

## Chapter 4



USFWS

*Refuge wetlands*

# Management Direction and Implementation

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## **Chapter 4: Management Direction and Implementation**

### **4.1 Introduction**

This chapter describes the process used to formulate the management direction for Chincoteague NWR and Wallops Island NWR, including descriptions of the management actions and alternatives that were considered but not analyzed or chosen as the management direction for the refuges. The chosen management direction for the refuge is then presented, including the goals, objectives, and strategies.

### **4.2 Development of Management Direction**

As described in chapter 2, the first step in the planning process is to map out the refuge's resources of concern and prioritize focal management species. These identified resources and species were used to develop a set of refuge goals, objectives to achieve those goals, and a series of strategies to implement them.

Refuge goals are intentionally broad, descriptive statements of the desired future condition for the refuge's resources of concern. By design, they are less quantitative and more prescriptive in defining the future desired habitat conditions of our management. Our goal statements include the principal elements of the refuge purposes and Refuge System mission and refuge-specific habitat vision statement developed by the public. All these inputs provided the framework for stepping down specific management objectives and strategies.

Objectives are essentially incremental steps toward achieving a goal; they further define management targets in measureable terms. "Writing Refuge Management Goals and Objectives: A Handbook" (USFWS 2004a) recommends writing "SMART" objectives that possess five characteristics: (1) specific, (2) measurable, (3) achievable, (4) results-oriented, and (5) time-fixed. A rationale accompanies each objective to explain its context and why we think it is important. The objectives outlined in this chapter will guide the future development of refuge step-down plans, which we describe later in this chapter.

We identified strategies for each of the objectives. 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 this plan.

### **4.3 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. This CCP focuses on focal species with proactive habitat management along with strategies to protect the barrier islands from the effects of sea level rise. This plan is presented in this chapter as the management direction that the refuges will implement over the next 15 years. Below are brief summaries of alternatives A and C along with components considered but not selected for detailed study in the CCP/EIS for the reason(s) described.

### **4.3.1 Alternative A (Current Management)**

**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 parking lots, that currently total 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.

### **4.3.2 Alternative C (Reduced Disturbance)**

**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.

### **4.3.3 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. In the CCP/EIS, we addressed how these components would not contribute to achieving the purpose of the CCP and could, in fact, detract from the elements of the purpose. While the USFWS has utilized site-specific beach nourishment to accomplish habitat goals, such as at Prime Hook NWR in Delaware to fill breaches as part of a broader marsh restoration project, it is the general position of USFWS that natural shoreline processes (including migration) are more beneficial in maintaining 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.

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 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.

It should be noted that beach nourishment is very costly. 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 perspective and compared to other alternatives evaluated, an alternative that included beach nourishment and coastal engineering element was not reasonable from an economic or common sense perspective.

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 will 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 considered beach nourishment to be outside the scope of the plan, and did not further evaluate nourishment as part of alternatives under consideration.

#### **4.3.4 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 EO 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 was not be eliminated.

#### **4.3.5 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 did not contribute to achieving the purpose of the CCP; rather, it detracted 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 agreed with the 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.

#### **4.3.6 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 was 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 was 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.

#### **4.4 General Refuge Management**

This CCP is a 15-year management plan that provides long-term guidance for management decisions on the refuge and set forth goals, objectives, and strategies needed to accomplish refuge purposes. We also identify our best estimate of future needs. This plan details program levels that are sometimes substantially above current budget allocations and, as such, are primarily for USFWS strategic planning and program prioritization purposes. This CCP does not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition. When possible, we often identify time frames for implementation of objectives and strategies within the next 15 years.

This plan will continue established habitat and wildlife management strategies but will pursue additional management activities for resources and public use. 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 4-1 and Figure 4-2 provides an illustration of major spatial elements of the plan.

