stakeholders and adjacent landowners such as the Virginia Department of Transportation (DOT) and NASA WFF to monitor and preserve the integrity of the Lucky Boy Fen. For example, WFF has an Integrated Contingency Plan which details storm water pollution prevention and spill control measures; contact DOT to see if they have measures to prevent run-off from Highway 175 from degrading the fen.
- Maintain wooded habitat on Wallops Island NWR that serves as a recharge area for Lucky Boy Fen.

Lucky Boy Fen Biological Monitoring

- Monitor for invasive plants during rare plant assessments.

Maritime Forest Management Strategies

- Using the community type descriptions in Fleming and Patterson (2010) and coastal maritime forest map for Accomack County in Berman and Berquist (2007) as starting points, map the maritime forest on Assateague Island, and other areas on Chincoteague NWR.
- If any portions of the maritime forest type are found to be degraded, develop silvicultural or other forest management practices to restore its integrity.

Objective 1.5 Salt Marsh Habitats for Nesting, Migrating, and Wintering Birds

Manage 3,070 acres of salt marsh in Wildcat Marsh, Morris Island, Assateague Island, and on Wallops Island NWR to include a mix of high and low salt marsh vegetation, pool, mudflat, and

panne habitat containing less than 5 percent overall cover of non-native invasive plants, ensuring the quality and natural function of the marsh, as measured by a regionally developed salt marsh integrity index, are sustained and provide habitat for breeding clapper rail, saltmarsh sparrow and American oystercatcher, as well as, migrating and wintering American black duck and shorebirds.

Rationale:

Sea level rise is a constant threat to the natural salt marsh habitats of the refuge, with marsh submergence having a major negative impact on marsh-nesting species such as clapper rails, black rails, saltmarsh sparrows, seaside sparrows, American oystercatchers, and the American black duck. Whimbrel, a species of highest conservation priority in the New England/Mid-Atlantic Bird Conservation Region (BCR) 30, was selected as a surrogate or representative species by the Mid-Atlantic Landscape Conservation Cooperative to represent the guild of shorebirds that feed in mudflats at low tide and roost in salt marsh vegetation at high tide. It is a wintering and migrant bird in this area, as are many of the shorebirds that use salt marsh habitats, which include mudflats and salt pannes. The saltmarsh sparrow, a species of highest conservation priority in BCR 30, was selected as a representative species because it is an indicator of healthy salt marsh habitat. Saltmarsh sparrows breed in large patches, greater than or equal to 125 acres (50 hectares) in size, of high marsh dominated by saltmeadow cordgrass; they forage in low marsh dominated by smooth cordgrass and saltgrass (Smith, pers. comm., 2010). Chincoteague NWR is unique in being one of the few places that have good numbers of breeding and wintering saltmarsh sparrows; estimated at 2.47 birds per 2.5 acres (1 hectare) and 2.3 birds per 2.5 acres, respectively (Center for Conservation Biology 2010 and Paxton 2007). American oystercatcher were selected as a representative species because they are a species of conservation concern in Virginia and use a range of salt marsh habitats for their life history needs. They nest on low salt marsh islands (Rounds et al. 2004), and during the non-breeding season they gather in communal high-tide roosting flocks on sand or mud flats, oyster shell rakes, and topographic high spots in the marsh (Wilke et al. 2007). The American black duck is a globally vulnerable watch list species, considered one of the highest priority species of concern by the Atlantic Coast and Eastern Habitat joint ventures (Steinkamp 2008); its continental population is half of its historic size (Longcore et al. 2000). Since 2001, the Mid-Atlantic region (including New Jersey, Delaware, and Virginia) has accounted for approximately 68 percent of its U.S. wintering population; within the Mid-Atlantic region, Virginia comprises about 12 percent of that wintering population (VDGIF 2005).

With the exception of Chincoteague pony grazing on certain areas of Assateague Island, the salt marshes on Chincoteague NWR are relatively unaltered. Grazing effects on wildlife are mixed. Grazing can help attain wildlife objectives. For example, allowing the Chincoteague ponies in the North Wash Flat (NWF) impoundment prior to the breeding season removes vegetation, creating preferred habitat for plovers and other “beach nesting” birds. Pony fecal matter may stimulate the growth of invertebrate food matter for waterfowl. In salt marshes, the impacts of pony grazing on wildlife habitat may outweigh the benefits because: (1) Trampling during the nesting season can disturb or destroy nests; (2) Direct forage competition reduces food resources for wildlife; and (3) Grazing alters vegetation structure and species composition resulting in habitat loss for marsh-dependent representative species. Comparing grazed to un-grazed low salt marsh, study sites on the Maryland side of Assateague Island (Sturm 2008) found that areas grazed by Assateague horses had significantly lower overall plant cover, decreased reproductive success of smooth cordgrass, and resulted in a shift in species composition from smooth cordgrass to saltgrass. Horses alter the species composition of low salt marsh communities by preferentially grazing on smooth cordgrass, thus providing a competitive advantage to other plant species. The latter is

significant for wildlife because saltgrass provides very poor nesting cover and food resources for representative species compared to smooth cordgrass (Sturm 2007 and 2008). Grazing is therefore a concern in salt marshes because it can reduce the abundance and distributions of salt marsh obligate breeding birds such as clapper rail, seaside, and saltmarsh sparrows (NPS 2006). Management strategies would protect the salt marsh to allow for native species to nest and survive on the refuge, helping to meet other species objectives.

Management Strategies

- Work with the Chincoteague Volunteer Fire Company and others with technical expertise in grazing systems. Adjust grazing compartments and/or Chincoteague pony numbers in order to reduce the adverse effect of ponies on the habitat of representative species, and determine if pony grazing can be integrated into impoundment management strategies.

Biological Monitoring

- Use the USFWS Region 5 Salt Marsh Integrity Index for the installation of surface elevation tables in coordination with efforts by NPS in Maryland to assess the rate of sea level rise, assess grazed and un-grazed salt marsh, determine areas of the marsh that are impacted and need to be restored and design a monitoring program to improve salt marsh quality, diversity, and integrity.
- Encourage and work with partners (e.g., NASA, MSC, TNC, NPS, USGS) to conduct studies to better understand saltmarsh health and migration on the refuge, and coastal barrier islands.
- Continue collecting American oystercatcher data on the Chincoteague Bay Boat Route, and coordinate with partner agencies to determine the frequency of future productivity monitoring on this route.
- Encourage partners (e.g., Center for Conservation Biology (CCB) at the College of William and Mary and Virginia Commonwealth University, USGS, VDGIF, and Saltmarsh Habitat and Avian Research Program collaborators) to conduct studies to better understand the distribution and abundance of saltmarsh sparrows on the refuge, and help identify their limiting factors and other threats.

Goal 2: Managed Wetlands (Impoundments)

Manage refuge impoundments to support native wildlife and plant communities, including a diversity of waterbirds, aquatic species, and other species of conservation concern.

Objective 2.1 Impoundments for Waterfowl, Shorebirds, Waders, and associated species

Manage to provide approximately 2,650 acres of wetland habitat with a mosaic of native emergent marsh vegetation (i.e. American three-square, smartweed, Bidens) and mudflat to support migrating and wintering waterfowl and shorebirds, and breeding shorebirds and waterbirds until an impoundment is no longer functioning. Taxa specific objectives may be rotated among impoundments from year to year depending on environmental conditions and impoundment capabilities, and would be directed to provide the following:

- (1) Wintering Waterfowl - Manage 55 to 75 percent of the impoundments' surface area each winter (December through mid-March) to provide shallow flooded (less than 12 inch water depth) and seed-producing moist-soil vegetation for wintering waterfowl including black duck, pintail, gadwall, shoveler, teal, and Atlantic population of Canada geese.
- (2) Migrating Shorebirds - Manage 35 to 50 percent of the impoundments' surface area each spring (April and May), and 25 to 40 percent each early fall (July through October) to provide a mix of 40 percent mudflat and shallow water (less than four inch water depth) with sparse vegetation (less than 15 percent cover) for migrating shorebirds (e.g., short-billed dowitcher, dunlin, semipalmated sandpiper, yellowlegs).
- (3) Migrating Waterfowl - Manage 40 to 50 percent of the impoundments' surface area each fall (late October through November) for migrating waterfowl (e.g., black duck, green-winged teal, blue-winged teal) to provide shallow flooded (less than 12 inch water depth) annual vegetation composed primarily of American three-square, grasses of the genus *Echinochloa*, smartweed, Bidens, and other seed producing moist soil vegetation at time of peak migration and by controlling invasives.
- (4) Breeding Shorebirds - Manage NWF impoundment (mowing, pumping and pony exclusion fencing) to provide 90 percent dry habitat conditions for breeding piping plover, Wilson's plover and least terns between March 15 and August 31 or thereafter, until all chicks are fledged.
- (5) Foraging Waterbirds - Provide concentrated food resources in at least two impoundments during June, July, and August each year for breeding waterbirds such as snowy egrets, glossy ibis, and herons.

Rationale:

All of the refuge impoundments, with one exception, were constructed in the 1950s and 1960s with the primary purpose of providing waterfowl migration and wintering habitat. The impoundments supply numerous habitat benefits, including wintering/migratory habitat for waterfowl; food sources for water birds of conservation concern; and shorebird migratory stopover habitat for many species. The water levels of each impoundment are difficult to manage since they depend entirely on precipitation for their source of freshwater, and continued natural occurrences such as sea level rise and storms introduce more salt water, which diminishes the quality of the habitat. The HMP water control prescriptions will allow the refuge to meet their objectives.

The American black duck is a species that has declined by as much as 60 percent, due in part to the loss of their wintering habitat. Invertebrates comprise the majority of black duck diet, and in Virginia wintering areas, mudflat and salt marsh provide the greatest invertebrate biomass (Eichholz and Yerkes 2009). The refuge impoundments, typical black duck wintering habitat, have

seen less and less of these species due to decreased quality of the habitat, either by an increase in invasive plants, or increase in salinity due to sea level rise. We seek to improve the quality of black duck habitat as part of a regionwide effort to increase this species' population.

Coastal refuges in USFWS Region 5 are currently developing a tool, or model, that can be used to weigh the costs and benefits of maintaining an impoundment, and reach a decision about whether to restore or maintain it. Since this model would be science-based, would have technical expert review, would evaluate refuge impoundment habitat in a regional context, and be consistent with other coastal refuges, refuge staff plan to use the Coastal Impoundment SDM model to direct future management for each of the refuge impoundments. Until refined by the outcome of the SDM model, this objective would be met by manipulating impoundment water depths and vegetation. Refuge staff would continue to monitor and assess each impoundment using the Coastal Impoundment SDM model to evaluate whether to continue managing it for current capabilities, or to restore it to its natural hydrology.

An Annual Habitat Management Plan, detailing management prescriptions to achieve impoundment objectives, would be prepared annually. Impoundments are managed to encourage growth of desirable waterfowl food plants in impoundment bottoms, while balancing the need to maintain a certain amount of woody vegetation along pond edges for black duck thermal cover and songbird habitat. Annual water management plans would prescribe where and how frequently to remove encroaching woody vegetation through mowing, disking, and/or prescribed burning. Vegetation treatments would occur on a rotational basis, with two to four impoundments being manipulated each year. Taxa-specific objectives may be rotated among impoundments from year to year depending on environmental conditions and impoundment capabilities.

Assateague Island is a critical stopover point for southbound migrating monarchs that use the refuge's resources to rest, refuel, and roost for the night. *Bidens* is a prime peak migration nectar source for monarchs, as well as an excellent seed source for waterfowl. This species grows in the borrow ditches of impoundments, especially those along the Wildlife Loop, and can cover large portions of some impoundments, including Shoveler (B-North Pool), Mallard (C Pool), Pintail (D Pool), and Gadwall (E Pool). Blooming times vary from mid-September to mid-October, depending on rainfall from late summer storms and fall hurricanes; plants often hold buds closed for weeks until there is sufficient rainfall (Gibbs 2008). *Bidens* is particularly attractive to migrating monarchs because it often covers large areas and provides a quality nectar source.

Periodic mowing and disking seems to enhance the germination and growth of *Bidens* in refuge impoundments (Savage, pers. comm., 2010). Late summer and early fall are sometimes the only periods that mowing can be accomplished due to breeding birds or wet conditions during other times of the year. Therefore, mowing would be strategically planned so that at least half of the identified nectar sources would be left un-mowed for butterflies.

Management Strategies

- Manage at least 10 impoundments each winter (December through mid-March) for wintering waterfowl. Manage at least 4 impoundments each spring (April and May) and 3 each fall (July through October) for migrating shorebirds. Manage at least 6 impoundments each fall (late October to early November) for migrating waterfowl. Manage at least 2 impoundments during June, July, and August to provide suitable

feeding areas (ponded areas or borrow ditches that concentrate fish) for nesting waterbirds.

- Draw-down NWF impoundment beginning February 15 each year by a combination of pumping and constructing/maintaining shallow ditches. Continue to evaluate the contribution of NWF impoundment to plover reproductive success in the annual shorebird report; if it is determined that these efforts are not contributing to plover recovery or benefitting other species, develop alternate management prescriptions for the NWF impoundment and an alternative plan with USFWS Ecological Services to mitigate for the loss of piping plover habitat due to the current location of the recreational beach.
- On alternate years, enhance piping plover nesting habitat in the NWF impoundment by various methods which may include placing clam shells, constructing low-profile nesting islands, flooding and/or disking/mowing/burning to remove vegetation.
- Prescribe burn, on a rotational basis, 150 to 300 acres in impoundments. This is based on the acres of impoundments covered by burnable vegetation (1500 acres) divided by the fire return interval in this habitat type (T. Craig, USFWS Fire Mgmt, pers. comm., January 27, 2010).
- In cooperation with USDA, continue to reduce, eliminating if possible, populations of non-migrant Canada geese. Control measures would be timed to take place before migrants begin arriving (September). Support the town of Chincoteague's efforts to reduce Canada goose populations, since geese nesting and loafing in town areas move to the refuge.
- Record all management actions implemented in each impoundment in the refuge impoundment database.
- Encourage the growth of Bidens on 40 acres of impoundment bottoms and borrow ditches. Conduct mechanical treatments (disking, mowing) and prescribed burning in impoundments Snow Goose (B-South Pool), Shoveler (B-North Pool), Mallard (C Pool), Pintail (D Pool), and Gadwall (E Pool) on a rotational basis so that at least 50 percent of the Bidens stands are in flower September-October in a minimum of two of these impoundments.
- Avoid mowing or disking any areas with Phragmites because it spreads this invasive.
- Avoid prescribed burning of Bidens stands where natural germination and growth is desirable.
- Adjust the timing of Phragmites aerial spraying so that it is completed prior to September 10th to avoid herbicide contact with butterflies. In addition, avoid overspray and wind-drift onto non-target plants such as, goldenrod, Bidens, and other nectar plants by spraying in calm conditions.
- Delay fall mowing of other monarch nectaring plants on dike tops and slopes until after November 1.
- Collaborate with potential partners doing greenhouse germination experiments of Bidens, and other nectar plants if appropriate, by collecting seeds for propagation.
- Impoundment dikes such as for Mallard (C Dike), Pintail (D Dike), etc.: Mow as needed to prevent woody encroachment. During the growing season mow a 10-foot wide strip on the top of dike, providing un-mowed habitat on slopes and toes of dike for ground nesting birds and monarch nectar plants. Slopes and toes of dike would be mowed early in November to reduce woody encroachment but prevent waterfowl disturbance.

Biological Monitoring

- Continue monitoring for waterfowl, shorebirds, and waders on refuge impoundments and adjacent tidal areas as per the Chincoteague NWR Inventory and Monitoring Plan.
- Continue to collect bi-weekly water level and salinity readings for each impoundment throughout the year. Water gauge readings would be used to adjust impoundments to proper depth for target species use, and to conduct/evaluate water level manipulations as identified in annual work plans.
- Conduct vegetative transects at fixed sampling points in each impoundment in order to monitor the effectiveness of water level management/vegetation management for achieving bird and monarch objectives. Use the results to evaluate vegetation response to management actions, adjust prescriptions in the Annual Water Management Plan.
- Continue to map Phragmites patches in and adjacent to impoundments bi-annually, at a minimum, and annually the year following any major treatment such as aerial spraying or prescribed burning. Use results to prioritize treatment areas.
- Conduct observational walks within the impoundments following mechanical/chemical treatments or water level manipulations to qualitatively assess whether desired results are being achieved. Also scout for invasive species and estimate overall vegetative composition of the impoundments.

Goal 3: Upland Habitats

Manage upland habitats for biological integrity, diversity and environmental health of coastal forests and shrublands to sustain native wildlife and plant communities, including species of conservation concern.

Objective 3.1 Coastal Shrub Habitat for Breeding and Migrating Landbirds

Manage 2,500 acres of coastal shrubland with a continuous band of >500 feet between impoundment and the dunes, comprised of 100 percent native species (wax myrtle, bayberry, and groundsel) with at least 50 percent fruit bearing shrubs averaging about 10 feet in height and containing few or no pine trees, to provide forage and cover for breeding, migrating and wintering landbirds.

Rationale:

Early successional habitats are an important part of the forest landscape for supporting avian communities. As the frequency and extent of anthropogenic disturbances have declined, suitable habitat for scrub-shrub bird species also has decreased, resulting in significant declines for many species (Greenberg et al. 2011). Shrubs provide abundance of insect food and berries for breeding birds during the fall migration and/or throughout the winter. Migrating birds depend on stopover habitat along migration routes where they can find food, water, and protection to regain energy lost in flight and re-fuel for the next leg of the journey (Duncan et al. 2002). Robert's (2009) 10-year banding study found that the refuge's wax myrtle/bayberry/groundsel shrub community provides important stopover habitat. Dense, tall (10 to 12 feet high) wax myrtle/bayberry habitat between impoundments and the dune line is also preferred nesting habitat for passerines, including several "highest" and "high" priority species of conservation concern in BCR 30, such as prairie warbler, field sparrow, and brown thrasher.

A recent 3-year study at Assateague Island National Seashore in Maryland used a series of exclosure treatments to assess the influence of pony herbivory on Assateague Island's shrub and

forest habitats. The results indicate that pony grazing is reducing species diversity in forest habitats and altering vegetative community composition in both shrub and forest habitats (Sturm 2007). The study found that pony grazing also influences the abundance and average height of several native plant species in these habitats. Grazing by sika and resident white-tailed deer is a potential threat to achieving objectives if numbers are not managed by hunting.

Assateague Island is a critical stopover point for southbound migrating monarchs that use the refuge's resources to rest, refuel, and roost for the night. Monarch roosting site locations vary somewhat from year to year, but they are generally found on the east-facing and/or leeward side of trees and shrub clumps. Roosting habitat is defined as thickets of bayberry, groundsel-tree, black cherry, marsh elder, or red cedar with an eastern exposure of a patch size sufficient to buffer winds adjacent to large open areas such as north side of Toms Cove and western side of impoundments. Monarch seek protection from the wind behind low growing plants, manmade objects such as fences, and even tire tracks in the sand. On very windy days they wait for the wind to dissipate before crossing Chincoteague Inlet. Management activities to return the beach to more natural processes (no longer maintaining the artificial dune around the public beach and removing the split rail fences around the parking areas), removed some monarch wind breaks. Without daytime roosting areas that are protected from the wind on large open areas such as the Hook and Overwash, monarchs may deplete energy reserves to the point they are unable to continue southward migration, or are blown out to sea.

Management Strategies

Manage a 500-foot wide continuous strip of 10 to 12-foot tall myrtle/bayberry shrub, free of trees, parallel to (and behind the) dunes on eastern side of the South Wash Flats impoundment.

- Use a hydroaxe or chainsaw to selectively remove loblolly pine trees greater than or equal to 6.5 feet tall where they are encroaching in otherwise suitable myrtle/bayberry habitat on impoundment edges.
- Carefully manage the encroachment of woody shrubs around the edges of the impoundments around Wildlife Loop to achieve multiple objectives of providing waterbird habitat and wildlife viewing, while maintaining habitat for wintering sparrows. Mow on a rotational basis, leaving at least 50 percent of the brushy vegetation around the perimeter of these impoundments un-mowed in any given winter.
- Wildlife Loop: Mow a strip no wider than 5 feet on either side of the road around the perimeter, with minimal mowing around benches and viewing spots. Primarily for public health and safety reasons, keeping roadside grass low allows pedestrians and bicyclers to step off the road with less concern for ticks and chiggers. Dikes may be mowed between November 1 and April 1 to prevent woody encroachment and maintain wildlife viewing opportunities.
- Pony Fences: Mow only as wide as needed to facilitate inspection and repair of fences and prevent woody plants and vines from strangling the fence. Generally, this would be a swath no more than 6 to 7 feet wide on either side of the fence. In areas where brush or tree limbs need to be trimmed back to a distance greater than 7 feet from the fence to ensure the safety of equipment operators, maintenance and biology staffs would coordinate to flag or otherwise mark the areas prior to mowing. Mowing during the nesting season would be avoided, except where this is not possible (e.g., wet/muddy conditions). Combine with herbicide spraying to increase effectiveness.

- Through hunting, maintain the sika and resident white-tailed deer populations at levels low enough so as not to degrade the shrub vegetation by over-browsing. The present season: a sika/deer archery season in October, a sika/deer firearms season in early December, and a firearms sika only season in January is currently fulfilling this objective. Depending on the sika/deer population and/or hunter participation, this season may be expanded or contracted in the future.
- Delay mowing, on rotational basis, of monarch nectaring and roosting locations until after November 1 or seed-set (whichever is later) on at least 80 percent of the roost sites and 50 percent of the nectar sources.
- Encourage interested partner(s) to periodically (every 3 to 5 years) reassess important monarch roosting and nectar locations. The dynamic nature of barrier island systems is expected to alter some of the monarch habitat, so monarch habitat protection and management actions would need to be dynamic as well.
- Minimize mowing on Beach Road from Pony Coral to Toms Cove Visitor Center to protect goldenrod and other butterfly nectar plants. Mowing would occur only if needed for safety reasons and only then would grass on the road side of the wooden posts be trimmed so wooden posts are visible to motorists. Care would be taken by maintenance crew so that vegetation behind posts is left uncut for the entire growing season, allowing goldenrod plants to seed and spread. Mowing to control woody vegetation would not take place until after November 1.

Biological Monitoring

- Plot BBS route survey points on the cover map. Use this spatial analysis, together with results from previous strategy, to determine how frequently the refuge's BBS routes should be repeated, and whether additional routes should be added.
- Continue to partner with volunteers and other individuals or organizations as opportunities arise, to increase our understanding of how breeding and migrating landbirds use refuge habitats through banding and other monitoring projects.
- Continue to collaborate with VDGIF and NPS to annually estimate sika and resident white-tailed deer population size and structure on Assateague from deer hunt check station data and other information as appropriate.

Objective 3.2 Loblolly Pine Forest for Delmarva Peninsula fox squirrel, Brown-headed Nuthatch & Eastern Towhee

Manage the biological integrity and diversity of 1,600 acres of mature loblolly pine forest on Assateague Island by diversifying the structure and age class using small openings (2 to 10 acres) that favor hardwood regeneration, to support a minimum population of 200 Delmarva Peninsula fox squirrels as well as, breeding habitat for brown-headed nuthatch and eastern towhee.

Rationale:

Forest habitat on Assateague Island consists largely of monotypic stands of even-aged and mature loblolly pine trees, which are vulnerable to catastrophic loss from insect damage or extreme weather/wind events, without management. The southern pine beetle, a native species, is the only major known insect threat to this forest. Some younger forest stands date back to the southern pine beetle infestations in 1983 and 1994 when blocks of forest were clear-cut in Black Duck Drain (1983) and Woodland Trail/Wildlife Loop/White Hills (1994) to control the outbreak. Many of these younger stands are dense and stunted, with understory habitat conditions unfavorable for focal

species. Creating a mosaic of pine and hardwood trees of varying age classes and structural diversity would make the forest more resistant to damaging insect outbreaks, and create habitat characteristics more favorable to the Delmarva Peninsula fox squirrel, bobwhite, brown-headed nuthatch, and eastern towhee. The southern pine beetle does not attack hardwood trees and younger age-class trees provide a barrier to bark beetle spread (Merten, pers. comm., 2010).

The natural fire frequency for southern pine forests of the Mid-Atlantic is estimated at 5 to 15 years (Kulynycz 2004 and Tim Craig, USFWS Fire Mgmt Officer, pers. comm., January 27, 2010). Reintroducing fire into the “pure pine” habitat type described above through prescribed burning could create open understory habitat conditions preferred by Delmarva Peninsula fox squirrel (USFWS 2011), diversify the age-class and structure of the forest, and mimic natural disturbance factors. On the other hand, hardwoods are not resistant to fire, so prescribed burning may be detrimental in increasing the hardwood component. Other silvicultural techniques, such as creating small openings by clear-cutting pine around naturally regenerating hardwood saplings and/or replanting hardwoods in these clearings or natural openings, may better meet the objective (Kellum and Lewis, pers. comm., February 25, 2010).

Management Strategies

- If a southern pine beetle outbreak spreads to cover a single block of 5 contiguous acres in one growing season, assess whether management actions are needed to control the infestation so that it can be contained within a 10-acre or less block (Keller, pers. comm., February 25, 2010). Each situation would need to be evaluated on a case-by-case basis to determine rate of spread and whether natural barriers would contain the outbreak to a size that does not impact Delmarva Peninsula fox squirrels, public safety, or other important resources. If suppression action is determined necessary, the preferred method would be to cut all currently infested pine trees in addition to a green tree buffer of at least the average stand tree height in front of the leading edge or head of the outbreak during the April-October growing season (Merten, pers. comm., 2010). Green and infested trees within the buffer would be felled so they fall in the direction of the infected zone and can be left on the ground. Vacated trees (those with numerous beetle exit holes or with sloughing bark) should be left standing as they provide habitat for the checkered beetle, and other native biological control insects of southern pine beetle (Merten, pers. comm. 2010). Standing dead trees no longer harbor southern pine beetles and provide snag habitat for birds and squirrels. Leaving dead trees also minimizes disturbance to wildlife habitat, and may also promote the growth of hardwood trees in the understory. Hardwoods are not affected by southern pine beetle, but are often damaged by clear-cutting methods to remove infested pine trees.
- Thin overstocked, young, monotypic loblolly pine stands (“pure pine” habitat type) in the Woodland Trail compartment and along Wildlife Loop by mechanical means and/or the use of prescribed fire. Thin to the area’s Site Index. Time thinning so that it occurs when cones are green, to avoid spreading mature seeds.
- If supported by the Forest Management Plan and Continuous Forest Inventory (CFI), conduct another prescribed burn in “pure pine” forest habitat. The prescribed burn unit should be planned to avoid the “loblolly pine/mixed hardwood” habitat and maritime forest. The burn would be conducted in late spring/early summer, with the goal of creating a more open understory and increasing structural diversity. If the prescribed burn has the desired effect of creating habitat conditions favored by forest focal species, additional burns could be considered for other areas.

- Through hunting, manage sika and resident white tailed deer, at low enough levels so as not to degrade the shrub vegetation by over-browsing. If population decreases, maintain practices. Develop a managed threshold to identify desired population size (conduct research to identify vegetation thresholds)

Biological Monitoring

- Continue to regularly scout for natural southern pine beetle outbreaks, focusing the most effort during conditions when the southern pine beetle is most active: spring and fall when daily temperatures are between 60 and 80 degrees Fahrenheit. Scout weekly during these conditions. During periods of successive drought, or other physiological stress, conduct aerial surveys, especially in mid-summer. When southern pine beetle infested tree(s) are discovered, mark individual tree(s) and/or GPS the perimeter of the infestation and monitor for spread of the disease at least monthly. Identify and map natural barriers to the southern pine beetle such as non-pine vegetation, young pine stands, roads, water, etc.
- Continue to perform early detection and rapid response to control invasive, undesirable plants and animal species.
- Refer to previous strategies concerning BBS data analysis and resumption of refuge BBS routes as these would also serve to monitor the response of brown-headed nuthatch and eastern towhee to forest objectives and management actions.
- Conduct woodcock surveys on three of the four refuge routes every 3 to 5 years. Due to the complete lack of detections and marginal habitat, drop the northern Service Road route from the survey. In years that surveys are conducted, conduct a minimum of two surveys: one prior to March 14 and one during the national survey period (April 10 to April 30). Encourage a graduate student or other partner to investigate Assateague Island's importance for migrating and breeding woodcock. Woodcock was considered but eliminated as a focal species because it is thought that Chincoteague NWR does not make a significant contribution to the population; however, this assumption has not been thoroughly investigated.

Delmarva Fox Squirrel Management Strategies

- Protect Delmarva Peninsula fox squirrels from hunting, competition and predation by continuing to prohibit pets on Assateague Island, remove all feral cats, and reduce numbers of red fox. Trap and remove gray squirrels.
- In coordination with USFWS Ecological Services and recommendations from the most recent status review, evaluate the need to maintain Delmarva Peninsula fox squirrel nest boxes (the current number is 127). Decrease or eliminate boxes in favor of natural nesting cavities.
- Conduct Delmarva Peninsula fox squirrel population surveys in loblolly pine forest north of White Hills using Reconyx remote cameras, or other methods.
- Mow a 10 to 12-foot wide swath along each side of Beach Road between Assateague Channel Bridge and the Pony Corral as needed during the growing season to maintain vegetation height at less than or equal to 6 inches, in order to minimize Delmarva Peninsula fox squirrel fatalities due to vehicle strikes.
- Service Road: Mow a strip no wider than 5 feet along the road edge during the growing season to minimize Delmarva Peninsula fox squirrel fatalities due to vehicle strikes and for

maintenance of road bed. A wider swath may be mowed between November 1 and April 1 to prevent woody encroachment.

- Do not mow Woodland Trail, except to facilitate public enjoyment of kiosks, benches, and trails.

Delmarva Fox Squirrel Biological Monitoring

- Conduct bi-annual population estimate of Delmarva Peninsula fox squirrel population in White Hills, Lighthouse Ridge, and Woodland Trail areas using mark/re-capture methods.
- Continue to record (including sex and age) all Delmarva Peninsula fox squirrels killed by vehicle strikes and inspect them for Passive Integrated Transponder (PIT) tags to determine whether road-killed Delmarva Peninsula fox squirrels remain below 5 per year.

Objective 3.3 Upland Habitats on Wallops Island NWR

On Wallops Island NWR, manage and restore the biological integrity and diversity of 121 acres of mixed hardwood forest and 57 acres of early successional habitat maintained in the power line ROW and NASA runway approach to benefit migrating and nesting landbirds, bobwhite and woodcock with less than 40 acres infested with invasive plant species.

Rationale:

Since its creation in 1971, Wallops Island NWR has been unstaffed, with little to no monitoring or management, except by ANEC, a utility company with a power line ROW. ANEC removes tall growing trees, primarily the non-native autumn olive, and some brush species. Manipulations, with the goal of creating early successional habitat favored by bobwhite and other species that prefer edge and early succession habitats, have occurred in the old-field habitat, but these have been poorly documented.

Forested habitats have shown the greatest loss of any cover type on the Delmarva Peninsula, and forest cover on the Peninsula is fragmented (Chincoteague NWR 2004). Given that most forests in the area are small private woodlots, maintaining an approximately 175-acre block of mature forest with a significant hardwood component would provide an important habitat type for migrant and resident landbirds.

The spread of invasive plant species is the greatest management concern to upland habitat. Invasive plant mapping conducted in 2004 and 2009 identified autumn olive, Phragmites, Nepalese browntop, Japanese siltgrass, Japanese honeysuckle, and several thistles as non-native species of concern. Approximately 75 acres of autumn olive were mapped in 2009; one-third of the autumn olive mapped was located in monotypic stands along the forest edge, and two-thirds of the acreage consists of autumn olive invading the understory of the pine/hardwood forest. Japanese siltgrass also covers large areas of the forest understory (Buffa 2009). Twenty acres of Phragmites were mapped in wetlands adjacent to the forest.

Management Strategies

- Continue to support and build upon ANEC management of the ROW on Wallops Island NWR which favors maintenance of an early-successional plant community composed primarily of low-growing native shrubs such as dogwoods and warm- season grasses.

ANEC plans to conduct the following actions (Belknap, pers. comm., 2010) to manage their ROW:

- Mechanically (hydro-axe) remove tall-growing trees and shrubs, emphasizing the removal of autumn olive. Most mechanical work was completed in 2008; however, from time to time tall dead, dying, leaning, or brittle trees along the ROW border may need to be removed or topped.
- Selectively remove target growing trees/shrubs (red maple, pine, oak, sweet gum, dense raspberry) and all invasive species with herbicides and backpack sprayers within 3 years, and thereafter, conduct chemical treatments at intervals of 3 years. Manage vegetation selectively for dogwoods, low-growing shrubs like bayberry that don't interfere with ROW maintenance, and grasses.
- Minimize use of heavy equipment in wetlands or other areas where vehicles would tear up the ground or create deep ruts. Use hand tools and backpack sprayers in these areas, or conduct activities in winter when the ground is frozen.
- Time chemical-based vegetation control activities for August or later to avoid impacts to breeding birds.
- Work with ANEC staff to select danger trees that could be topped to create brush piles that would be left in place for wildlife habitat.
- Coordinate with ANEC representative annually (target is March) to review vegetation management plans for the coming year, collect information to prepare Pesticide Use Proposals, and/or conduct a site visit to evaluate vegetation management.
- Through hunting, maintain a sustainable white-tailed deer population that does not degrade the native understory vegetation by over-browsing or pose safety concerns to NASA, WFF, or the Virginia DOT.

Biological Monitoring

- Repeat GPS ground mapping of invasive species' perimeter every 3 years. Scout for invasive species in conjunction with other management or survey activities.
- ANEC would monitor vegetation objectives in the ROW by visual field observations every 1 to 2 years.

Goal 4: Southern Barrier Islands Unit (Assawoman, Metompkin, Cedar)

Perpetuate the biological integrity, diversity and long term viability of natural habitats that support native avian communities and turtles on Assawoman, Metompkin and Cedar Islands through a partnership approach.

Objective 4.1 Barrier Beach and Dunes - Breeding Shorebirds and Turtles

Work with partners to prevent disturbance and mortality to nesting representative species (piping plover, least tern, and loggerhead sea turtle) on Assawoman, Metompkin, and Cedar Islands during the breeding season.

Rationale:

Virginia's string of barrier islands, which extend from Assateague Island south to Fisherman Island at the mouth of the Chesapeake Bay, is the largest collection of near pristine barrier islands left in the country (USFWS 1998). Aside from small private in-holdings, all of Virginia's barrier islands are protected by either Federal or State agencies, or TNC. These partners developed a Conservation Action Plan in 1996 with a goal, "To ensure the long-term viability of the avian

communities, species, and habitats in the Virginia barrier islands system through a partnership approach” (TNC 1996). This objective works towards the preservation of these islands in their natural state, allowing coastal processes to continue to shape them.

The Mid-Atlantic barrier islands provide preferred nesting habitat for terns, skimmers, gulls, American oystercatchers, willets, herons, egrets, other waterbirds, shorebirds, and turtles. Erwin (1980) found that 81 percent of seabirds, which include terns and skimmers, in Virginia nest on barrier island beaches. Many of the avian species that nest, migrate, and winter in the Virginia barrier islands system were nearly extirpated at the turn of the 20th century by a combination of hunting and other human activities. Although nearly all of the Virginia barrier islands are in a protected status in one form or another, many wildlife species are still in decline or below objective levels, including common terns, least terns, gull-billed terns, black skimmers, American black duck, piping plover, and several herons. Documented and potential threats include severe weather events, sea level rise, competition and displacement from nesting habitat by aggressive avian species, mammalian and avian predators, and disturbance from recreational use of barrier islands and salt marsh habitats. Public recreational activities are restricted to varying degrees on Assawoman, Metompkin, and Cedar Islands during the shorebird breeding season (March 15–August 31) (USFWS 2008d), but because the islands are remote and unstaffed, human disturbance has not been measured or monitored.

The intermixed public and private ownership and lack of a complete boundary survey on Cedar Island limits staff’s ability to enforce restrictions on this island. Most wildlife-dependent public uses are allowed; however, because it is more remote than either Assawoman or Metompkin Islands and accessible only by boat, it is less visited by the public. The differences in permitted activities, dates of restrictions, and differing policies of the various agencies and organizations that manage the barrier islands also may make it hard for the public to understand and abide by regulations. Working with partners to develop consistent rules and signage, and directing public use to less sensitive areas would help meet this goal.

Where possible, the refuge will take management steps to replant natural vegetation and protect native species, such as conducting a feasibility study to determine if a transplant program to establish seabeach amaranth on southern barrier island(s) sites is desirable, to further enhance the habitat of the barrier islands.

Management Strategies

- Continue to work with VCAP and other partners (TNC, VDCR, VDGIF, etc.) to standardize public use regulations that reduce disturbance to nesting species on all Virginia barrier islands. This would include implementing standard operating procedures and consistent signing; directing recreation to less sensitive areas; and developing outreach materials and educational programs for the public.
- Continue to post the south end of Assawoman Island and the north end of Metompkin Island. Conduct law enforcement patrols during the breeding season, focusing on the period when nests and chicks are present and visitor use is highest: Memorial Day through Labor Day.
- Continue to minimize direct predation of piping plover, least tern, American oystercatcher, and other beach nesting birds through removal of mammalian and avian predators, and erecting nest exclosures. Discourage nesting of gulls by egg-addling, where feasible.

- Protect any sea turtle nests on Assawoman, Metompkin, and Cedar Islands from human disturbance and predators by erecting “closed area” signs, placing predator screens over all nests, and conducting mammalian and avian predator control.
- Maintain a refuge staff presence on Assawoman, Metompkin, and Cedar Islands of at least 3 days per week during the nesting season in order to enforce beach closures and educate the public about the need to minimize wildlife disturbance. At least one day should be on the weekend.
- Continue to work with Virginia DCR to periodically obtain up-to-date aerial mapping of Phragmites on the southern barrier islands.
- Continue early detection and removal of Japanese sedge and beach vitex on all three southern islands.
- Work with partners to obtain improved bathymetry data and vegetation cover mapping of the southern island units and seaside lagoons to better assess and plan for the impacts of sea level rise.

Biological Monitoring

- Continue breeding shorebird and invasive species monitoring on all of the refuge’s barrier islands (see Objective 1.1).
- Conduct sea turtle crawl and nest searches of Assawoman and Cedar Island beaches at least 3 times per week June through August, in conjunction with shorebird monitoring activities.
- Train all personnel conducting regular shorebird surveys on the identification of common native and potential non-native plants they may encounter, so that they can perform early detection and removal of invasive plants.