Figure 4-1. The Plan – Chincoteague NWR

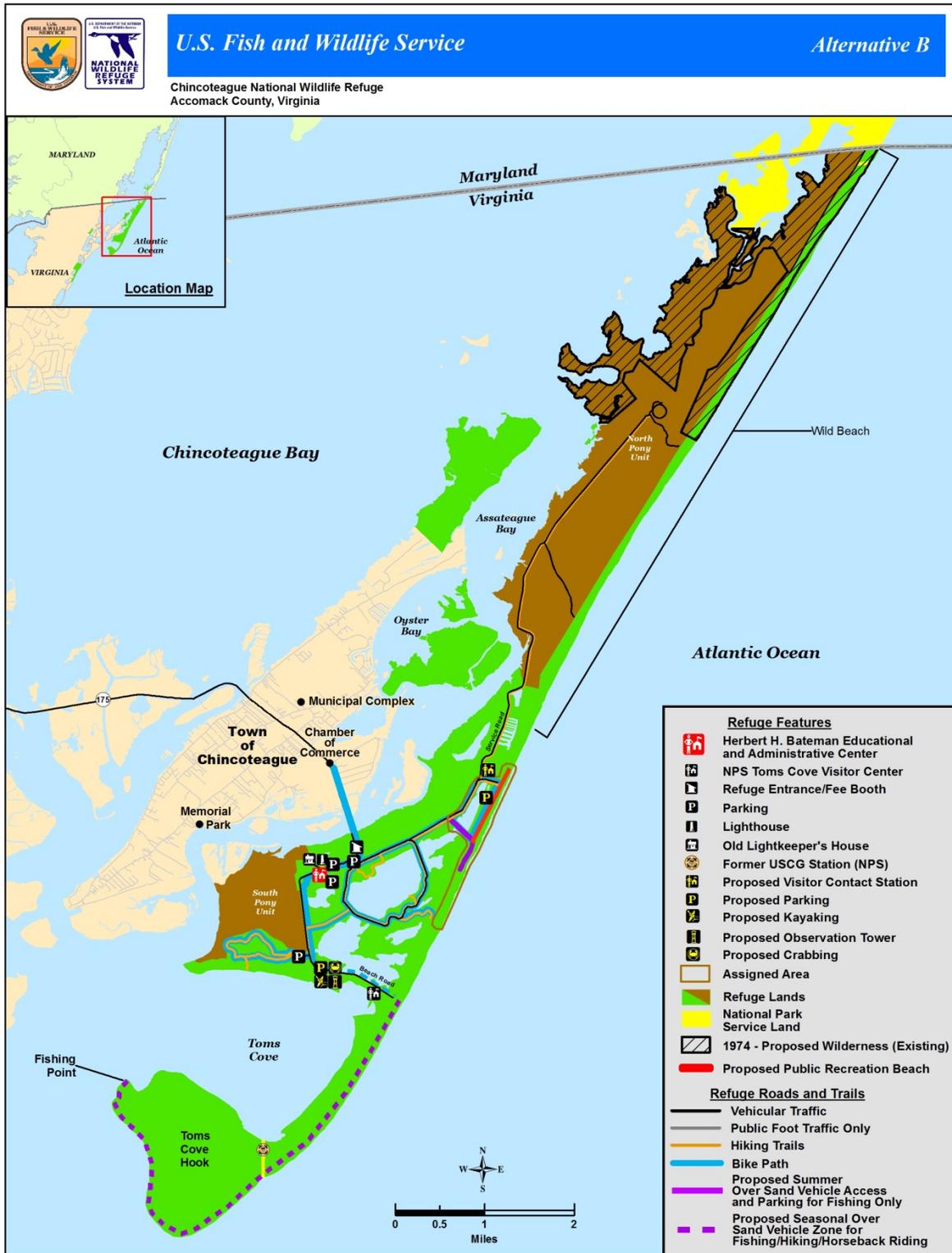