Objective 4.2 Barrier Beach, Dune, and Tidal Marsh – Migrating and Wintering Shorebirds

Manage natural functioning sandy beach and overwash habitat along Assawoman Island, Metompkin Island, and Cedar Island, and the tidal marshes on the backside of the islands to benefit migrating and wintering shorebirds of conservation concern (red knot, sanderling, American oystercatcher, whimbrel).

Rationale:

The ecological significance of Assawoman, Metompkin, and Cedar Islands is recognized through their inclusion in the Western Hemisphere Shorebird Reserve Network; in excess of 100,000 shorebirds migrate along the refuge’s barrier islands during their migration season, using the sandy beach, overwash, and tidal marsh areas as habitat for resting and feeding. This objective works to preserve those areas, and allow for migrating shorebirds to continue use of the refuge.

The refuge’s southern barrier islands are particularly important as spring stopover sites for migrating red knots between late April to early June, with numbers peaking in late May (Niles et al. 2010). Virginia hosts approximately 30 percent of the hemisphere’s red knot rufa subspecies population, and Cedar and Metompkin Islands fall in the upper third of islands in terms of numbers of red knots counted during migration (TNC 1996). The red knot was proposed for listing as a Federal threatened species in September 2013.

The refuge does not currently conduct or organize systematic winter/migratory shorebird surveys on the southern islands like those conducted by volunteers on Assateague Island. Aside from the

winter American oystercatcher roost-site surveys conducted over the past several winters by VDGIF and TNC, the level of non-breeding season surveys conducted by partners is unknown. The Wachapreague Christmas Bird Count includes Cedar Island; this 1-day survey in mid-December consists of a volunteer party walking the entire island and counting all birds seen and heard.

Biological Monitoring

- Evaluate existing shorebird and waterfowl data pertaining to islands in the Southern Barrier Islands Unit to identify key habitat use areas on Assawoman, Metompkin, and Cedar Islands for migrating/wintering red knots, American oystercatcher, sanderling, dunlin, whimbrel, American black duck, and other representative species.
- Support research by partners aimed at fostering a better understanding of migrant and winter bird use of Assawoman, Metompkin, and Cedar Islands. An example is the Center for Conservation Biology's study of the red knot use of barrier islands (Smith et al. 2008).
- Annually conduct resight surveys for tagged red knots in fall and spring, as part of cooperative study, using protocols consistent with partners involved with red knot monitoring and research.
- Continue to collaborate with partners on winter resight surveys for color-banded American oystercatchers in fall and winter. Currently, TNC and VDGIF survey roost sites around Metompkin, Assawoman, and Cedar Islands, while the refuge conducts winter roost resight surveys in Chincoteague Bay.

Goal 5: Partnerships

Working with partners, protect and restore vigorous, viable populations of migratory and resident wildlife, fish, and native plants and their habitats found on the Delmarva Peninsula and identified in state, national, and international treaties, plans, and initiatives. Take a leadership role in collaborative regional efforts to achieve broader conservation goals and serve as a catalyst for achieving a multi-state eco-regional partnership. The refuge will continue to work with partners to explore how best to sustain the resiliency of this unique barrier island system, its communities, and its economy, consistent with the refuge's mission and in the face of dynamic coastal processes, climate change, and storm events.

Objective 5.1 Regional Conservation

Enhance partnerships with conservation organizations to support mutual natural resource conservation efforts in the Delmarva Peninsula by establishing the Lower Delmarva Peninsula Conservation Area and developing other regional management strategies with partners.

Rationale:

With the establishment of the Refuge System over a century ago, USFWS created a vision to embrace a scientific, landscape-level approach to conserve, manage, and restore refuge lands and waters, and to facilitate conservation benefits beyond its boundaries. This vision has been revisited recently with the USFWS strategic plan for climate change and the NWRs's vision document, *Conserving the Future*, which employs a science-based adaptive resource management framework for conserving species on a landscape scale to bring to bear the best available planning, research, monitoring, and management tools to deliver conservation in the right places at the right time to address the challenges posed by climate change and predicted land use changes (USFWS 2010b and USFWS 2011).

The USFWS recognizes the conservation importance of the southern Delmarva Peninsula; over a quarter of the land in the area has been protected by the USFWS and its Federal, State, local, and non-profit partners. New challenges, such as climate change and increasing fragmentation of wildlife habitats, require an adaptive, broad, landscape level approach to conservation actions. To continue the conservation of the Delmarva area, the refuge currently is involved in a number of conservation partnerships, including but not limited to the Pocomoke River Conservation Partnership and the Southern Tip Ecological Partnership, and is working with a number of conservation entities, such as states of Virginia and Maryland and affected counties, TNC, the Conservation Fund, the Virginia Eastern Shore Land Trust, the Assateague Coastal Trust, and Ducks Unlimited. The refuge also works with Federal partners, including NPS, National Oceanic and Atmospheric Administration (NOAA), NASA, U.S. Navy, and USDA.

Strategies:

- Participate in events with local partners to advocate resource conservation and promote the mission of the Refuge System.

Objective 5.2 Economic Development

Continue partnerships and seek additional collaborative relationships with the gateway community and regional organizations to support economic development by participating in meetings and events and utilize information from a visitor survey to inform refuge management decisions.

Rationale:

Access to the refuge is primarily through the town of Chincoteague, the economy of which has become increasingly dependent on the tourism dollars brought into its community by refuge visitors. Tourism generates revenue for the town and for surrounding counties not only from the purchasing of products from local businesses, but also in the form of food and lodging excise taxes. Tourism also provides jobs and supports property values. Continued partnerships with the surrounding community and local businesses, and consideration of economic impacts and opportunities for the town of Chincoteague in future management practices would be maintained to support and improve the surrounding economy.

Strategies:

- Participate in economic development efforts and meetings of tourism groups (State tourism, Chamber of Commerce, NASA, Mid-Atlantic Regional Spaceport, etc.).
- Collaborate on communication to public about activities/events.
- Increase participation in events with local partners to enhance refuge visibility.
- Continue to work with NPS, the town of Chincoteague, and other partners to provide a high-quality recreational experience.

Objective 5.3 Community Resiliency

Collaborate with Federal, State, and local partners to explore potential impacts and identify protective methods to address hazard mitigation and improve community resiliency, in coordination with others.

Rationale:

The town of Chincoteague, Accomack and Northampton counties, adjacent coastal communities, and NASA are concerned about future impacts of sea level rise and storm surge on infrastructure

and access to the region. The refuge shares this concern and would work in coordination with other state and Federal agencies and other appropriate partners to investigate the vulnerabilities and anticipated impacts of climate change and sea level rise on the Eastern Shore. The refuge would also work with partners to explore how best to advance the study, information exchange, and project resources for adaptive management practices that sustain the resiliency of this unique barrier island system including but not limited to Assateague, Wallops, Assawoman, and Metompkin Islands in the face of dynamic coastal processes and climate change.

Strategies:

- Continue working with coastal geologists to model the impacts of coastal storm events and other dune breaching scenarios on Assateague Island to evaluate potential effects that breaches and modifications to infrastructure may have on natural and manmade habitats, refuge infrastructure, and flood control for the town of Chincoteague.

Objective 5.4 Federal Interagency Collaboration and Facility Management

Maintain existing partnerships focused on science research, interpretation, and shared facilities with adjacent Federal entities.

Rationale:

The USFWS recognizes the value of collaborating with other Federal agencies to accommodate their needs, goals, and mandates, when appropriate and when possible within the scope of the refuge purposes and USFWS mission. Currently, NASA and the U.S. Navy own and use land adjacent to the refuge, and NPS has an interagency agreement with the refuge to maintain a specific area and certain activities on Assateague Island. Also, USFWS, NPS, and USDA have a 2007 use agreement for shared facilities, in which the USDA uses area on the refuge to store various types of equipment. The refuge has coordinated with these Federal partners on many issues and is interested in identifying potential opportunities for future collaboration on wildlife management, scientific research, and public education. Furthermore, the refuge recognizes the need to formalize and expand upon arrangements of shared facilities to continue and enhance facility efficiencies in future developments.

Strategies:

- Continue existing partnerships (including monitoring of development impacts and access to Assawoman Island) and assist with trust species management and recovery.
- Continue to monitor and address wildlife/USFWS concerns and opportunities as NASA and the Mid-Atlantic Regional Spaceport explores expansion of its launch facilities and increases activities.
- On an annual basis, execute the objectives and operational activities of the NPS and USFWS MOU and the strategies in the annual work plan developed by staff.
- Continue the use agreements between NPS and USFWS and between USDA and USFWS for maintenance and storage facilities on Wallops Island NWR.

Objective 5.5 Local Conservation of Tidal Creeks, Estuaries, Mudflats, and Nearshore Marine Waters

Over the 15 year lifespan of the CCP, protect the ecological integrity of tidal creeks, estuaries, mudflats and nearshore marine waters through an active role in local, state, and Federal partnerships to ensure the needs of USFWS trust species are addressed in decisions and actions

within the focus areas of Chincoteague and Wallops Island NWRs. Increase protection of these habitats by 5 percent through agreements established through these partnerships.

Rationale:

Most species that are found on the refuge depend on off-refuge habitats to fulfill one or more of their life cycle needs. These habitats are highly susceptible to damage through pollution, human disturbance, and off-refuge projects, all which could influence the success of management activities that the refuge undertakes. Protection of these habitats through partnerships and pooling of resources and funding is needed.

Strategies:

- Continue an active role in the VCAP to share monitoring data with adjacent and sister agencies and organizations such as VDGIF, TNC, NASA WFF, and NPS.
- Continue to collect breeding American oystercatcher data on the Chincoteague Bay Boat Route, and coordinate with partner agencies to determine the frequency of future productivity monitoring on this route.
- Through the refuge's monthly Community Leaders Meeting, continue to inform local political leaders, tourism councils, and sister agencies about trust resources that use the refuge and actions they can take to protect and enhance the ecological integrity of Chincoteague Bay and adjacent habitats.
- Conduct outreach or form a collaborative partnership with the aquaculture industry in surrounding refuge waters aimed at eliminating or cleaning up netting that washes up on refuge habitats.
- Work with other members of VCAP to conduct education and outreach programs targeted at eco-tour operators and other boaters on how to minimize their disturbance to nesting birds.
- Participate in watershed, water quality, and other planning meetings hosted by the county, city, and other similar agencies/organizations.

Goal 6: Visitor Services

People of all ages and abilities develop a stewardship ethic while enjoying their refuge experience and increasing their knowledge of the USFWS, Refuge System, and the refuge.

Objective 6.1 Hunting

Maintain current level of opportunities (e.g., number of hunt days) and current level of visitor satisfaction in hunting program that offers high quality hunting opportunities, including migratory bird and big game.

Rationale:

Hunting is one of the priority public uses of the Refuge System and is to be facilitated when compatible. Hunting on the Delmarva Peninsula is a traditional outdoor pastime and remains a popular form of wildlife-dependent recreation on the refuge and a vital part of the cultural, social, and economic fabric of the communities near the refuge. Furthermore, harvesting surplus animals through hunting is one tool used to manage wildlife populations on the refuge at a level compatible with the environment, provide wildlife-dependent recreational opportunities, and permit the use of a valuable renewable resource. Responsible hunting practices can instill a unique understanding and appreciation of wildlife, their behavior, and habitat needs, as well as their role in the surrounding environment.

Strategies:

- Continue current hunting policy on Chincoteague NWR:
 - Big game hunting (white-tailed deer and sika) on Assateague Island with firearms and archery by lottery. *(Note: Although some hunters require OSV to access hunting areas in the Toms Cove Hook area, we address OSV uses primarily in sections where we discuss fishing).*
 - Migratory game bird hunting by water access outside of Assateague Island.
- Continue current hunting policy on Wallops Island NWR:
 - Big game hunting (white-tailed deer).
- Continue to utilize depopulation permits for sika from VDGIF to assess and monitor sika population.
- Continue monitoring techniques in partnership with NPS (e.g., camera detection survey, aerial flight, and remote sensing) to obtain more accurate population counts for sika and resident white-tailed deer.
- Continue to ensure that the white-tailed deer and waterfowl harvest are consistent with VA regulations.
- Complete development of opportunity for hunters with disabilities, such as those participating in the Wounded Warriors Project, outside of Woodland Trail area.

Objective 6.2 Fishing and OSV Use

Maintain current level of access to fishing areas (this includes surf fishing, crabbing, oyster harvest, and clamming) and current level of visitor satisfaction in these fishing opportunities for people of all ages and backgrounds, including access by OSV to high-quality surf fishing areas.

Rationale:

Fishing is one of the priority uses of the Refuge System and is to be facilitated when compatible. Surf fishing, crabbing, oyster harvest, and clamming are among the most popular wildlife-dependent recreational activities conducted on the refuge. Surf fishing is allowed anywhere along the Atlantic Ocean outside of the life-guarded area. Those surf fishing areas south of the current parking lots (Overwash and Toms Cove Hook) are accessible via OSV use, which is limited to times of the year to provide maximum protection to prime nesting habitat for coastal nesting birds and sea turtles. Crabbing is allowed in designated areas in Swan Cove Pool (F Pool) and along Beach Road. Clamming and oyster harvest are also allowed as a recreational activity in the bayside areas for Toms Cove, also accessible via the Bi-Valve Trail.

Strategies:

- Maintain existing fishing and crabbing programs and areas.

- Continue to allow surf fishing on Assateague Island without a refuge permit (except to stay after-hours) anywhere along the Atlantic Ocean outside of the life-guarded area, with areas north of the recreational beach accessible by foot only and areas south accessible by foot or OSV, with OSV permit.
- Continue to maintain designated crabbing areas (Toms Cove and Swan Cove Pool (F Pool)) (Areas within Assateague Channel provided by NPS).
- Continue joint programs with NPS on surf fishing demonstrations.
- Continue incorporating crabbing and other fishing activities into youth programs.
- Maintain existing OSV closure schedule, vehicle limits, and permits for fishing access south of recreational beach in coordination with NPS, per the NPS-FWS MOU.
- Continue yearly OSV permit sales (cost set by NPS). Continue to limit the number of vehicles to 48 at any one time or 18 when the Hook is closed.
- Continue to require OSV operators in designated zone to carry the following equipment:
 - A shovel with a blade at least 6 inch square and at least 18 inches long.
 - A vehicle jack sufficient to lift one wheel clear of the sand.
 - A jack support that is at least 12 inch by 12 inch of non-bending steel, 5/8 inch plywood or 1.5 inch hardwood.
 - A tire gauge with a minimum reading of 15 pounds or less.
 - A tow rope or tow strap, chain or cable with a minimum pulling strength of 6,000 pounds and at least 10 feet long. Minimum diameter is one-half inch for nylon or Dacron ropes; three-quarter inch for all other ropes; one-quarter inch for carbon steel cable; 5/8 inches for chain links.
- Close Overwash portion of the OSV zone March 15 through August 31 intermittingly based on nesting behavior; close 256 feet (200 meters) north of nesting sites from 2 days prior to any nests hatching to fledging.
- Close Hook portion of the OSV zone from March 15 to August 31 or thereafter, until the last shorebird fledges.

Objective 6.3 Environmental Education and Interpretation

Continue to achieve current level of participation (number of students/programs, number of Web site hits) and current level of visitor satisfaction with environmental education and interpretation opportunities.

Rationale:

Interpretation and environmental education are priority public uses. Interpreting the resources and challenges of the refuge to the general public and incorporating these topics into school curricula is a service welcomed by the general public, communities, and schools. The refuge works with local K to 12 schools, communities, and educational organizations to provide classroom and hands-on programs both on and off the refuge for youth. On the refuge, interpretative hubs are located on several trails, with one trail and pavilion designated for environmental education, as well as the Herbert H. Bateman Educational and Administrative Center, built in 2003. Through the use of interpretation and education, the Refuge System can create a personal, emotional connection with visitors while providing them with a deeper understanding of their ecological place in the natural world, offering a clear understanding of the benefits of the Refuge System, and providing an avenue to promote an ecological conscience in future conservationists.

Strategies:

- Maintain current environmental education opportunities (at least 7,500 education participants annually) as administered by USFWS, including:
 - Serve students by working with NPS, MSC, Accomack and Northampton County school districts, Girl Scouts, Boy Scouts, and Home School students, among others.
 - Offer teacher workshops and teacher-led learning opportunities when staff guided programs are not available.
 - Offer environmental education programs in the classroom of the Herbert H. Bateman Educational and Administrative Center and in the environmental education pavilion (e.g. Habitat Hunting, Forest Ecology, Nature and ME, Critters and Gadgets).
 - Continue to allow the NPS to offer programs from the Toms Cove Visitor Center (e.g. Aquarium Talk, Beach Walk, Marine Explorers, and Salt Marsh Adventure).
 - Continue to participate in Science on the Shore program in collaboration with NASA, MSC, TNC, and the Eastern Shore Community College (ESCC) to “provide the Eastern Shore community with an understanding of how local science-based research and preservation techniques are used to solve challenges that impact the nation” (Marine Science Consortium).
- Maintain current interpretive opportunities (at least 68,000 interpretation participants annually) primarily through self-guided interpretation:
 - Continue to maintain exhibits and videos at the Herbert H. Bateman Educational and Administrative Center.
 - Continue to offer the Children of the Woods Day Camp (a week long day-camp offered to kids ages 8 to 11 which offers activities such as crabbing, clamming, archery, surf fishing, bicycling, and kayaking), sponsored by the CNHA.
 - Pursue interpretation opportunities on proposed shuttle, through an automated audio recording or staff narration.
 - Continue to maintain the kiosk at the Virginia New Church Welcome Center on Route 13.
 - Continue to partner with the CNHA on tours, lectures, and other programs.
 - Continue to allow the NPS to offer hands-on immersive programs from the Toms Cove Visitor Center (e.g., seining, kayaking).
 - Continue training of volunteers to assist in activities.
 - Continue pursuit of proposal for mobile trailer for outreach/education and acquire by 2015.
 - Continue to hold eight major special events (Junior Duck Stamp Contest, International Migratory Bird Day Celebration, National Wildlife Refuge Week, National Public Lands Day, Waterfowl Weekend, Sunrise Pony Walk during Pony Penning, Annual Beach Clean-up, Great Backyard Bird Count).

Objective 6.4 Wildlife Observation and Photography

Maintain current level of visitor satisfaction with opportunities for wildlife observation and photography.

Rationale:

Wildlife observation and photography are two of the 6 priority public uses of the Refuge System and are to be facilitated when compatible. Both public uses promote visitor understanding of, and increase visitor appreciation for, the value of and need for fish and wildlife habitat conservation.

Refuges facilitate these uses by providing enhanced opportunities to view wildlife in their natural habitat by providing platforms, brochures, interpreters, viewing areas, and tour routes. Developing specific areas for visitors to view wildlife enhances wildlife observation and limits the disturbance to wildlife and habitat.

The refuge provides outstanding wildlife viewing opportunities throughout the year, including migrating birds, sika, and resident white-tailed deer, and others. Birding in particular is a popular wildlife observation activity, with well-used sites at Swan Cove Pool (F Pool), Toms Cove, Woodland Trail, and Snow Goose Pool (B-South Pool) in the Wildlife Loop, all of which provide wildlife viewing and opportunities for amateur and professional photographers. This objective represents the current direction of the wildlife observation and photography program on the refuge and assumes continued funding and staffing for operations and maintenance.