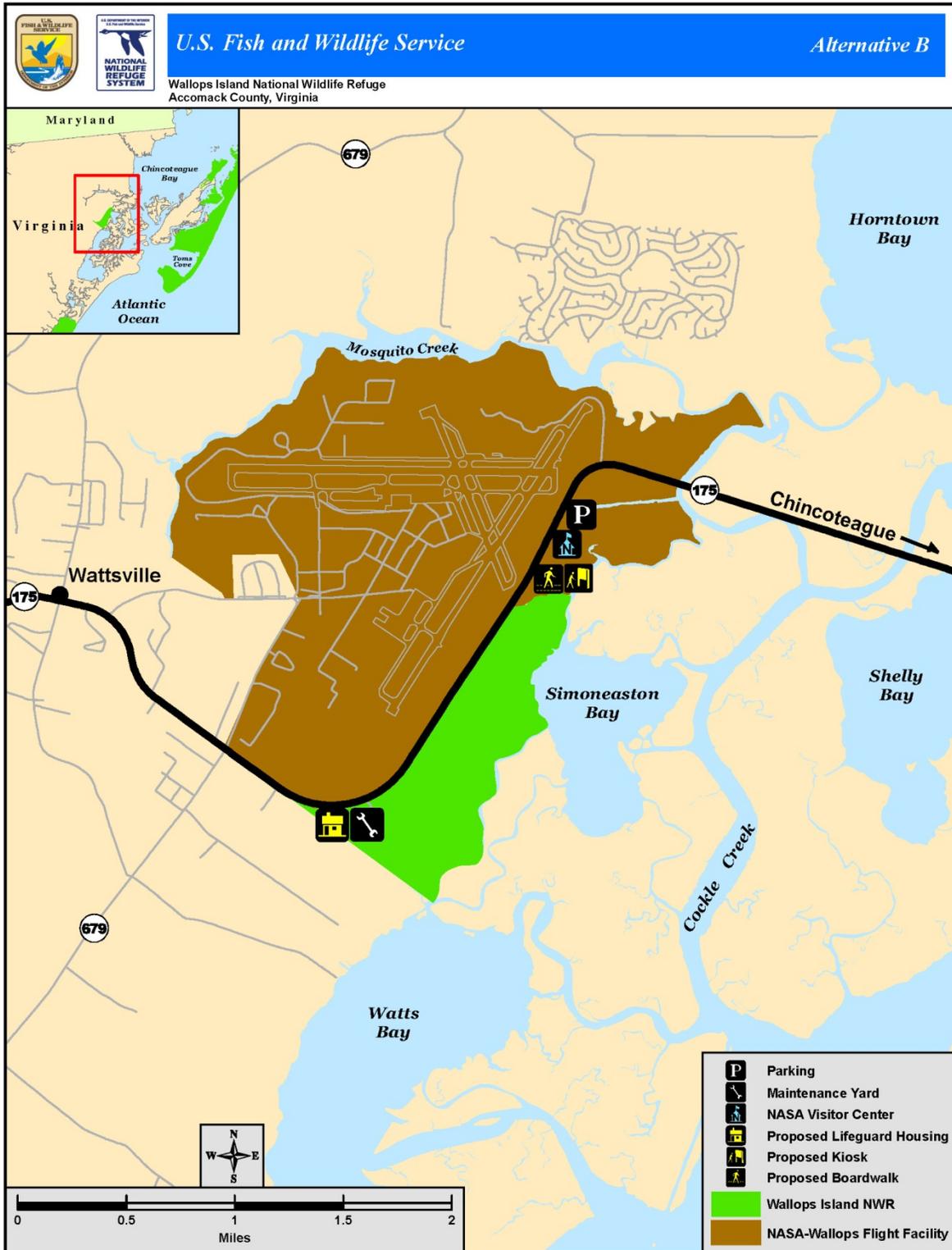


Figure 4-2. The Plan – Wallops Island NWR



**Natural Resource Management.** Under this plan, the refuge will 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 will 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 will continue to shape habitat on the barrier islands. The refuge will continue to protect and enhance the wilderness character of the 1974 proposed wilderness area, and there will be no change in its size (1,300 acres) or location.

**Beach Access and Parking.** In recognition of the vulnerability of the current parking, the refuge will 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. In comments on the draft CCP/EIS regarding beach access and parking from NPS, we concur that "...8.5 acres is not a limit, but a guideline, that can be changed as needed with the actual design of a facility that provides the required 961 spaces and related facilities as part of a well-thought-out plan." Because USFWS is committed to working with NPS and others to future design, refine and analyze beach relocation infrastructure in a separate NEPA document, if the actual footprint becomes larger, then it can more appropriately be considered at that stage. The new recreational beach will offer accessible parking in close proximity to the beach.

The refuge in consultation with NPS will provide management strategies for maintaining the current beach and parking areas in the interim until the newly located recreational beach is ready for visitor use. The refuge will provide a transition plan for moving from the current beach location to the new beach location, including proposed processes (such as construction in phases) and management strategies to ensure access to a recreational beach is always available for visitors.

**Visitor Use and Experience.** Existing public uses will continue with some exceptions. Hiking will continue to be allowed on the Service Road north of the new recreational beach parking, but private vehicles will be restricted unless authorized under SUP or special day use privileges/openings. A joint NPS and USFWS Visitor Contact Station will be developed near the new recreational beach. OSV and hiking access will continue via Beach Road across Toms Cove south to Fishing Point September 16 through March 14. Access to Toms Cove for environmental education programs will require a permit. Beach Road will continue to be open to vehicles year-round as far as the vicinity of the South Pony Corral, where we will also provide multi-habitat viewshed, access to trails, and viewing of Chincoteague ponies and wildlife. Construction in this area will include a vehicle turn-around area with parking, crabbing dock, and launch point for non-motorized boats. Assawoman Island will 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 will remain and become part of the new assigned area.

The refuge will 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 will add mourning doves, light geese, and non-migratory Canada goose hunting opportunities to the refuge's migratory bird hunting program. Additionally, the refuge will allow migratory bird hunting on Federal holidays within the Commonwealth of Virginia hunting seasons. The refuge will also add turkeys to the big game hunting program and pursue

development of a trapping program for furbearers. The refuge will continue sika hunting and will conduct research to identify a desired population size. The refuge will continue to manage opportunities for recreational shellfish and crab harvest.

OSV use will be permitted for priority public uses, including wildlife observation, fishing and to access hunting zones. We propose to develop a new ½-mile, OSV zone to facilitate the six priority uses (March 15 through September 15) south of new recreational beach, and add this to the new assigned area. We will also continue current management of the Overwash and Hook area for shorebirds until the new recreational beach is established, at which time the March 15 through September 15 closure will go into effect. OSV access from September 16 to March 14 will continue via Beach Road. The refuge will allow recreational horseback riding in the OSV zone from approximately September 16 to March 14. The refuge will allow visitor access by foot to the OSV zone from approximately September 16 to March 14.

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

***Cultural Resource Management.*** With partners, the refuge will restore the lightkeeper'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 will allow access to the cemetery near Beach Road and develop tours and controlled access opportunities for Assateague Village. The refuge will work with NASA to develop a boardwalk and kiosk from the NASA Visitor Center in or adjacent to Wallops Island NWR.

The “Chincoteague ponies” have a strong cultural tie to the community, and the refuge will implement a Chincoteague pony management plan that meets multiple objectives: visitor viewing, habitat management, and pony health. The refuge will 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.

## 4.5 Management Goals, Objectives and Strategies

### *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 refuge wide 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 will 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 region wide productivity data and the Piping Plover Recovery Plan (USFWS 1995). In accordance with research on piping plovers, our current management target allows for population growth necessary to meet current 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, will 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. Please refer to Piping Plover Recovery goals and objectives at this link:

<http://www.fws.gov/northeast/pipingplover/> for more information.

#### 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. (Note: this strategy does not apply to the recreational beach at Toms Cove).
- 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.
- We will continue current management of the Overwash and Hook area for shorebirds until the new recreational beach is established, at which time the March 15 through September 15 closure will go into effect.
- 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.

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- 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 will 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 could also allow natural island movement.
- 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.
- Once the new recreational beach becomes fully operational, 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 will also allow natural island movement, which will 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.

### 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.

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- 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 knot, a threatened species, 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 will 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 to 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,

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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 to October) at dunes adjacent to overwash and public beach locations to aid in monarch nectaring and roosting locations.
- 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.

### 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

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Inland Fisheries (VDGIF) and TNC. 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 will 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, will 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 will indirectly help sea turtle production.

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- 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.
- 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. We use the Virginia and Maryland Sea Turtle Conservation Plan to help guide our actions, and will consider daily sea turtle monitoring during the appropriate nesting season on Assateague and Assawoman Islands.
- 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.

### 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 refuge shorelines by allowing natural processes to occur with a goal of increasing the current population of one to five 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). 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.

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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.
- Within 3 years of the CCP implementation, evaluate NPS amaranth propagation/transplant methods and success elsewhere (e.g., Assateague Island National Seashore in Maryland), and seek guidance from USFWS Seabeach Amaranth Coordinator to determine whether such methods could be used to establish other populations on refuge lands (particularly southern island units). Seek partners for implementing a transplant program if determined feasible.