Strategies:

- Maintain current walking, biking, and driving access and allow boating access for wildlife observation and photography:
 - Existing trails;
 - Hand-carried, human-powered, non-motorized boat access;
 - Photography workshops;
 - CNHA Bus Tours; and

Objective 6.5 Recreational Beach Use

In cooperation with the NPS, continue to provide a 1-mile recreational beach for enjoyment of an undeveloped, natural setting that is accessible by several means including private vehicles, and parking near the beach, to maintain the current level of visitor use.

Rationale:

The beaches of Assateague Island offer a unique experience in the Mid-Atlantic area as they exist primarily in an undeveloped setting, drawing many families seeking out a natural experience. Under a 2012 NPS-FWS MOU, the NPS manages an assigned area consisting of the 1-mile recreational beach and corresponding adjacent 961 parking spaces. The current recreational beach and facilities on Assateague Island are located in one of the most dynamic areas of the island, and over the years, coastal storms and accompanying extreme high tides have repeatedly washed out the recreational beach parking lots. The 1993 Master Plan addressed these conditions by identifying a long-term strategy to pursue alternative means of transportation such as a shuttle system and off-site parking as necessary to maintain beach use in the future. The 1993 Master Plan acknowledged that although the loss of the existing parking will not likely occur for many years, potential parking sites on Chincoteague Island, that are close to the refuge and beneficial from an economic standpoint to the town (in that visitors to the beach would be parking in town), are being lost to other forms of development, and as a result, potential off-site parking locations should be pursued (Master Plan 1992).

Strategies:

- Continue to allow NPS to maintain 8.5 acres of land for parking, which would preserve the existing capacity of 961 spaces, in the current location at the terminus of Beach Road near Toms Cove, as long as suitable land base directly behind the recreational beach remains. As sea level rise and natural forces reduce the land base capable of supporting the current parking, the number of spaces would be reduced accordingly.

- Continue to coordinate with NPS and the town of Chincoteague to identify a suitable off-site beach parking area for future use once the existing beach parking is reduced or lost due to lack of suitable land base behind the recreational beach.
 - Continue to identify potential Chincoteague Island parking site(s) and pursue funding to acquire land or rights to use. Any decision to pursue purchase of additional property will have a separate public process.
- In being consistent with the 1993 Master Plan, as storms and other natural forces eliminate parking spaces adjacent to the beach, implement an alternate means of transportation such as a shuttle system.
 - The shuttle would have an express route from off-site parking to the recreational beach.
 - Shuttle schedule would be dependent on the number of parking spaces lost, but would initially operate on weekends in May and September and Columbus Day weekend and daily June through August and move to year-round as necessary.
 - Ownership and operation of the shuttle would need to be determined; it may involve USFWS, the town of Chincoteague, or other partner (private or public).
 - Protection from hazardous weather conditions would be provided to shuttle riders in coordination with NPS by providing shelters.
- Continue to confine recreational beach use on Assateague Island to the assigned area identified in the NPS-FWS MOU.
- Continue to allow only wildlife-oriented recreational activities north of the recreational beach.
- Continue pursuit of bicycle trail development via Beach Road to recreational beach to replace the temporary Swan Cove Trail.
- Areas important to nesting piping plovers and other shorebirds would continue to be closed to recreational use from March 15 to August 31, or thereafter until the last shorebird fledges, annually. These closures are subject to extension if the refuge makes the determination that unfledged chicks or other beach nesting birds are still present beyond August 31. Refuge staff would post the nesting areas for protection of nesting birds as well as informing the public of the restricted area.
 - Public use activities would be monitored and if visits increase to a point where disturbance to nesting birds becomes a problem, additional access restrictions would be implemented.

Objective 6.6 Other Recreational Uses

Continue to provide opportunities for public to use the refuge for non-wildlife dependent recreation that is compatible with the refuge purpose and maintain current level of visitor satisfaction.

Rationale:

The refuge does allow uses beyond the 6 wildlife-dependent public uses but only after determining they are appropriate, compatible with the refuge's purpose, and consistent with public safety. All such uses are required to have a Finding of Appropriateness and a CD, which evaluates an activity's compatibility with refuge purposes and outlines measures to ensure compatibility which must be followed if the use is to be allowed.

Strategies:

- Maintain walking and bicycling on the following trails: Woodland Trail (1.6 miles), Black Duck Trail (1.0 miles), Wildlife Loop Trail (3.2 miles; closed to cars until 3 p.m. each day) and along Beach Road and connecting to Chincoteague. Continue to restrict bicycling on the Service Road from the Wildlife Loop to the MD line.
- Continue to restrict boat access:
 - Allow boats to land on designated areas on Toms Cove Hook from September 1 through March 14 or as otherwise posted.
 - Close refuge impoundments to all boats and flotation devices.
 - Only allow non-motorized, human-powered, hand-carried boats to access water from recreational beach and Toms Cove.
 - No boat ramps or docks available for public use.
- Continue to only allow horseback riding in OSV zone with closures March 15 through August 31 or thereafter, until the last shorebird fledges.
- Maintain current mobility-impaired access: designated mobility-impaired parking spaces, ramp access to boardwalk at NPS Visitor Center, two beach wheelchairs, and one designated accessible hunting zone.
- Continue current commercial use permits and restrictions:
 - Commercial photography allowed by special use permit only.
 - Commercial or education films or photography workshops allowed by special use permit only.
- Ceremonies/weddings allowed at recreational beach with permit and some restrictions.
- Continue current prohibition policies:
 - No littering;
 - No pets, including in vehicles;
 - No skateboards;
 - No roller or in-line skates;
 - No camping;
 - No alcohol;
 - No collecting plants, animals, or artifacts (exception: one gallon per person per day of unoccupied shells);
 - No feeding wildlife;
 - No segways;
 - No use of motorized vehicles on trails; and
 - No mopeds allowed on Wildlife Loop.

Goal 7: Refuge Administration

Maintain and enhance refuge infrastructure and operations responsibly and sustainably for the safety and well-being of the wildlife, cultural resources, public, and employees.

Objective 7.1 Outreach, Communication, and Emergency Communication

Continue to provide information about the refuge to maintain current levels of public awareness of the refuge purpose, programs, and challenges.

Rationale:

Though the fundamental purpose of the refuge is wildlife conservation, it is recognized that keeping the public aware of the refuge and its purpose, programs, and challenges is essential to the overall mission. An informed public can not only take advantage of the recreation afforded by

the refuge, but can play a role in influencing and shaping management direction and the challenges which face the refuge. It is no longer acceptable for the refuge to rely solely on posted signs, printed brochures, or interpretive kiosks to orient and educate the public; we must also utilize electronic communications tools— such as Web sites, social media, and mobile applications—to invite and prepare people to visit refuges, give them up-to-date information on what is happening there, and develop a greater appreciation for natural values.

Strategies:

- Continue to communicate refuge events and information through a variety of media outlets (Junior Duck Stamp Contest, International Migratory Bird Day Celebration, National Wildlife Refuge Week, National Public Lands Day, Waterfowl Weekend, Sunrise Pony Walk during Pony Penning, Annual Beach Clean-up, Great Backyard Bird Count).
- Continue to hold monthly Community Leaders Meetings.
- Continue to host on-site visits of public officials.
- Continue to implement the memorandum of agreement with the town of Chincoteague on emergency management.
- Participate in and support regional and national initiatives (e.g. Connecting People with Nature, America’s Great Outdoors).
- Continue Web site updates, seasonal “Eagle Cam” broadcast, and upgrade/changeover of Web site to content management.
- Continue relationship and programs with local radio stations, WCTG 96.5 FM and Delmarva Public Radio’s WSDL National Public Radio (NPR) News 90.7.
- Continue to maintain the 1610 AM Radio station (providing information on refuge hours, emergency information, and refuge special events) and continue development of messages in Spanish.
- Continue implementation of fiber optics capacity.
- Continue agreements on radio communications with NASA.
- Continue pursuit of proposal for mobile trailer for outreach/education and acquire by 2015.
- Continue current outreach activities and implementation of Intelligent Traffic System (Federal Transit Administration implementation grant):
 - Install off-site kiosks for entrance fee pass purchase and information at hotels and public places;
 - Install electronic information signage (variable message sign purchased);
 - Install traffic counters to monitor parking occupancy;
 - Inform the public of peak visitation times and alternative modes by of transportation; and
 - Provide the public with real-time information regarding parking availability, traffic congestion, and expected delays.

Objective 7.2 Staffing and Volunteer Program/Friends Group

Continue to fill any vacancies and otherwise sustain current levels of staffing and volunteer programs to achieve refuge purposes.

Rationale:

In 2007, our Regional Directorate completed a workforce plan to support a new base budget approach. Its goal is a maximum of 75 percent of a refuge station budget to cover salaries and fixed costs, while the remaining 25 percent or more would be operating and maintenance funds. Our strategy is to improve the capability of each refuge manager to do the highest priority work,

and not to have most of a refuge budget tied up in inflexible fixed costs. This strategy was successful for a few fiscal years; however, we now anticipate a level or declining budget environment, which will impact flexibility in managing financial resources and may have implications for the level of permanent staffing. A new round of workforce planning began in 2013 in response to the sequester and anticipated future budget reductions. Our budgets are determined annually by Congress and distributed through our Washington and Regional offices before arriving at field stations.

The Refuge System must continue to be adequately staffed to protect wildlife and habitat, make refuges safe places for staff and visitors, and meet its purposes while continuing opportunities for public use. The current staffing is supplemented by volunteers from the community as well as local and national youth and adult groups, who provide help with invasive plant removal, trash pick-up, interpretive education, and other projects. Chincoteague NWR also receives significant support from its non-profit friends group, the CNHA, which produces and provides interpretive and educational material for refuge visitors and for local teachers, funds student interns, and enables the refuge to receive matching grants for workshops and programs.

Strategies

- Maintain relationship with CNHA Friends group.
- Maintain 23 full-time positions and 10 to 20 part-time, student, or contractor positions in the areas of Visitor Services, Law Enforcement, Biology, administration, fee collection, management, and maintenance (see Appendix K for current staff plan).
- Continue to pursue opportunities for interns with the Student Conservation Association.
- Continue to cooperate with NPS staff, including lifeguard, law enforcement, maintenance, and seasonal interpretive staff, regarding their activities at Toms Cove and the recreational beach.
- Continue work with volunteer groups (e.g., Road Scholars, Master Gardeners, Master Naturalists).

Objective 7.3 Wilderness

Continue to protect and enhance the wilderness character of the proposed wilderness area.

Rationale:

The purpose of designated wilderness under the 1964 Wilderness Act (Public Law 88-577) is to “preserve the wilderness character” and preserve and protect natural conditions. Although there exists no “congressionally designated wilderness lands” within the refuge, there are 1,300 acres of land that have been proposed as wilderness. These areas can also protect watersheds and habitats and provide opportunities for unique scientific research and recreation.

Strategies:

- Continue to protect and enhance the wilderness character of the proposed area through actions to eliminate incompatible features and activities. There would be no change in the size or location of the proposed wilderness.
- Complete wilderness assessment every 5 years to follow monitoring protocol.

Objective 7.4 Cultural and Historic Resources

Continue to maintain and protect all archaeological, cultural and historical sites on the refuge in compliance with all applicable Federal and State laws.

Rationale:

Cultural resources include archaeological resources, historic and architectural properties, and areas or sites of traditional or religious significance to Native Americans. It is the policy of the USFWS to identify, protect, and manage cultural resources located on USFWS lands and affected by USFWS undertakings, in a spirit of stewardship, for future generations. Specifically, USFWS will manage these resources in such a manner that sites, buildings, structures, objects, and values of importance are sufficiently protected for present or future scientific study, public appreciation, and socio-cultural use. Consequently, USFWS will encourage and enhance educational, interpretive, and research opportunities for USFWS managed cultural resources consistent with the overall management objectives of USFWS. The refuge will also protect such resources from illegal take or damage in compliance with all applicable Federal and State laws.

Strategies:

- Continue to maintain cemeteries.
- Continue to allow CNHA and refuge volunteers to give tours of the Assateague Lighthouse.
- Complete restoration of Assateague Lighthouse.
- Working with CNHA, set up endowment account for maintenance funding for Assateague Lighthouse.
- Maintain a Chincoteague pony population consistent with current numbers (125 to 150 ponies), under the pony management agreement in partnership with the Chincoteague Volunteer Fire Company (the current CD allows 150 ponies to graze on 4,000 acres).

Objective 7.5 Climate Change and Sea Level Rise

Incorporate climate change considerations into decisions about facilities and development of new interpretive exhibits and pursue opportunities to contribute to climate change research.

Rationale:

The earth's climate is changing at an accelerating rate that has the potential to cause abrupt changes in ecosystems and increase the risk of species extinction. Climate change transcends USFWS and the Refuge System and poses one of the largest conservation threats of the 21st century. One climate change effect, sea level rise, has specific implications for coastal refuges in terms of habitat, public access, and facility management. The USFWS *Climate Change Strategic Plan* states that it is imperative that the USFWS rise to the challenges at hand, lay the foundation for wise decisions in the future, and begin taking steps right now to begin a continuous and dynamic process of actions that will be crucial to conserving the nation's fish and wildlife resources in the years to come. These steps focus on adaptation, or response to the anticipated impacts; mitigation, or reducing levels of greenhouse gases; and engagement, or soliciting partnerships and raising awareness of the issues. Similarly, *Conserving the Future* recognizes that climate change is a crosscutting theme that interacts with other stressors and requires an assessment of the challenges that climate change poses to refuges as well as of the quantification and reduction of the Refuge System's overall carbon footprint. Refuge system operations and facilities generate heat-trapping gases and have other impacts on the environment and wildlife. *Conserving the Future* states that USFWS stewardship of the Refuge System should provide

cutting-edge leadership in reducing carbon emissions and implementing sustainable, green business practice, including prioritizing land restoration activities that effectively sequester carbon.

Strategies:

- Incorporate climate change into interpretation:
 - Provide interpretive exhibits on climate change at the global and local levels by replacing the migration exhibit with a climate change/severe weather exhibit.
 - Update roadside exhibits with climate-range related content and Quick Response (QR) codes.
 - Add climate change link to refuge Web site.
 - Explore geocaching with climate change theme.
 - Develop questions to be asked as part of an exhibit and incorporated into the broad visitor survey to measure and track visitors' understanding of climate change issues.

2.5.3 Alternative B (Balanced Approach)

Alternative B would continue established habitat and wildlife management strategies but would pursue additional management activities for resources and public use. As introduced in section 1.9.3, a “balanced approach” here still upholds the statutory and policy framework of the Refuge System that states that wildlife and wildlife conservation must come first on refuge lands and waters. Figure 2-3 and Figure 2-4 provides an illustration of major spatial elements of the alternative.

Natural Resource Management. Under this alternative, the refuge would protect and maintain all lands it administers, primarily focusing on the needs of threatened and endangered species, with additional emphasis on the needs of migratory birds and resident wildlife. The refuge would continue to preserve approximately 2,650 acres of wetland impoundments, but make adjustments in accordance with a new impoundment management plan that takes into account various factors, such as the habitat needs of black ducks and monarch butterflies, climate change and natural coastal processes, and relocated beach access and parking. Natural coastal processes would continue to shape habitat on the barrier islands. The refuge would continue to protect and enhance the wilderness character of the 1,300-acre proposed wilderness area and there would be no change in its size or location.

Beach Access and Parking. The refuge would continue to allow NPS to maintain 961 automobile parking spaces (8.5 acres) at the recreational beach. In recognition of the vulnerability of the current parking, the refuge would develop and implement a site design plan for parking and access to a new beach location, approximately 1.5 miles north of the existing beach. The new recreational beach would offer accessible parking in close proximity to the beach.

The refuge in consultation with NPS would provide management strategies for maintaining the current beach in the interim until the newly located recreational beach is ready for visitor use. The refuge would provide a transition plan for moving from the current beach location to the new beach location, including proposed processes and management strategies to ensure access to a recreational beach is available for visitors.

Visitor Use and Experience. Existing public uses would continue with some exceptions. All public access on the Service Road north of the new recreational beach parking would be restricted unless authorized under special use permit or special day use privileges/openings. A joint NPS and USFWS Visitor Contact Station would be developed near the new recreational beach. The Beach Road causeway across Toms Cove would be closed to all public access once other equivalent public access to the new recreational beach is provided. The refuge would continue to allow vehicular access along Beach Road to its new terminus to provide multi-habitat viewshed, access to trails, and viewing of Chincoteague ponies and wildlife. A vehicle turn-around area, crabbing dock, and launch point for non-motorized boats would be constructed at the new terminus of Beach Road. Assawoman Island would be completely closed to all forms of public use, including fishing, from March 15 through September 15 or thereafter, until the last shorebird fledges. Swan Cove Bicycle Trail would be replaced by an alternative bicycle trail from Wildlife Loop north to the south end of the relocated recreational beach, near the OSV zone entrance.

The refuge would maintain and where possible expand current hunting opportunities by including additional species, extending hours, and providing special events and opportunities for youth and

women. The refuge would add mourning doves, light geese, and non-migratory Canada goose hunting opportunities to the refuge's migratory bird hunting program. Additionally, the refuge would allow migratory bird hunting on Federal holidays within the Commonwealth of Virginia hunting seasons. The refuge would also add turkeys to the big game hunting program and pursue development of a trapping program for furbearers. The refuge would continue sika hunting and would conduct research to identify a desired population size. The refuge would continue to manage opportunities for recreational shellfish and crab harvest.

OSV use would be permitted for priority public uses, including wildlife observation, fishing and to access hunting zones. The OSV zone would be expanded from the new recreational beach to Toms Cove and would be open from approximately September 16 to March 14. The OSV zone would be closed to public access March 15 through September 15 or thereafter, until the last shorebird fledges. There would be a designated, year-round area for fishing from south of the recreational beach to the point of closure that would include OSV parking. The refuge would allow recreational horseback riding in the OSV zone from approximately September 16 to March 14 and develop new horse trailer parking area near Mallard (C Dike)/entrance to OSV zone. The refuge would allow visitor access by foot to the OSV zone from approximately September 16 to March 14.

Partnerships. The refuge would pursue partnerships to enhance land conservation, environmental education and interpretation on the Delmarva Peninsula.

Cultural Resource Management. With partners, the refuge would restore the light keeper's house and historic landscaping at Assateague Lighthouse and develop new cultural resource and interpretation amenities, including a virtual tour of the lighthouse. The refuge would allow access to the cemetery near Beach Road and develop tours and controlled access opportunities for Assateague Village. The refuge would work with NASA to develop a boardwalk and kiosk from the NASA Visitor Center in or adjacent to Wallops Island NWR.

The refuge would implement a Chincoteague pony management plan that meets multiple objectives: visitor viewing, habitat management, and pony health. The refuge would allow grazing of the current pony population, with a maximum pony herd size of 150, per the management agreement with the Chincoteague Volunteer Fire Company.