### Seabeach Amaranth Biological Monitoring:

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- 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.
- Maintain wooded habitat on Wallops Island NWR that serves as a recharge area for Lucky Boy Fen.
- 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 3rd 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. Monitor for invasive plants during rare plant assessments.
- 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.
- We will continue to collaborate with Virginia DCR on several projects including management of rare plant communities on the refuge. A re-survey of refuge lands to more accurately document the current location and extent of natural heritage resources will be considered in future step-down planning efforts, such as the HMP.

### 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. DGIF notes that other species that may breed in refuge-owned salt marsh habitats can include willets, black ducks, and possibly black-necked stilts. Whimbrel, a species of highest conservation priority in the New England/Mid-Atlantic 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. Whimbrels only occur in Virginia during spring and fall migration, but like many shorebirds 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 (CCB) 2010 and Paxton 2007). American oystercatcher was selected as a representative species because it is a Tier II Species of Greatest Conservation Need, indicating it is a species which has a high risk of extinction or extirpation (DGIF 2005). Oystercatchers use a range of salt marsh habitats for their life history needs, nesting on topographical high spots in low salt marsh islands, 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-

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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 will 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.
- 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 addling, 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:

- 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, Chincoteague Bay Field Station (CBFS), 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

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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.

- 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***

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 will 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 4-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

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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 will be science-based, will have technical expert review, will evaluate refuge impoundment habitat in a regional context, and be consistent with other coastal refuges, refuge staff plan to use the Coastal Impoundment Strategic Decision Making (SDM) model to direct future management for each of the refuge impoundments. Until refined by the outcome of the SDM model, this objective will be met by manipulating impoundment water depths and vegetation. Refuge staff will 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 (AHMP), detailing management prescriptions to achieve impoundment objectives, will 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 will prescribe where and how frequently to remove encroaching woody vegetation through mowing, disking, and/or prescribed burning. Vegetation treatments will 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 will be strategically planned so that at least half of the identified nectar sources will be left un-mowed for butterflies.

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### 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.
- **NOTE:** Once the new recreational beach becomes fully operational, the use and management of NWF will also change. Due to potential parking lot configuration, Pintail (D Pool) will be removed from impoundment management capabilities. Since NWF will no longer be 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, and artificial shell nesting islands will no longer be maintained. Management of NWF will be improved for spring and fall migratory shorebirds and waterfowl.
- 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 Management, pers. comm., January 27, 2010).
- In cooperation with USDA, continue to reduce, eliminating if possible, populations of non-migrant Canada geese. Control measures will 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 to 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 will be mowed early in November to reduce woody encroachment but prevent waterfowl disturbance.
- 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.
- 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. Goldenrod 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.
- As opportunities arise, we will incorporate native plants that produce fruits high in antioxidants, such as arrowwood and Virginia creeper, in restoration efforts for the benefit migratory songbirds.
- 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. We will use this evaluation to determine whether the pony enclosure fencing should be removed.
- 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.

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### 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.
- 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 greater than 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:

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

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these areas will 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 will 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 will not mitigate these natural effects. The possible habitat shift, from scrub shrub to coastal, will 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.

### Management Strategies:

- 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.
- 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 will 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 will coordinate to flag or otherwise mark the areas prior to mowing. Mowing during the nesting season will 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.

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- 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 will 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 will occur only if needed for safety reasons and only then will grass on the road side of the wooden posts be trimmed so wooden posts are visible to motorists. Care will 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 will not take place until after November 1.
- 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 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 fox squirrels killed by vehicle strikes and inspect them for PIT tags to determine whether road-killed Delmarva 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 will be maintained by various vegetation management techniques.

### 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.
- Within 5 years, analyze data set from the 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 fox squirrel, Brown-headed Nuthatch and 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 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 will make the forest more resistant to damaging insect outbreaks, and create habitat characteristics more favorable to the Delmarva 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 Management 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 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 will need to be evaluated on a case-by-case basis to determine rate of spread and whether natural barriers will contain the outbreak to a size that does not impact Delmarva fox squirrels, public safety, or other important resources. If suppression action is determined necessary, the preferred method will 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 to October growing season (Merten, pers. comm., 2010). Green and infested trees within the buffer will 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 will 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).
- Within 5 years, develop silvicultural prescriptions to create small openings (2 to 10 acres) in the forest that will 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/compartment map using CFI Procedures developed by Chesapeake Marshlands NWR Complex, or comparable inventory method that takes into account wildlife variables.

### 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 Global Positioning System (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.

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- Refer to previous strategies concerning BBS data analysis and resumption of refuge BBS routes as these will 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.
- 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.

### Delmarva Fox Squirrel Management Strategies:

- Protect Delmarva 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 fox squirrel nest boxes (the current number is 127). Decrease or eliminate boxes in favor of natural nesting cavities.
- Conduct Delmarva 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 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 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 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 fox squirrels killed by vehicle strikes and inspect them for Passive Integrated Transponder (PIT) tags to determine whether road-killed Delmarva fox squirrels remain below 5 per year.
- **(NOTE: Although the Delmarva fox squirrel has been proposed for delisting from the endangered species list since the CCP/EIS was published, it has not been finalized yet.)**

**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 right-of-way (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 A & N Electric Cooperative (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 will provide an important habitat type for migrant and resident landbirds.

The spread of invasive plant species is the greatest management concern to upland habitat. Previous invasive plant mapping 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 will 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.

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- 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 will 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.
- 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:

- 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.
- 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**

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, nest on barrier island beaches, in Virginia. 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 through 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 will 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

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Virginia barrier islands. This will 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.
- 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:

- 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.

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- 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.
- 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).
- 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.

### **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 listed as a Federal threatened species in December 2014.

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.

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- 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 Refuge System'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 (DU). The refuge also works with Federal partners, including NPS, National Oceanic and Atmospheric Administration (NOAA), NASA, U.S. Navy, and USDA.

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### Strategies:

- Participate in events with local partners to advocate resource conservation and promote the mission of the Refuge System.
- 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 within 3 years.
- 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**

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 will 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.
- 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 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. Since release of the draft CCP/EIS we committed to a partnership to address coastal resiliency on the Eastern Shore of Virginia through MACRI, which is *“a multi-disciplinary institution dedicated to integrated climate change research with the goal of helping local and regional leaders make coastal communities and habitats more resilient through scaled*

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*science and research informing public policy. Its several partners provide specific expertise in environmental monitoring and forecasting, modeling about coastal vulnerability and risk assessment, and moreover access to climate change space-based data.”* The USFWS is committed to exploring the implementation of resiliency strategies informed by the latest science available.

### 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 will 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 will 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.
- Continue our new partnerships to address coastal resiliency on the Eastern Shore of Virginia through Mid-Atlantic Coastal Resiliency Institute (MACRI), which is *“a multi-disciplinary institution dedicated to integrated climate change research with the goal of helping local and regional leaders make coastal communities and habitats more resilient through scaled science and research informing public policy. Its several partners provide specific expertise in environmental monitoring and forecasting, modeling about coastal vulnerability and risk assessment, and moreover access to climate change space-based data.”* The USFWS is committed to exploring the implementation of resiliency strategies informed by the latest science available.
- 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 will 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.

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### 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.
- 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 3 years, revise the use agreement between NPS and USFWS to include construction of lifeguard housing on Wallops Island NWR. We recognize that the availability of housing for the USFWS and the NPS seasonal workers in the area is an issue. There are no specific plans (blueprints, etc.) developed at this time to share; this strategy will require additional environmental compliance.
- Within 3 years, pursue funding in support of the 2011 non-reimbursable umbrella agreement signed between USFWS, NASA, and the CBFS for establishing a leading research and teaching environment where students and staff address new and evolving challenges such as those posed by climate change and corresponding sea level rise to coastal environments, and work on 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**

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

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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.
- Within 5 years of plan implementation, collaborate with the USFWS Maryland Fisheries Office, Virginia Institute of Marine Science, CBFS, 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 USFWS, Refuge System, and the refuge.

#### ***Objective 6.1 Hunting***

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.

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### 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 will further reduce the stress of predators for threatened and endangered species. Furthermore, institution of increased hunting opportunities for youth and women will 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:

- 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 State regulations.
- Complete development of opportunity for hunters with disabilities, such as those participating in the Wounded Warriors Project, outside of Woodland Trail area.
- 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 will 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 will include:
  - Introduce/add non-migratory Canada goose and light goose hunting opportunities in refuge impoundments on Assateague Island.