Figure 2-3. Alternative B – Chincoteague NWR

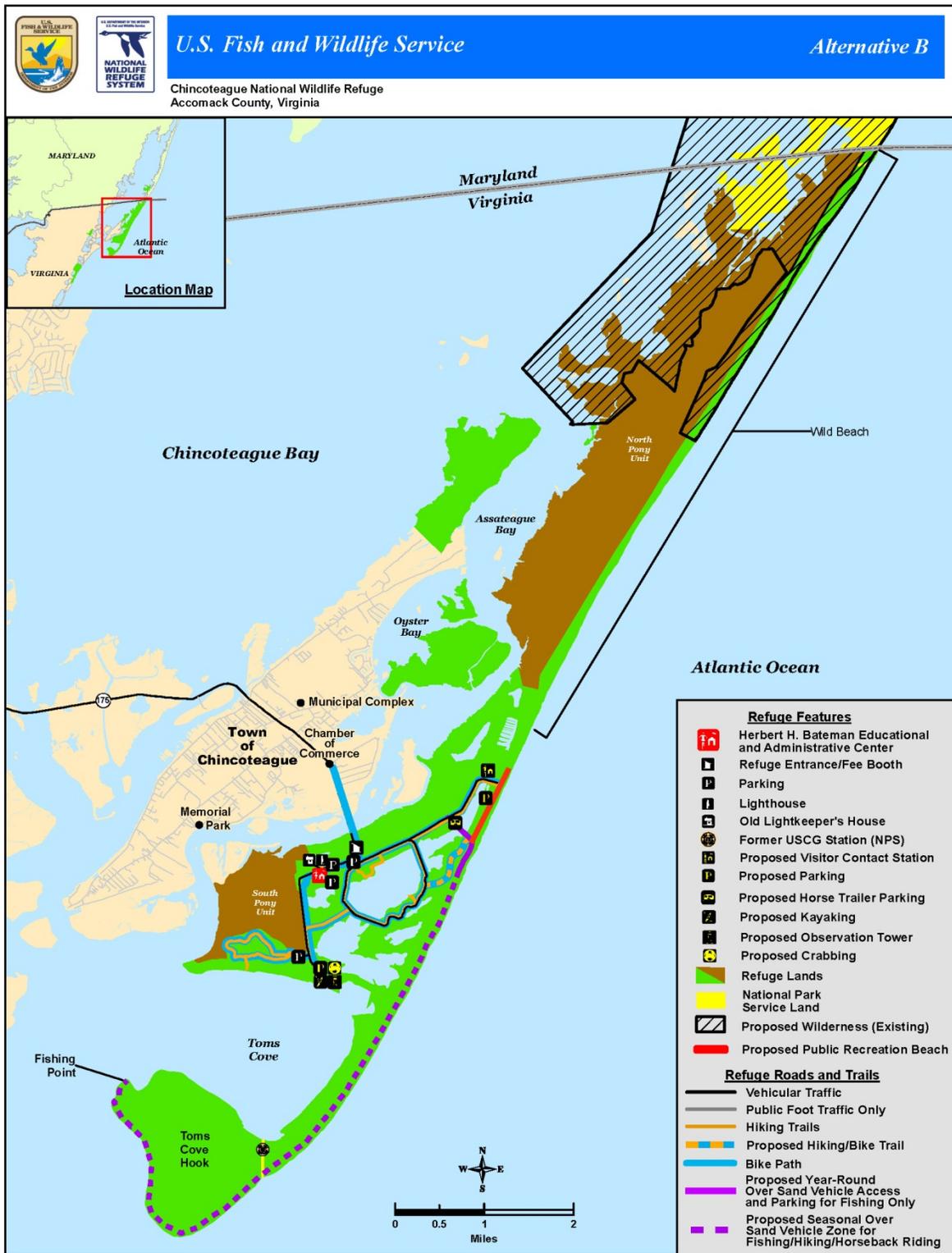
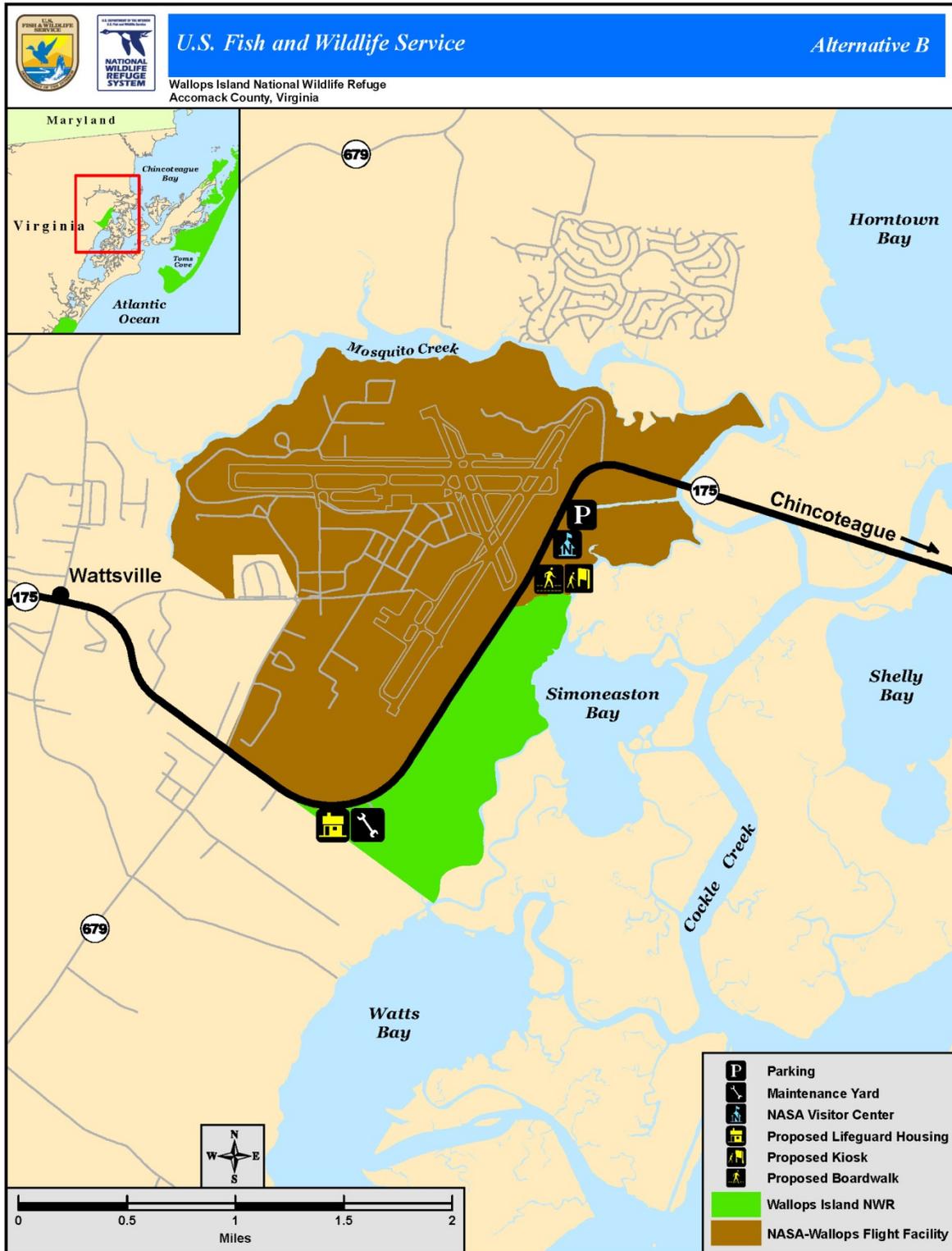


Figure 2-4. Alternative B – Wallops Island NWR



Goal 1: Coastal Habitats

Manage quality coastal habitats for biological integrity, diversity, and environmental health of refuge barrier beach and dunes in concert with natural processes as part of the Delmarva Peninsula coastal barrier island system to provide habitat for species of conservation concern.

Objective 1.1 Barrier Beach and Dune Habitat – Coastal Nesting Birds

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative A, plus:

- Allow natural geologic processes to restore overwash to the former recreational beach and parking areas on Assateague Island in order to increase nesting habitat for plover, least terns, sea turtles, and other nesting shorebirds. This would also allow natural island movement, which would buffer the effects of sea level rise and future storms on other wildlife habitats.
- Require all OSV users to be actively engaged in wildlife-dependent priority public uses, such as wildlife observation, photography, surf fishing, or to access hunting zones at Toms Cove Hook during the hunting season, with a valid hunting permit.
- Improve the beach nesting habitat at the former recreational beach parking area (8.5 acres); for example, removal of infrastructure and other man-made structures.

Objective 1.2 Barrier Beach and Dune Habitat - Migrating and Wintering Shorebirds and Migrating Monarch Butterflies

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative A, plus:

- Improve the migratory and wintering habitat at the former recreational beach parking area (8.5 acres); for example, removal of infrastructure and other man-made structures.

Objective 1.3 Barrier Beach and Dune Habitat - Turtles

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative A, plus:

- Improve beach/dune habitat for turtle nesting areas at the former recreational beach parking area (8.5 acres); for example, removal of infrastructure and other man-made structures.

- Restrict nighttime permitted beach driving in September and October, when the OSV zone is open but the sea turtle nesting season (June through October) is still ongoing. The refuge will continue to monitor the nesting area for artificial light sources caused by nighttime driving, which impairs the natural sea-finding capabilities of nesting female turtles and emerging hatchlings. Future management actions may need to be altered due to a change in current turtle nesting activity.
- Limit night use of the beach by official NPS or USFWS vehicles during the plover and sea turtle breeding season to the greatest extent possible.

Objective 1.4 Federally Endangered Plants and Rare Plant Communities

Same as alternative A

Rationale:

Same as alternative A

Seabeach Amaranth Management Strategies:

Same as alternative A, plus:

- Within 3 years of the CCP implementation, evaluate NPS amaranth propagation/transplant methods and success elsewhere (e.g., Assateague Island National Seashore in MD), and seek guidance from USFWS Seabeach Amaranth Coordinator to determine whether such methods could be used to establish another population on the Hook. Seek partners for implementing a transplant program if determined feasible.
- Within 3 years of the CCP implementation, study restoration for dynamic beach and overwash system, particularly in the Wild Beach area, in order to increase seabeach amaranth habitat that was lost when the artificial dune system was created. Improve beach/dune habitat for seabeach amaranth at the former recreational beach parking area (8.5 acres); for example, removal of infrastructure and other man-made structures.
- Evaluate amaranth propagation/ transplant methods and success elsewhere and seek guidance to determine whether such methods should be used to establish another population on the Hook.

Lucky Boy Fen Management Strategies:

- Within 2 years, and/or in conjunction with Virginia DCR's next survey, accurately map the boundaries of the Lucky Boy Fen and a buffer area of sufficient width around the perimeter to protect it from human disturbance and other perturbations.
- Within 5 years, consult the literature and experts in fen management to determine whether the myrtle shrubs and other woody plants in and near the fen pose a threat to the rare plants in this unique habitat type, and determine best management practices to address any problems.

Lucky Boy Fen Biological Monitoring

- Starting in 2014, and at least every third year thereafter, coordinate with Virginia DCR personnel to survey rare plants present during the growing season. Monitoring surveys were previously conducted in 2003 and 1992.
- Within 5 years, initiate simple ground or surface water monitoring at Lucky Boy Fen to determine if pollutants are present, and identify potential limiting factors such as nitrogen or alkalinity. A recommended protocol involves first taking a grab sample to establish a

baseline and test for nutrients. Depending on the results, a simple perforated PVC tube ground water monitor or small surface collector (resembles a dustpan) could be installed.

Objective 1.5 Salt Marsh Habitats for Nesting, Migrating, and Wintering Birds

Same as alternative A

Rationale:

Same as alternative A

Management Strategies:

Same as alternative A, plus:

- In cooperation with USACE and other partners develop strategies that will improve tidal flow to Swan Cove Pool (F Pool). This may be accomplished by engineering new water control structures.
- Use adaptive approach to balance visitor use experience with the need to manage non-migrant Canada goose populations (selecting time and location to avoid negative visitor experience) and work with USDA to reduce non-migrant Canada goose population through adding, firearms, and round-ups.
- Within 5 years, evaluate existing studies conducted by the NPS, refuge, and others on the effects of pony grazing on wildlife and habitat, including the effects of compaction, to identify information gaps.
- Within 5 years, work with partners (Ducks Unlimited, Black Duck Joint Venture, VDGIF) to identify additional habitat restoration projects that can be done to enhance/restore habitat for black ducks.

Biological Monitoring:

Same as alternative A, plus:

- Within 5 years, implement a survey protocol (building on CCB study or the USFWS Region 5 Salt Marsh Integrity Study) to monitor population trends and densities of saltmarsh, Nelson's and seaside sparrows, and clapper rails in high priority salt marshes.

Goal 2: Managed Wetlands (Impoundments)

Manage refuge impoundments to support native wildlife and plant communities, including a diversity of waterbirds, aquatic species, and other species of conservation concern.

Objective 2.1 Impoundments for Waterfowl, Shorebirds, Waders, and associated species

Same as alternative A

Rationale:

Same as alternative A

Management Strategies:

Same as alternative A, plus:

- Within 4 years, complete the habitat analysis of existing impoundments to identify impoundments with the most potential for enhancement to meet black duck feeding, loafing, and thermal requirements; plan and implement habitat restoration/enhancement on one to two impoundments using an Adaptive Management approach.

- Within 4 years, contract a tidal wetland expert or a hydrologist to design several alternative hydrologic models to restore Sow Pond, Ragged Point, or Swan Cove Pool (F Pool) impoundment to salt marsh.
- Within 6 years, develop and implement an adaptive management experiment to flood encroaching myrtle and other encroaching woody vegetation in the impoundments to focus on black duck habitat enhancement and restoration.
- Within 10 years, investigate the feasibility of allowing Lighthouse Meadow impoundment to revert to a tidal salt marsh.
- Due to potential parking lot configuration, Pintail (D Pool) will be removed from impoundment management capabilities.
- Since NWF is no longer needed as a piping plover mitigation area due to the relocation of the recreational beach, pumping operation will no longer be required to create additional piping plover nesting habitat. In addition, the pony enclosure fencing will be removed, and artificial shell nesting islands will no longer be maintained.
- Management of NWF will be improved for spring and fall migratory shorebirds and waterfowl.
- In cooperation with USACE and other partners develop strategies that will improve tidal flow to Swan Cove Pool (F Pool). This may be accomplished by engineering new water control structures.
- Improve or replace all water control structures to maximize flow capabilities.
- As opportunities arise, use volunteers to plant seaside goldenrod seedlings in spring or fall on Toms Cove Hook, small dunes that dot the Overwash area, the north end of Toms Cove (including the causeway west of the NPS Toms Cove Visitor Center), and the backsides of dunes along Wild Beach. Planting should occur on no greater than 5 percent of the Overwash area so as not to conflict with beach nesting birds, which prefer open un-vegetated beaches and shell flats.
- Within 3 years, fine-tune water level management capability by completing a bathymetric survey of all impoundments so that water depths can be better related to water gauge readings.
- Within 3 years, evaluate whether Chincoteague pony grazing can be used more effectively to meet habitat needs of shorebird and waterfowl species and if so, work with the Chincoteague Volunteer Fire Company to adjust grazing compartments and/or pony numbers in order to accomplish this.
- Within 3 years, use outcomes from three USFWS efforts (the Integrated Waterbird Project, Region 3/Region 5 Impoundment Study, and the Coastal Impoundment SDM Model) to refine management strategies for impoundments.

Biological Monitoring:

- Within 3 years, analyze 20-year data set of bird use in comparison to water levels and precipitation. Use this data to identify which impoundments have the most potential to manage for different groups of birds.

Goal 3: Upland Habitats

Manage upland habitats for biological integrity, diversity and environmental health of coastal forests and shrublands to sustain native wildlife and plant communities, including species of conservation concern.

Objective 3.1 Coastal Shrub Habitat for Breeding and Migrating Landbirds

Same as alternative A

Rationale:

Scrub shrub habitat provides an abundance of insect food and berries for breeding birds during the fall migration and/or throughout the winter. Migrating birds depend on stopover habitat along migration routes where they can find food, water, and protection to regain energy lost in flight and re-fuel for the next leg of the journey (Duncan et al. 2002). Roberts' (2009) 10-year banding study found that the refuge's wax myrtle/bayberry/groundsel shrub community provides important stopover habitat. Dense, tall (10 to 12 feet high) wax myrtle/bayberry habitat between impoundments and the dune line is also preferred nesting habitat for passerines, including several of highest and high conservation concern BCR 30 species such as prairie warbler, field sparrow, and brown thrasher.

The refuge realizes the benefits of scrub shrub habitat for migrating and neotropical birds, and will therefore allow this habitat to form along the dune system east of the NWF, since mowing these areas would no longer be required to mitigate for the loss of piping plover habitat at the current recreational beach. Within the NWF there is a 704-acre mitigation area that would be allowed to succeed to scrub shrub habitat on approximately 300 acres. This will significantly offset the loss of scrub shrub habitat contained within the 27 acres of habitat lost due to development at the proposed new recreational beach.

Additionally, though the refuge will allow for the natural scrub shrub habitat to grow, we also recognize that natural coastal processes could reshape or change the type of habitat at any point. If overwash or other coastal processes were to occur, the refuge would not mitigate these natural effects. The possible habitat shift, from scrub shrub to coastal, would result in a tradeoff of benefits for species, eliminating migrating bird habitat but providing good nesting habitat for coastal bird species such as the threatened piping plover.

Strategies:

Same as alternative A, plus:

- Manage a minimum 500-foot wide continuous strip of 10 to 12-foot tall myrtle/bayberry shrub, free of trees, parallel to (and behind the) dunes on eastern side of the NWF impoundment.
- Mow a 10 to 12-foot wide swath along each side of the new access road between Assateague Channel Bridge and the newly established parking at Pintail (D Dike) as needed during the growing season to maintain vegetation height at less than or equal to 6 inches, in order to minimize Delmarva Peninsula fox squirrel fatalities due to vehicle strikes.
- Do not mow Woodland Trail, except to facilitate public enjoyment of kiosks, benches, and trails.
- Continue to record (including sex and age) all Delmarva Peninsula fox squirrels killed by vehicle strikes and inspect them for PIT tags to determine whether road-killed Delmarva Peninsula fox squirrels remain below 5 per year.
- Within 5 years, refine first strategy using a combination of ground reconnaissance, aerial photos, and GIS to identify and map additional areas on the eastern side of other impoundments (i.e., behind the dune line), where a 10 to 12-foot tall myrtle/bayberry shrub community would be maintained by various vegetation management techniques.

Biological Monitoring

- Within 5 years, analyze the 10-year data set (1996 to 2006) from the Breeding Bird Survey (BBS) routes conducted in refuge shrub and forest habitats and determine trends of prairie warbler, brown thrasher, northern bobwhite, field sparrow, and other breeding landbirds of Highest, High, or Medium conservation concern on the BCR 30 list, analyzing results in the context of other BBS routes in the Region. Use this analysis to develop additional habitat management actions to benefit these representative species.
- Within 5 years, assess whether elements of the USFWS Region 5 Migrating Landbird Study can be incorporated into refuge monitoring strategies.

Objective 3.2 Loblolly Pine Forest for Delmarva Peninsula fox squirrel, Brown-headed Nuthatch & Eastern Towhee

Same as alternative A

Rationale:

Same as alternative A

Management Strategies:

Same as alternative A, plus:

- Within 5 years, develop silvicultural prescriptions to create small openings (2 to 10 acres) in the forest that would increase the hardwood component.
- Within 5 years, update the vegetation cover map for Assateague Island.
- Within 5 years, develop Forest Management prescriptions for the HMP that integrate the results of the CFI; include silvicultural prescriptions to enhance the hardwood component, enhance habitat for focal species, and incorporate relevant management actions outlined in the 1992 Upland Management Plan.
- Within 7 years, implement a silvicultural prescription on a 100 to 150-acre block of mature forest that creates small openings, totaling no more than 25 acres of the block, and aims to increase the hardwood component and diversify the structure and age-class of loblolly forest.
- Within 3 years, create an updated forest stand/compartments map using CFI Procedures developed by Chesapeake Marshlands NWR Complex, or comparable inventory method that takes into account wildlife variables.

Biological Monitoring:

Same as alternative A, plus:

- Within 5 years, develop a simple monitoring protocol to estimate wild turkey population size and trends. The survey should be designed so volunteers and staff can conduct them easily. Wild turkeys are a popular game species and increasing populations may bring increased interest for opening a hunting season.

Objective 3.3 Upland Habitats on Wallops Island NWR

Same as alternative A

Rationale:

Same as alternative A

Management Strategies:

Same as alternative A, plus:

- Within 5 years, annually remove 5 to 10 acres of dense autumn olive stands by mechanical or chemical means, with the goal of eliminating the 25 acres of autumn olive-dominated stands.
- Within 3 years, develop a plan and funding source to remove autumn olive intermixed in the understory of the 52-acre pine/hardwood forest. “Basal bark treatment” with an oil-based herbicide applied to the bottom foot of individual trees during the winter is one possible technique. Consult with ANEC, Patuxent Research Refuge, TNC, and others experienced in removing this invasive tree to refine methods, schedules, funding sources, etc.
- Within 7 years, conduct a habitat assessment of the 57 acres of former agricultural fields to determine whether a portion of this area should be maintained in an early successional stage to provide bobwhite breeding habitat, in a patch size large enough to attract shrubland breeding birds.

Biological Monitoring:

- Within 5 years, survey suitable habitat for northern bobwhite and American woodcock to determine their breeding and population status on Wallops Island NWR.
- Within 10 years, recruit a graduate student(s), volunteer, or other partner to investigate Wallops Island NWR’s importance to migrating and breeding landbirds and make management recommendations.
- Within 3 years, develop a simple monitoring protocol to estimate wild turkey population size and trends. The survey should be designed so volunteers and staff can conduct them easily. Wild turkeys are a popular game species and turkey hunting may be proposed in the future for Wallops Island NWR.

Goal 4: Southern Barrier Islands Unit (Assawoman, Metompkin, Cedar)

Perpetuate the biological integrity, diversity, and long term viability of natural habitats that support native avian communities and turtles on Assawoman, Metompkin and Cedar Islands through a partnership approach.

Objective 4.1 Barrier Beach and Dunes - Breeding Shorebirds and Turtles

Same as alternative A

Rationale:

Same as alternative A

Management Strategies: Same as alternative A, plus:

- Meet with the Virginia Marine Resources Division and DCR staffs to review OSV laws, regulations, and enforcement options for beach driving on Cedar Island.
- Within 3 years of CCP, work with TNC to complete land transfer (fee title or easement) of TNC landholdings on Cedar Island to USFWS so that complete land survey and marking of refuge boundaries can be conducted.

- By 2020, collaborate with other barrier island managers and stakeholders to develop a “Virginia Barrier Island Public Use Management Plan.”
- Within 10 years, conduct a feasibility study to see if a population of seabeach amaranth should be established on one or more of the southern island units through a transplant program. According to Weakley et al. (1996), islands longer than 3 miles have the potential for supporting two to three sites, and islands shorter than 3 miles can support one site. Using these guidelines, Assawoman Island appears to have conditions suitable for the establishment of one to two seabeach amaranth sites, and Cedar Island, two to three sites.
- Reduce mortality and disturbance factors on Assawoman Island during the breeding season, by implementing a complete closure, including fishing, from March 15 through September 15 or thereafter, until the last shorebird fledges.

Biological Monitoring

- Within 7 years, conduct systematic search for seabeach amaranth on southern islands in suitable habitat defined as sandy beach zone from 0.7 to 5 feet above the mean high tide in overwash flats, blowouts, lower foredunes, and upper strands of non-eroding beaches. Focus survey on accreting portions of barrier islands that are sparsely vegetated with American sea rocket and seabeach spurge, with which the species always co-occurs (Weakley and Bucher 1992).

Objective 4.2 Barrier Beach, Dune and Tidal Marsh – Migrating and Wintering Shorebirds

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative A

Goal 5: Partnerships

Working with partners, protect and restore vigorous, viable populations of migratory and resident wildlife, fish, and native plants and their habitats found on the Delmarva Peninsula and identified in state, national, and international treaties, plans, and initiatives. Take a leadership role in collaborative regional efforts to achieve broader conservation goals and serve as a catalyst for achieving a multi-state eco-regional partnership. The refuge will continue to work with partners to explore how best to sustain the resiliency of this unique barrier island system, its communities, and its economy, consistent with the refuge’s mission and in the face of dynamic coastal processes, climate change, and storm events.

Objective 5.1 Regional Conservation

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative A, plus:

- Pursue adoption of a Preliminary Plan Proposal (PPP) or Landscape Conservation Design (LCD) for the Lower Delmarva Peninsula Conservation Area; PPP or LCD allows Washington Office to review any acquisition proposal and provide internal approval by the USFWS Director before proceeding with the Land Protection Plan (LPP).
 - In consultation with local and regional stakeholders, pursue completion of LPP for the Lower Delmarva Peninsula Conservation Area by 2015.
- Consider land acquisition, easements, and other land conservation strategies with partners and landowners, such as a rolling wetlands easement.
- Engage and work with USDA to conserve family farms, open space, and wildlife habitat in the Lower Delmarva Peninsula.

Objective 5.2 Economic Development

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative A, plus:

- Within 5 years, develop a visitor survey to better assess visitation levels and patterns and capture visitor feedback to inform management decisions; the survey will be conducted every 5 years.

Objective 5.3 Community Resilience

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative A, plus:

- Within 3 years:
 - Identify partners, which may include the town of Chincoteague, Accomack and Northampton counties, Commonwealth of Virginia, NPS, NASA, FEMA, USACE, etc. who may wish to work together to develop plans and strategies toward community resilience in the face of climate change impacts.
 - Participate in a study, which would be led by others, to determine potential impacts/vulnerabilities of the coastal communities and identify protective methods for hazard mitigation.
 - Work with NASA to conduct workshops and identify strategies on how best to advance the study, information exchange, and project resources for adaptive management practices that sustain the resiliency of this unique barrier island system including but not limited to Assateague, Wallops, Assawoman, and Metompkin Islands in the face of dynamic coastal processes and climate change.

Objective 5.4 Federal Interagency Collaboration and Facility Management

Within 5 years, enhance existing partnerships and develop new relationships focused on science research, interpretation, and shared facilities with adjacent Federal entities.

Rationale:

Same as alternative A

Strategies:

Same as alternative A plus:

- Re-establish an interagency non-exclusive use agreement/MOU with NASA to support wildlife and habitat management for marshlands and uplands not impacted by facilities (3,000 acres).
- Within 3 years, work with NPS to construct additional office space at the existing Herbert H. Bateman Administrative Office Complex.
- Within 4 years, develop boardwalk and kiosk for Wallops Island NWR with access from the NASA Visitor Center.
- Within 1 year, revise the use agreement between NPS and USFWS to include construction of lifeguard housing on Wallops Island NWR. This would require additional environmental compliance.
- Within 3 years, pursue funding in support of the 2011 non-reimbursable umbrella agreement signed between USFWS, NASA, and the MSC for establishing a leading research and teaching environment where students and staff tackle new and evolving challenges such as those posed by climate change and corresponding sea level rise to coastal environments, and work on inexpensive aerial data gathering platforms supporting the NASA mission theme of conducting earth science measurements, understanding global climate change and conducting coastal research.

Objective 5.5 Local Conservation of Tidal Creeks, Estuaries, Mudflats, and Nearshore Marine Waters

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative A, plus:

- Within 5 years of plan implementation, collaborate with the USFWS Maryland Fisheries Office, Virginia Institute of Marine Science, Marine Science Consortium (MSC), and/or other technical experts to develop a fish monitoring program (that includes frequency, location, and protocols) aimed at monitoring refuge fisheries population and water quality implications. Within 5 years, meet with NPS staff monitoring water quality around Assateague Island and Chincoteague Bay to determine how their monitoring results can be used to help meet this objective, and how the refuge can better support NPS water quality monitoring efforts.
- Within 5 years, work with partners to assess and monitor water flow, water quality, and accretion rates within Swan Cove Pool (F Pool).

Goal 6: Visitor Services

People of all ages and abilities develop a stewardship ethic while enjoying their refuge experience and increasing their knowledge of the Service, System, and refuge.

Objective 6.1 Hunting and Trapping

Within 5 years of CCP approval, increase level of opportunity (e.g., expansion of hunted species) in the hunt program, such as the fall/winter light goose hunt, through expansion of hunted species, trapping, and new hunting programs.

Rationale:

Hunting is one of the priority uses of the Refuge System and is to be facilitated when compatible. Hunting on the Delmarva Peninsula is a traditional outdoor pastime and remains a popular form of wildlife-dependent recreation on the refuge and a vital part of the cultural, social, and economic fabric of the communities near the refuge. Expansion of current hunting practices to incorporate different species, such as fox and raccoon, and trapping opportunities would further reduce the stress of predators for threatened and endangered species. Furthermore, institution of increased hunting opportunities for youth and women would promote traditional wildlife-dependent recreation and provide increased opportunities for learning about wildlife, their habits, life histories and the need to protect their habitats.

Developing and using a visitor survey, whether for hunting or for any public use, is one tool the refuge could utilize to measure visitor satisfaction, experience, and knowledge. Such a survey can be activity-specific, refuge-specific, or completed as part of a larger national effort. Visitor satisfaction surveys are integral to establishing a baseline, and monitoring visitor experiences and responses over time at various levels, well as for assessing meeting of measurable objectives.

Strategies:

Same as alternative A, plus:

- Within 5 years, develop questions on visitor experience of hunting through measuring tools, which could include a refuge-specific visitor survey.
- Within 5 years, develop two partnerships for implementation of hunt programs for non-traditional audiences.
- Within 5 years, maintain, and where possible expand, current hunting opportunities by including additional species, extending hours, and creating events. Any expansions of current hunting programs would require additional environmental analysis and compliance with NEPA beyond that contained in this document. Additional details will be included in the hunt management plan and annual hunt program, but generally these proposed additions would include:
 - Introduce/add non-migratory Canada goose and light goose hunting opportunities in refuge impoundments on Assateague Island.
 - Add mourning doves for migratory bird hunting in areas of the refuge outside of Assateague Island.
 - Add turkey for big game for youth hunting on Assateague Island.
 - Increase outreach to youth, new hunters, and women about hunting opportunities; create an apprentice hunter program.
 - Increase hunter education opportunities (partnership with VDGIF or others).
 - Open refuge for migratory bird hunting on Federal holidays, in accordance with State regulations, in designated areas of the refuge within Wildcat Marsh, Morris

Island, Assawoman Island and Metompkin Island divisions, that occur outside of the current hunting days of Thursday, Friday, and Saturday (Labor Day, Columbus Day, Veteran's Day, Christmas, New Year's, Martin Luther King Jr. Day, President's Day).

- Reduce/minimize administration of hunt program through streamlining process (kiosks, electronic lottery, etc.).
- Within 10 years, assess opening of fox and raccoon hunting for both Chincoteague and Wallops Island NWRs.
- Within 10 years, assess a trapping program for fur-bearers (including fox, raccoon, opossum, nutria) for Chincoteague and Wallops Island NWRs.

Objective 6.2 Fishing and OSV Use

Within 8 years of CCP approval, achieve a 10 percent increase in visitor satisfaction with fishing (surf fishing, crabbing, oyster harvest, and clamming) through permit improvements, expansion of the OSV zone, and other improvements.

Rationale:

Fishing is one of the priority uses of the Refuge System and is to be facilitated when compatible. Surf fishing, crabbing, oyster harvest, and clamming are among the most popular wildlife-dependent recreational activities conducted on the refuge. The expansion of the OSV zone due to the relocated recreational beach maintains restrictions and closures to protect nesting habitat, while ensuring access for fishing from the new, relocated OSV entrance. Streamlined fishing permit access and enhanced fishing opportunities on the refuge are aimed to increase recreational opportunities and improve visitor experience.

Strategies:

- Reduce mortality and disturbance factors on Assawoman Island during the breeding season, by implementing a complete closure, including fishing, from March 15 through September 15, or until the last shorebird fledges. Within 5 years, develop questions on visitor experience of fishing for a visitor survey.
- Maintain and assess expansion of current fishing opportunities including shellfishing and crabbing.
- Develop bilingual or multilingual fishing brochure (similar to hunting brochure).
- Collaborate with partners to organize youth fishing event.
- Increase beach access for disabled (beach mats).
- Install self-service electronic kiosk for fishing information, license purchase, and/or registration in the Commonwealth of Virginia's Fisherman Identification Program.
- Streamline fishing permit process for Assawoman and Metompkin Islands:
 - Work with partners (e.g., TNC, Commonwealth of Virginia) to provide QR codes (matrix barcodes readable by smartphones) on signage to link to Web site with permit form specific to each location.
- Within 5 years, work with partners to have consistent messaging across Virginia Eastern Shore islands.
- Improve signing on Woodland Trail for access/info on shellfishing.
- Create fishing access (e.g., crabbing dock) at new Beach Road terminus.
- Increase law enforcement compliance checks on lower Islands and work with state and non-governmental organizations (NGOs) for consistency along islands.
- Make the following changes to OSV use and zone:

- Expand the OSV zone from the new recreational beach to Fishing Point on Toms Cove Hook and continue to keep the zone open from approximately September 16 to March 14.
- Close the OSV zone to public access March 15 through September 15 or thereafter, until the last shorebird fledges.
- Develop a designated, year-round area for fishing at the southern terminus of the National Park Service assigned area/recreational beach then south along the Atlantic Ocean beachfront approximately .5 mile.

Objective 6.3 Environmental Education and Interpretation

Within 5 years, develop three teacher-led curriculum materials online and increase online traffic to the Web site and social media by 25 percent to increase the understanding of the refuge throughout the Delmarva Peninsula and online by utilizing technologies that achieve outreach to a wide, diverse audience.

Rationale:

Environmental education and interpretation are essential parts of the Refuge System that promote knowledge and respect for the refuges purpose and mission. Expanding these opportunities, especially for youth, would make for a more educated visitor and an overall enhanced experience. Finding ways of accomplishing this goal, by reaching out to the community more vigorously, and recognizing the growing online generation and finding ways to communicate more readily, are all appropriate steps for the refuge.

Strategies:

- Within the next 2 years, research technology/social media (e.g., Twitter, Facebook) that can enhance environmental education and interpretation.
- Within 5 years, develop questions on visitor experience of environmental education and interpretation through an appropriate tool, such as a visitor survey.
- Within 5 years, share administration of environmental education and interpretation programs with NPS and the MSC, including scheduling and reservations, and develop an MOU to define roles and responsibilities.
- Within 10 years, increase current environmental education opportunities to more than 7,500 education participants annually:
 - Add additional programming (e.g., climate change toolkit, pollinator garden).
 - Increase opportunities for citizen science (e.g., e-Bird, Great Backyard Bird Count).
 - Conduct web-based environmental education programs (e.g., distance learning opportunities, especially for schools).
 - Develop web-based/emerging technology lessons for pre/post visit (e.g., incorporation of QR codes on brochures and exhibits).
 - Partner to increase environmental education on the Delmarva Peninsula (e.g., Chincoteague Museum, MSC, NPS, NASA, Delmarva Discovery Center in Pocomoke, CNHA, Shore People Advancing Readiness for Knowledge (SPARK), and others) through individual outreach efforts.
 - Target local schools/students to conduct offsite visits/outreach in addition to onsite workshops.

- Develop partnerships (e.g. concessionaire/school district teacher on loan/detailed) to do programs (NPS Teacher-Ranger-Teacher program, grants under Artists in Residence Program).
- Encourage local schools (K to 12) to utilize refuge as outdoor classroom through marketing and working on outreach to achieve buy-in from administration.
- Utilize other areas/facilities (e.g., boardwalk, etc.) for educational purposes (contingent upon new facilities with relocated beach, including overlook at terminus of Beach Road).
- Increase provision of teacher workshops in coordination with partners.
- Continue pursuit of proposal for mobile trailer for outreach/education and acquire by 2015.
- Within 15 years, increase current interpretive opportunities to more than 68,000 interpretation participants annually:
 - Build boardwalk/observation tower in partnership with NASA at or near Wallops Island NWR and provide opportunity for Blue Goose passport signing.
 - Maintain and where possible expand interpretive opportunities by installing new wayside exhibits, offering volunteer-led tours, and develop a portable exhibit.
 - Create a virtual exhibit for Assateague Lighthouse.
 - Restore lightkeeper's house and develop cultural resource/interpretation materials.
 - Develop data for exhibit at NASA visitor center.
 - Develop new Visitor Center exhibits and introductory videos.
 - Replace self service fee station with 24-hour access to kiosk for passes, refuge information, e-Bird/Merlin, etc.
 - Maintain oversight of training or certification of third-party providers; continue training of volunteers to assist in activities.

Objective 6.4 Wildlife Observation and Photography

Within 5 years, increase visitor satisfaction with wildlife observation by 10 percent and provide an opportunity for visitors to share photography reflecting wildlife observation on the refuge online.

Rationale:

Wildlife observation and photography are two of the 6 priority public uses of the Refuge System and are to be facilitated when compatible. Continued expansion of opportunities for visitors to photograph and observe the wildlife and habitat of the refuge is important to promote visitor understanding of, and increase visitor appreciation for, the value of and need for fish and wildlife habitat conservation. Providing opportunities to view the refuge for those unable to visit is a way for the USFWS to reach more people, particularly children. Change in access or infrastructure should be evaluated for impacts to these two uses and actions should be taken to continue or improve opportunities. New management strategies and enhanced infrastructure as a result of this alternative would provide new photography and observation opportunities.

Strategies:

- Within 5 years, develop questions on visitor experience of wildlife observation and photography for a visitor survey.
- Within 5 years, facilitate real-time, online photography sharing specific to the refuge.
- Within 8 years, at new Beach Road terminus, build a wildlife viewing tower.

- Within 10 years, maintain and enhance where possible improved walking, driving and kayak access for wildlife observation and photography by exploring options for permanent photo blinds, and extending existing trail system.
 - Work with partners (e.g., North American Nature Photography Association) to determine when and where to install universally accessible photo blinds.
 - Develop new launch point at end of new terminus of Beach Road for small watercraft (non-motorized, hand-carried, manually propelled boats).
 - Work with the land owners of the current Maddox Campground to explore options for kayak/canoe access from site to connect to proposed backcountry canoe/kayak trail.
 - Work with the Commonwealth of Virginia to acknowledge the current dock/platform within Wildcat Marsh.
 - Develop a refuge-run kayak/canoe environmental education program from Wildcat Marsh.

Objective 6.5 Recreational Beach Use

Within 8 years, or sooner if funding is available, complete transition of recreational beach and associated parking from current location to new location and, working with the NPS and town of Chincoteague, maintain current level of visitor satisfaction.

Rationale:

The proposed relocation of the 1-mile recreational beach and associated parking would be in response to historic and anticipated impairment to the current recreational beach and parking from natural hazards, such as heavy storm damage to parking lots, overwash events, sea level rise, and the natural movement of barrier beach land forms. The relocation is intended to provide a sustainable situation so that the habitat and recreation portion of the beach can be sustained for as long as possible for both the wildlife of the refuge, and the visitors to the seashore. The relocation is intended to provide a more protected location for the recreational beach and parking, but prior to the relocation, the refuge, NPS, and town of Chincoteague may consider short-term strategies to address access after damage caused by coastal storms at the existing beach.

Strategies:

- Within 2 years, provide management strategies for NPS to maintain the current beach until the newly located recreational beach is ready for visitor use.
- Within 3 years, develop communication plan in conjunction with NPS for timeline for construction and opening of relocated recreational beach, including proposed processes and management strategies for the transition between locations to ensure access to a recreational beach is available for visitors.
- Within 2 years, develop site design plan for parking and access to new beach location.
- Within 5 years, develop questions on visitor experience of recreational beach for a visitor survey.
- Within 8 years, relocate the recreational beach, or “NPS assigned area” (beach and 8.5 acres of parking), to a more stable area(s) that meets visitor service and resource management criteria (as determined through the structured decision-making process -- see Appendix N). All public access on the Service Road north of the new recreational beach would be restricted unless authorized under special use permit or special day use privileges/openings. Continue to allow vehicular access along Beach Road to its new

terminus but close Beach Road causeway to all public access once new recreational beach is open.

- Within 8 years, revise NPS-FWS MOU to account for relocated beach/ assigned area.
- In conjunction with building a new parking area for the recreational beach, manage biting insect population at the recreational beach. The refuge is open to using commercially available targeted devices that capture mosquitoes which would improve visitor experiences; however, we will not use adulticide.

Objective 6.6 Other Recreational Uses

Within 8 years, expand non-wildlife dependent recreation opportunities by adding facilities and improving accessibility, among other strategies, to achieve a 10 percent increase in visitor satisfaction.

Rationale:

The refuge has identified the opportunity for increased non-wildlife dependent recreation that is still appropriate and compatible for the refuge, especially as it supports wildlife-dependent recreation, while also improving visitor experience. In addition, the various actions under this alternative, such as the relocation of the beach, provide opportunities to expand and enhance non-wildlife dependent recreation opportunities with minimal disruption and in some cases, mitigation of impacts by improvements in previous sites of disturbance, such as relocating bicycle trails.

Strategies:

- Within 5 years, develop questions on visitor experience of non-wildlife dependent recreation for a visitor survey.
- Improve bicycle access on the refuge and in the region:
 - Partner with the town of Chincoteague and the Accomack-Northampton Planning District Commission (A-NPDC) as they implement the Town of Chincoteague Bicycle Plan (2008), the Chincoteague Streetscape Enhancement Project (Rizzio & Spivey 2009), and the Eastern Shore of Virginia Bicycle Plan (2004).
 - Increase and formalize bike parking at the relocated public beach with removable bike racks.
 - Eliminate Swan Cove Bicycle Trail access and pursue alternative route north to relocated public beach (e.g., from Wildlife Loop to Mallard (C Dike)).
 - Include bicycle lanes on new access road to relocated public beach.
- Revise public access policy:
 - All public access on the Service Road north of the new recreational beach would be restricted unless authorized under permit.
 - End existing Beach Road access to beach.
- Improve non-motorized boat access with the following:
 - Allow non-motorized, hand-carried, manually propelled boats to launch from beach outside of lifeguarded area.
 - Construct a new non-motorized launch site at terminus of Beach Road.
 - Work with the land owners of the current Maddox Campground to explore options for kayak/canoe access from site to connect to proposed backcountry canoe/kayak trail.
 - Work with the Commonwealth of Virginia to acknowledge the current dock/platform within Wildcat Marsh.

- Develop a refuge-run kayak/canoe environmental education program from Wildcat Marsh.
- Within 8 years, allow recreational horseback riding in the new OSV zone from approximately September 16 to March 14 and develop new horse trailer parking area near Mallard (C Dike)/entrance to OSV zone.
- Work with NPS to improve accessibility:
 - Increase accessible spaces at beach and improve signage and markings. (To be compliant with ADA, 2 percent (20) of the approximately 1,000 parking spaces would need to be handicap accessible).
 - Consider wheelchair matting for designated spaces and beach wheelchairs.
 - Add removable wheelchair beach ramps.
 - Add seasonal mobility-impaired parking areas and access ramps (dependent on final configuration of parking).
- Continue enforcement of fees and restrictions on commercial uses and allow increase in uses only if deemed appropriate and compatible.
- Same as alternative A on prohibitions, and promote voluntary antilittering and no smoking campaign on public beach.
- Continuously monitor evolving technologies and modes of recreational transportation to determine if appropriate and compatible.
- Allow use of certain alternative-powered vehicles determined by the refuge manager to be safe, environmentally friendly, appropriate, and compatible, on Wildlife Loop after 3pm.

Goal 7: Refuge Administration

Maintain and enhance refuge infrastructure and operations responsibly and sustainably for the safety and well-being of the wildlife, cultural resources, public, and employees.

Objective 7.1 Outreach, Communication, and Emergency Communication

Within 2 years, develop new outreach strategies, including technology-based communication, to communicate refuge purposes and programs and within 5 years, incorporate these strategies into an outreach communication plan and emergency communication infrastructure for the existing and relocated recreational beach.

Rationale:

Continued and improved means of promoting the refuge and communicating any changes occurring on the refuge is necessary to keep the refuge relevant to the public and to maintain transparency and trust. The refuge must find current and relevant ways to communicate with the public beyond traditional media techniques such as newsletters and pamphlets. With social media and web-based technology always advancing, it is important to utilize these opportunities to the benefit of the refuge, and continue to keep the public aware of the refuge and its purpose, programs, and challenges. This communication is especially important when significant changes are being made, such as those changes in infrastructure that this alternative would propose, including the relocated recreational beach.

Strategies:

- Within 2 years, develop new outreach strategies, including technology-based outreach, such as:
 - Improve Web site and identify and pursue social media strategy/new technologies (e.g., Twitter, Facebook) to improve outreach and communication.

- Consider bilingual/multi-lingual opportunities for materials (e.g., 1610 radio messages in other languages).
- Develop new fishing brochure and install self-service electronic kiosk for fishing information, license purchase, and/or registration in the Commonwealth of Virginia's Fisherman Identification Program.
- Within 5 years, develop a communication plan and emergency infrastructure for the relocated recreational beach, including:
 - Institute protocols for use of intelligent transportation systems to communicate weather events, status of summer beach parking, and special events (e.g., International Migratory Bird Day).
 - Ensure adequate phone access or service at new relocated beach, where new bicycle trail ends at beach, and at terminus of Beach Road.

Objective 7.2 Staffing and Volunteer Program/Friends Group

Within 5 years, fill vacancies, establish nine additional permanent full-time positions, and increase the number of volunteers by 25 percent.

Rationale:

The Refuge System must continue to be adequately staffed to protect wildlife and habitat, make refuges safe places for staff and visitors, and meet its purposes while continuing opportunities for public use. Wallops Island NWR currently has no designated staff; having designated staff would better enable the refuge to meet its mission and goals. For Chincoteague NWR, in order to implement the changes proposed within alternative B, additional staffing would be necessary in the areas of biology, maintenance, law enforcement, and visitor services.

In 2007, our Regional Directorate completed the "Strategic Workforce Plan for the National Wildlife Refuge System in Region 5" (Phase 2; January 16, 2007) to support a new base budget approach. Its goal is a maximum of 75 percent of a refuge station budget to cover salaries and fixed costs, while the remaining 25 percent or more would be operating and maintenance funds.

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

Within the constraints or opportunities of our budget and in conformance with future workforce plans, we would seek to fill any currently approved but vacant positions, which we believe are necessary to accomplish our highest priority projects.

The current refuge staffing is supplemented by local volunteers as well as local and national youth and adult groups, who provide help with invasive plant species removal, trash pick-up, interpretive education, and other projects. Chincoteague NWR also receives significant support from its non-profit friends group, the CNHA, which facilitates and supports the refuge's interpretive and educational programs for refuge visitors and for local teachers, funds student interns, and enables both refuges to receive matching grants for workshops and programs. Although permanent staff is important, making partnerships with volunteer groups, and recruiting new volunteers for the

refuge is a high priority. To advance the volunteer and educational programs, a permanent full-time refuge volunteer coordinator position and education program specialist position are necessary.

Strategies:

- Maintain refuge complex budget and fill vacancies to better meet the obligations of wildlife stewardship, habitat management, and public use.
- Strengthen existing volunteer program and recruit new volunteers.
- Expand volunteer program to enhance aspects of all refuge management activities.
- Establish the following permanent full-time positions (see Appendix K for diagram)
 - Wildlife Refuge Specialist for Wallops Island NWR
 - Park ranger Volunteer Coordinator
 - Education Program Specialist
 - Wildlife Refuge Specialist
 - Forest Technician
 - Wildlife Biologist (additional)
 - Biological Science Technician (additional)
 - Maintenance Worker (additional)
 - Land Management Law Enforcement Officer (additional)
- Increase training opportunities for staff and volunteers to maximize volunteer efforts and self-sufficiency.
- Include residential volunteers, interns, community volunteers, and CNHA in most management efforts.
- Coordinate with NPS to expand and enhance volunteer opportunities.
- Develop relationship with space tourism group (e.g., Star Gazers) to provide programming around launches.

Objective 7.3 Wilderness

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative A

Objective 7.4 Cultural and Historic Resources

Within 10 years, establish partnerships to increase protection and visitor experience of archaeological, cultural and historical sites on the refuge in compliance with all applicable Federal and State laws.

Rationale:

Protection of the refuge's cultural and historic resources is a constant struggle in this harsh barrier island environment. Increased protection of these areas through new and enhanced partnerships with the surrounding community would benefit the resources and help preserve them for more visitors to experience. This alternative would also provide high-quality opportunities for Chincoteague pony viewing opportunities.

Strategies:

- Within 5 years, facilitate access to cemetery located near Beach Road
- Within 5 years, develop tours and allow controlled access to Assateague Village for general public (CNHA or volunteer led).
- Within 10 years, work with Partners to:
 - Restore the historic landscaping around the Assateague Lighthouse.
 - Restore Lightkeeper's house and develop cultural resource/interpretation.
 - Develop a virtual tour and exhibit for lighthouse.
- Within 10 years, take more active role on museum property preservation/restoration and making specimens available to public (stored at Wallops Island NWR, Herbert H. Bateman Educational and Administrative Center, and on loan).
- Within 10 years, assess feasibility of development of a virtual tour of museum property, using a digital photography database.
- Within 8 years, work with the Chincoteague Volunteer Fire Company to implement a Chincoteague pony management plan that designates a new grazing area for a viewable herd for the public along access to the new recreational beach.

Objective 7.5 Climate Change and Sea Level Rise

Same as alternative A

Rationale:

Adaptation to climate change impacts, such as sea level rise, consists of the following options for transportation and other facilities: maintain, manage, and operate; protect and strengthen; relocate and avoid; abandon and disinvest; promote redundancy. The refuge is committed to maintaining access to the recreational beach so we are not considering abandonment. We have historically, in partnership with NPS, been maintaining the recreational beach in place. However, scientific projections indicate that the current segment of land may not be able to continue to sustain the same amount of parking without substantial protection and strengthening actions. As documented previously (USACE 2012), this is not considered an option within the scope of this CCP by either NPS or USFWS. Instead, the refuge is interested in continuing to pursue relocation of facilities to a less vulnerable location.

Strategies:

Same as alternative A plus:

- Relocate beach parking and related facilities in part in response to climate change considerations and design new facilities to reduce energy use, such as an energy-efficient new visitor facility.
- Within 5 years, develop a process by which climate change is considered in planning and design for any infrastructure changes.
- Within 5 years, pursue designation from DOI to be a pilot site for mitigation research, such as testing the impacts of renewable energy on wildlife in partnership with other agencies, such as NASA, which is currently exploring solar panels.

2.5.4 Alternative C (Reduced Disturbance)

Alternative C would direct staffing and funding towards maximizing habitat and wildlife management strategies. As a result of prioritizing habitat and wildlife management, public use activities and access would be reduced. Figure 2-5 provides an illustration of major spatial elements of the alternative for Chincoteague NWR; Figure 2-2 provides an illustration for Wallops Island NWR (same as alternative A).

Natural Resource Management. Under this alternative, the refuge would protect and maintain all lands it administers, primarily focusing on the needs of threatened and endangered species, with additional emphasis on the needs of migratory birds and resident wildlife. The refuge would continue to preserve approximately 2,650 acres of wetland impoundments, but make adjustments in accordance with a new impoundment management plan that takes into account various factors including the habitat needs of black ducks and monarch butterflies, climate change and natural coastal processes, and new beach access and parking. The refuge would work with partners to protect comparable freshwater habitat on the Delmarva Peninsula. Natural coastal processes would continue to be the primary force that shapes habitat on the southern barrier islands.

Beach Access and Parking. The refuge would work with NPS to relocate the recreational beach, as indicated in alternative B. The refuge and NPS would allow and maintain 480 automobile parking spaces (approximately 4.25 acres) at the new recreational beach. The new recreational beach would offer accessible parking, pedestrian and bicycle connections, and safe storm shelters for visitors. We would coordinate with NPS and the town of Chincoteague to identify a suitable off-site beach parking area, as close to the beach as possible, and institute a shuttle service from off-site parking to recreational beach for use during specific times of the year when parking capacity is exceeded. The shuttle would have stowing capacity for beach cargo and shelters would be provided for shuttle riders at the beach in case of storms.

The refuge in consultation with NPS would provide management strategies for maintaining the current beach in the interim until the newly located recreational beach is ready for visitor use. The refuge would provide a transition plan for moving from the current beach location to the new beach location, including proposed processes and management strategies to ensure access to a recreational beach is available for visitors.

Visitor Use and Experience. Existing public uses would continue but with several exceptions. All public access on the Service Road north of the new recreational beach parking would be restricted unless authorized under permit, and public access to the beach south of the new recreational beach would be allowed from approximately September 16 to March 14. A joint NPS and USFWS Visitor Contact Station would be developed near the new recreational beach. The Beach Road causeway across Toms Cove would be closed to all public access as soon as the relocated recreational beach was accessible. Assawoman Island would be completely closed to all forms of public use, including fishing, from March 15 through September 15 or thereafter, until the last shorebird fledges.

The refuge would discontinue recreational horseback riding and OSV use. The refuge would prohibit smoking on the recreational beach. These actions are intended to reduce adverse impacts on humans and wildlife.

The refuge would maintain recreational hunting opportunities with a focus on local, regional, and state wildlife priorities like sika, light goose, and non-migrant Canada goose. The refuge would

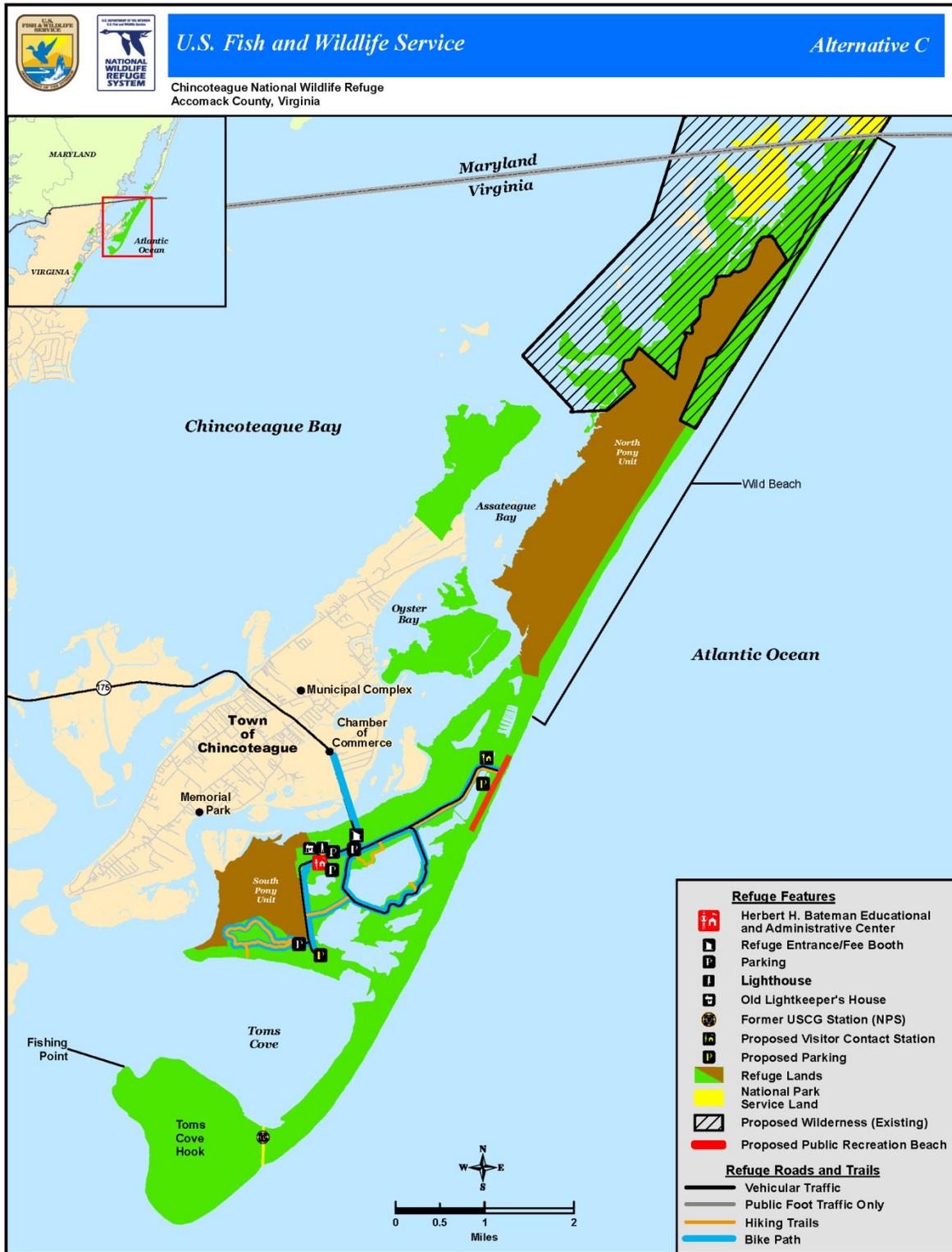
work to phase out the sika population through continued recreational hunt and professional contracts within 5 years. The refuge would expand non-migrant Canada goose and light goose hunting opportunities to other refuge properties where feasible and work to reduce those populations. The refuge would continue to manage opportunities for recreational shellfish and crab harvest.

Partnerships. The refuge would pursue and enhance off-refuge environmental education and interpretation partnerships with an emphasis on wildlife and habitat issues. The refuge would also work with partners to manage exotic, invasive, and nuisance species outside of refuge lands.

Cultural Resource Management. The refuge would complete restoration of Assateague Lighthouse and maintain current access to cultural resources. The refuge would limit the number of Chincoteague ponies allowed to graze on the refuge within 15 years to no more than 125 ponies.

Wilderness. The refuge would continue to protect and enhance the wilderness character of the proposed area through actions to eliminate incompatible features and activities.

Figure 2-5. Alternative C



Goal 1: Coastal Habitats

Manage quality coastal habitats for biological integrity, diversity, and environmental health of refuge barrier beach and dunes in concert with natural processes as part of the Delmarva Peninsula coastal barrier island system to provide habitat for species of conservation concern.

Objective 1.1 Barrier Beach and Dune Habitat – Coastal Nesting Birds

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative B, plus:

- Return footprint of current public beach parking area to wildlife habitat and reduce parking impact on habitat by reducing the size of public beach parking and relocating it to areas less sensitive for wildlife habitat and more stable to the forces of the tides and storms.
- Discontinue OSV use and horseback riding.

Objective 1.2 Barrier Beach and Dune Habitat - Migrating and Wintering Shorebirds and Migrating Monarch Butterflies

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative A; except discontinue OSV use and horseback riding.

Objective 1.3 Barrier Beach and Dune Habitat - Turtles

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative B; except discontinue OSV use and horseback riding.

Objective 1.4 Federally Endangered Plants and Rare Plant Communities

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative B

Objective 1.5 Salt Marsh Habitats for Nesting, Migrating, and Wintering Birds

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative B except:

- Reduce allowed population of Chincoteague ponies from 150 to 125 and remove ponies from the proposed wilderness area.

Goal 2: Managed Wetlands (Impoundments)

Manage refuge impoundments to support native wildlife and plant communities, including a diversity of waterbirds, aquatic species, and other species of conservation concern.

Objective 2.1 Impoundments for Waterfowl, Shorebirds, Waders, and associated species

Same as alternative A

Rationale:

Same as alternative A

Management Strategies/Biological Monitoring:

Same as alternative B

Goal 3: Upland Habitats

Manage upland habitats for biological integrity, diversity, and environmental health of coastal forests and shrublands to sustain native wildlife and plant communities, including species of conservation concern.

Objective 3.1 Coastal Shrub Habitat for Breeding and Migrating Landbirds

Same as alternative A

Rationale:

Same as alternative A

Management Strategies/Biological Monitoring:

Same as alternative B

Objective 3.2 Loblolly Pine Forest for Delmarva Peninsula fox squirrel, Brown-headed Nuthatch and Eastern Towhee

Same as alternative B

Rationale:

Same as alternative B

Management Strategies/Biological Monitoring:

Same as B, plus:

- Within 5 years, reduce sika population through continued recreational hunt and professional means of elimination.
- Within 15 years, eliminate the sika population, using an aggressive recreational hunt and year-round removal contract for sika, and monitor population and make adjustments to program as necessary to eliminate this exotic species.

Objective 3.3 Upland Habitats on Wallops Island NWR

Same as alternative A

Rationale:

Same as alternative A

Management Strategies/Biological Monitoring:

Same as alternative B

Goal 4: Southern Barrier Islands Unit (Assawoman, Metompkin, Cedar)

Perpetuate the biological integrity, diversity, and long term viability of natural habitats that support native avian communities and turtles on Assawoman, Metompkin and Cedar Islands through a partnership approach.

Objective 4.1 Barrier Beach and Dunes - Breeding Shorebirds and Turtles

Same as alternative A

Rationale:

Same as alternative A

Management Strategies/Biological Monitoring:

Same as alternative B

Objective 4.2 Barrier Beach, Dune, and Tidal Marsh – Migrating and Wintering Shorebirds

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative B

Goal 5: Partnerships

Working with partners, protect and restore vigorous, viable populations of migratory and resident wildlife, fish, and native plants and their habitats found on the Delmarva Peninsula and identified in state, national, and international treaties, plans, and initiatives. Take a leadership role in collaborative regional efforts to achieve broader conservation goals and serve as a catalyst for achieving a multi-state eco-regional partnership. The refuge will continue to work with partners to explore how best to sustain the resiliency of this unique barrier island system, its communities,

and its economy, consistent with the refuge’s mission and in the face of dynamic coastal processes, climate change, and storm events.

Objective 5.1 Regional Conservation

Same as alternative A

Rationale:
Same as alternative A

Strategies:
Same as alternative B

Objective 5.2 Economic Development

Same as alternative A

Rationale:
Same as alternative A

Strategies:
Same as alternative B

Objective 5.3 Community Resiliency

Same as alternative A

Rationale:
Same as alternative A

Strategies:
Same as alternative B

Objective 5.4 Federal Interagency Collaboration and Facility Management

Same as alternative B

Rationale:
Same as alternative B

Strategies:
Same as alternative B

Objective 5.5 Local Conservation of Tidal Creeks, Estuaries, Mudflats, and Nearshore Marine Waters

Same as alternative B

Rationale:
Same as alternative B

Strategies:
Same as alternative B

Goal 6: Visitor Services

People of all ages and abilities develop a stewardship ethic while enjoying their refuge experience and increasing their knowledge of the USFWS, Refuge System, and the refuge.

Objective 6.1 Hunting and Trapping

Within 15 years, work to phase out sika and non-migrant Canada goose populations.

Rationale:
Hunting is one of the priority uses of the Refuge System and is to be facilitated when compatible. Hunting can be used as a management tool to harvest surplus wildlife populations and achieve populations levels appropriate for the available habitat and to support other wildlife populations. Current hunting practices could be expanded to incorporate different species, such as fox and raccoon, and trapping opportunities to further reduce the stress of predators for threatened and endangered species. Efforts to reduce sika and non-migrant Canada goose could aid in the refuge's initiative to decrease the non-native, nuisance, or overabundant species that currently impact native species habitat.

Strategies:
Same as alternative A except:

- Expand hunting opportunities for sika, non-migrant Canada goose, and light goose (designated as non-native, nuisance, and/or overabundant species) to reduce populations. Specifically:
 - Within 5 years, reduce sika population through continued recreational hunt and professional means of elimination.
 - Within 15 years, eliminate the sika population, using an aggressive recreational hunt and year-round contract for sika removal, and monitor population and make adjustments to program as necessary to eliminate this exotic species.
- Within 5 years, introduce/add resident Canada goose and light goose hunting opportunities in refuge impoundments on Assateague Island.
- Within 10 years, use all available tools to minimize or eliminate non-migrant Canada goose (e.g. Provide non-migrant Canada goose hunting on all refuge properties).
- Within 10 years, refuge would assess opening of fox and raccoon hunting by assembling a new opportunity package.
- Within 10 years, assess a trapping program for furbearers (including fox, raccoon, opossum, and nutria) for the public.

Objective 6.2 Fishing and OSV Use

Discontinue OSV access in order to further protect refuge habitats, including a 10 percent increase in piping plover fledgling success rate as an annual average over a 5 year period.

Rationale:

Although current OSV management protects nesting habitat, concerns about OSV use still exist for habitat and species management, visitor experience, and administrative resources. Continuous compaction of the coastal zone habitat and deep tire ruts by repeated OSV trips could have adverse effect on unfledged young, invertebrates, and plant species that are part of the refuge ecosystem. Furthermore, visitor experience can be affected by the disruption of the natural landscape by repeated OSV trips.

Strategies:

Same as alternative B except:

- Continue fishing access by foot along the Atlantic Ocean except in the lifeguarded beach.
- Do not develop new crabbing docks at new Beach Road terminus.

Objective 6.3 Environmental Education and Interpretation

Same as alternative B

Rationale:

Same as alternative B

Strategies:

Same as alternative B except:

- No Wallops Island NWR boardwalk.
- No public canoe/kayak launch to Toms Cove.
- Develop audio message and/or training for shuttle.

Objective 6.4 Wildlife Observation and Photography

Same as alternative B

Rationale:

Same as alternative B

Strategies:

Same as alternative A except:

- Explore opportunities to restrict public use to specific sites during specific times of year (e.g., restrict access to Beach Road to bicycles and pedestrians before 3 p.m. during certain times of year).
- Restrict access on Service Road north of the recreational beach except under permit.

Objective 6.5 Recreational Beach Use

Within 8 years, complete transition of recreational beach and associated parking from current location to new location and, working with the NPS and town of Chincoteague, maintain current level of visitor satisfaction.

Rationale:

The proposed relocation of the 1-mile recreational beach and associated parking would be in response to historic and anticipated impairment to the current recreational beach and parking from natural hazards, such as heavy storm damage to parking lots, overwash events, sea level rise, and the natural movement of barrier beach land forms. The relocation is intended to provide a sustainable situation so that the habitat and recreation portion of the beach can be sustained for as long as possible for both the wildlife of the refuge, and the visitors of the shoreline. A reduction in parking would preserve more undeveloped, natural habitat and would meet the parking needs for most of the year. Based on hourly manual parking counts for shoulder and off-season weekends (approximately 9 a.m. to 4 p.m. in April 2010, May 2010, and September 2010 through February 2011), the demand for parking did not surpass 480 except for Memorial Day and September weekends. A shuttle system and off-site parking would provide access to visitors at times when 480 spaces are insufficient and provide opportunities for interpretation.

Strategies:

Same as alternative B except:

- Reduce beach parking to 480 spaces (approximately 4.25 acres).
- Coordinate with NPS and the town of Chincoteague to identify a suitable off-site beach parking area, as close to the beach as possible, and institute a shuttle service from off-site parking to recreational beach for use during specific times of the year when parking capacity is exceeded (anticipated to be every weekend in May and September and every day from Memorial Day weekend through Labor Day weekend).
 - The shuttle would operate an express route from identified off-site parking to the recreational beach.
 - For purposes of analysis, route length is assumed to be between 5 to 10 miles and one-way route time 12 to 25 minutes; however, the refuge would work with NPS and the Town to identify a site as close to the beach as possible.
 - The estimated frequency would be 10 minutes, assuming three shuttles each with a capacity of 40 people, as well as accommodation of beach gear and bicycles (actual vehicle type dependent on availability, cost, and other factors, but an open-air tram (power and trailer cars) may be considered).
 - Ownership and operation of the shuttle would need to be determined; it may involve USFWS, the town of Chincoteague, or other partner (private or public).
 - Protection from hazardous weather conditions would be provided to shuttle riders in coordination with NPS by providing shelters

Objective 6.6 Other Recreational Uses

Same as alternative B

Rationale:

Although current management of horseback riding protects nesting habitat, concerns about horseback riding still exist for habitat and species management, visitor experience, and administrative resources, especially when combined with the action to discontinue OSV use. Disturbance of the coastal zone habitat by repeated horse passage could have adverse effects on invertebrates and plant species that are part of the refuge ecosystem.

Strategies:

Same as alternative B except:

- No new off-road bicycle or pedestrian trails.
- No public non-motorized launch site at terminus of Beach Road.
- At Beach Road terminus, build a vehicle turn around.
- Continue to allow canoe/kayak access for environmental education and interpretation programs by NPS and the MSC.
- No horse trailer parking.
- Ensure shuttles are wheelchair accessible and equipped with external bike racks.

Goal 7: Refuge Administration

Maintain and enhance refuge infrastructure and operations responsibly and sustainably for the safety and well-being of the wildlife, cultural resources, public, and employees.

Objective 7.1 Outreach, Communication, and Emergency Communication

Same as alternative B

Rationale:

Same as alternative B

Strategies:

Same as alternative B except:

- Establish outreach activities primarily related to protection of wildlife and habitat.

Objective 7.2 Staffing and Volunteer Program/Friends Group

Within 5 years, fill vacancies, establish eight additional permanent, full-time positions, and otherwise sustain current levels of staffing and volunteer programs to achieve refuge purposes to increase citizen science efforts.

Rationale:

Same as alternative B

Strategies:

Same as alternative B except:

- No Education Program Specialist (see Appendix K).
- Utilize the services of volunteers and Friends group primarily in ways that benefit wildlife and promote a stewardship ethic in visitors.

Objective 7.3 Wilderness

Continue to protect and enhance the wilderness character of the proposed wilderness area.

Rationale:

Congressionally designated wilderness lands are that which are “untrammelled (free from man's control), undeveloped, and natural, offering outstanding opportunities for solitude and primitive recreation” (Wilderness Act of 1964). Actions to reevaluate wilderness potential after a change in public use and restriction of activities within the proposed wilderness area would support the Wilderness Act and the refuge's purpose and mission. These areas can also protect watersheds and habitats and provide opportunities for unique scientific research and recreation.

Strategies:

- Continue to protect and enhance the wilderness character for the proposed 1,300-acre wilderness area.
- Conduct a new wilderness review and evaluation after beach relocation.
- Restrict Chincoteague pony access to proposed wilderness area.

Objective 7.4 Cultural and Historic Resources

Same as alternative A

Rationale:

Same as alternative A

Strategies:

Same as alternative A, except:

- Where possible, increase law enforcement patrols on all known sites to inspect for disturbances and illegal digging and or looting.
- Do not invest resources in seeking shipwreck or any new historic structures.
- Limit the number of Chincoteague ponies allowed to graze on the refuge within 15 years to no more than 125 ponies.
- Maintain viewable herd along access to recreational beach and explore options to increase Chincoteague pony viewing opportunities with new relocated beach.

Objective 7.5 Climate Change and Sea Level Rise

Same as alternative A

Rationale:

Same as alternative B

Strategies:

Same as alternative B plus:

- Consider alternative fuel options for shuttle.

Table 2-2: Summary of Project Features by Alternative

| Issue | Alternative A | Alternative B | Alternative C |
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| Recreational Beach | <ul style="list-style-type: none"> • Continue to allow NPS to manage a 1-mile recreational beach. • Continue to allow NPS to maintain 8.5 acres of land (and preserve the capacity of 961 spaces) for parking at the existing recreational beach as long as suitable land base directly behind the recreational beach remains. • Continue to coordinate with NPS and the town of Chincoteague to identify a suitable off-site beach parking area for future use once existing beach parking is lost due to lack of suitable land base behind the recreational beach. • In being consistent with the 1993 Master Plan, as storms and other natural forces eliminate parking spaces adjacent to the beach, implement an alternate means of transportation such as a shuttle system. • Continue pursuit of bicycle trail development via Beach Road to recreational beach to replace the temporary Swan Cove Trail. • Allow hiking/intertidal zone access north of recreational beach. | <ul style="list-style-type: none"> • Continue to allow NPS to manage a 1-mile recreational beach. • Relocate recreational beach and 8.5 acres of land and parking for 961 vehicles approximately 1.5 miles north of current area. • Allow hiking/intertidal zone access north of recreational beach. • Allow pedestrian access south of recreational beach outside of breeding season, between approximately September 16 and March 14. | <p>Same as alternative B, except:</p> <ul style="list-style-type: none"> • Reduce beach parking to 480 spaces (approximately 4.25 acres) • Coordinate with NPS and the town of Chincoteague to identify a suitable off-site beach parking area, as close to the beach as possible, and institute a shuttle service from off-site parking to recreational beach for use during specific times of the year when parking capacity exceeded (anticipated to be every weekend in May and September and every day from Memorial Day weekend through Labor Day weekend). |
| Service Road | <ul style="list-style-type: none"> • Maintain current access of the Service Road. | <ul style="list-style-type: none"> • Close Service Road to all public access north of relocated parking except by special use permit or special day use privileges/openings. | <ul style="list-style-type: none"> • Same as alternative B. |

| Issue | Alternative A | Alternative B | Alternative C |
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| Beach Road causeway | <ul style="list-style-type: none"> Continue current policy to allow access to the recreational beach, Toms Cove, and Toms Cove Hook via Beach Road. Continue to allow canoe/kayak access for environmental education and interpretation programs by NPS and the MSC. | <ul style="list-style-type: none"> Close Beach Road causeway to all public access. At new road terminus, build a vehicle turn-around, crabbing dock, wildlife viewing tower, and new launching area for small non-motorized vessels. Continue to allow canoe/kayak access for environmental education and interpretation programs by NPS and the MSC. | <ul style="list-style-type: none"> Close Beach Road causeway to all public access. At new road terminus, build a vehicle turn-around. Continue to allow canoe/kayak access for environmental education and interpretation programs by NPS and the MSC. |
| Fishing and OSV Use | <ul style="list-style-type: none"> Maintain current access and closures. | <ul style="list-style-type: none"> Improve signage, promotion, and coordination of the permit process for fishing throughout the refuge. Create fishing access (e.g., crabbing dock) at new Beach Road terminus. Close Assawoman Island to fishing during breeding season from March 15 until September 15 or thereafter until the last shorebird fledges. Expand the OSV zone from the new recreational beach to Fishing Point on Toms Cove Hook and continue to keep the zone open from approximately September 16 to March 14. Close the OSV zone to public access March 15 through September 15 or thereafter, until the last shorebird fledges. Develop a designated, year-round area for fishing from south of the recreational beach to approximately .5 mile to the point of closure that would include OSV parking. | <ul style="list-style-type: none"> Discontinue OSV use. |
| Horseback riding | <ul style="list-style-type: none"> Maintain current access. | <ul style="list-style-type: none"> Allow horseback riding within new OSV zone. Develop horse-trailer parking area. | <ul style="list-style-type: none"> Discontinue horseback riding. |

| Issue | Alternative A | Alternative B | Alternative C |
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| Hunting and Trapping | <ul style="list-style-type: none"> Maintain current hunting policy of big game and migratory bird on Chincoteague NWR. Maintain current hunting policy of big game on Wallops Island NWR. | <p>Same as alternative A plus:</p> <ul style="list-style-type: none"> Introduce non-migratory Canada goose and light goose hunting within Assateague Island impoundments. Add mourning dove hunting in areas outside of Assateague Island. Add turkey to big game for youth hunting. Open refuge for migratory bird hunting on Federal holidays in designated areas of the refuge within Wildcat Marsh, Morris Island, Assawoman Island and Metompkin Island divisions, that occur outside of the current hunting days of Thursday, Friday, and Saturday. Pursue opening for fox and raccoon hunting on Assateague Island. Pursue opportunity for fur-bearer trapping on Assateague Island. | <p>Same as alternative A except: Work to eliminate sika and reduce non-migratory Canada goose populations.</p> <p>Same as alternative A plus:</p> <ul style="list-style-type: none"> Introduce non-migratory Canada goose and light goose hunting within Assateague Island impoundments. Pursue opening for fox and raccoon hunting on Assateague Island. Pursue opportunity for fur-bearer trapping on Assateague Island. |
| Pony Management | <ul style="list-style-type: none"> Continue to allow current population of up to 150. | <ul style="list-style-type: none"> Implement revised Chincoteague pony management plan. Continue to allow for current pony population of up to 150. | <ul style="list-style-type: none"> Within 15 years, phase in requirement for Chincoteague pony population to consist of no more than 125. |
| Cultural and Historic Resources | <ul style="list-style-type: none"> Complete restoration of Assateague Lighthouse. | <p>Same as alternative A plus:</p> <ul style="list-style-type: none"> Restore Lightkeeper's house, and historic landscaping and facilitate limited public access to cemetery and Assateague Village. | <p>Same as alternative A</p> |
| Wilderness | <ul style="list-style-type: none"> Continue to protect the wilderness character of the proposed wilderness area. | <p>Same as alternative A</p> | <ul style="list-style-type: none"> Same as alternative A plus remove Chincoteague ponies from proposed wilderness area and conduct wilderness review after relocation of recreational beach. |