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- 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 during closure periods on the Hook. 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

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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) near new Beach Road/South Pony Corral site.
- 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:
  - Develop a designated area for fishing and other priority uses at the southern terminus of the NPS recreational beach then south along the Atlantic Ocean beachfront approximately 0.5 miles. This new OSV zone to facilitate priority uses (March 15 through September 15) south of new recreational beach will be added to the new assigned area.
  - OSV access on Toms Cove Hook from September 16 to March 14 will continue via Beach Road. Continue current management of the Overwash and Hook area for shorebirds until the new recreational beach is established, at which time the March 15 through September 15 closure will go into effect.

### ***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, will 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 CBFS, 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).

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- 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, CBFS, 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 new site near Beach Road and South Pony Corral).
- Increase provision of teacher workshops in coordination with partners.
- Continue pursuit of proposal for mobile trailer for outreach/education and acquire within 3 years.
- 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 six 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

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improve opportunities. New management strategies and enhanced infrastructure as a result of this plan will 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 site near Beach Road and South Pony Corral, 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 site near Beach Road and South Pony Corral 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 partners including the NPS, the Town of Chincoteague and Accomack County, maintain or exceed current level of visitor satisfaction.

### Rationale:

The proposed relocation of the recreational beach and associated parking will 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. The refuge will 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. In comments on the draft CCP/EIS regarding beach access and parking from NPS, we concur that "...8.5 acres is not a limit, but a guideline, that can be changed as needed with the actual design of a facility that provides the required 961 spaces and related facilities as part of a well-thought-out plan." Because USFWS is committed to working with NPS and others to future design, refine and analyze beach relocation infrastructure in a separate NEPA document, if the actual footprint becomes larger, then it can more

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appropriately be considered at that stage. The new recreational beach will offer accessible parking in close proximity to the beach.

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

### 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, and the “NPS assigned area” (beach, parking, facilities), 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, and future design and analysis as described above). The Service Road will continue to be open year-round to hikers north to the refuge/National Seashore boundary. Access north of the recreational beach via the Service Road will be available by foot or via the CNHA Wildlife Tour Bus and by other organized groups authorized with a permit or agreement.
- Within 8 years (or with development of relocated beach), revise NPS-USFWS 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 will improve visitor experiences; however, we will not use Adulticide to address nuisance mosquitoes. The most recent directive from the USFWS headquarters regarding mosquito control on lands of the Refuge System is included as an attachment to Appendix C. When a public health authority advises the USFWS of a threat to health and safety of the public from mosquitoes arising from a refuge, we will work with the public health authority to allow them to reduce the public health risk on the refuge, as long as the activities are in full accordance with our regulations, policies and permitting procedures.

### **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:

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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 plan, 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.
  - Maintain Swan Cove Bicycle Trail access, and include terminus at beach into new assigned area.
  - Include bicycle lanes on new access road to relocated public 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 new site near Beach Road and South Pony Corral.
  - 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 and adjacent property owners to acknowledge the current dock/platform within Wildcat Marsh.
  - Develop a refuge-run kayak/canoe environmental education program from Wildcat Marsh following public access improvements along Wildcat Lane to North Main Street.
- Work with NPS to improve accessibility:
  - Increase accessible spaces at beach and improve signage and markings. (To be compliant with the Americans with Disabilities Act (ADA), 2 percent (20) of the approximately 1,000 parking spaces will 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.
- Continue current prohibition policies:
  - No littering;
  - No pets, including in vehicles;
  - No skateboards;
  - No roller or in-line skates;

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- No camping;
- No alcohol;
- No collecting plants, animals, or artifacts (exception: 1 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.
- Promote voluntary anti-littering 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 3 p.m.

### ***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 plan proposes, 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:

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- 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 new site near Beach Road and South Pony Corral.

### **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 will better enable the refuge to meet its mission and goals. For Chincoteague NWR, in order to implement the changes proposed within this plan, additional staffing will 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 will 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 will 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.

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### 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**

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 will 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**

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

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partnerships with the surrounding community will benefit the resources and help preserve them for more visitors to experience. This plan will 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). We will consider partnering with NPS to provide interpretation for Assateague Village.
- 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**

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

### 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. While the entire project area and facilities are subjected to impacts of climate change and sea level rise, much of our discussion in this CCP is focused on the beach and related infrastructure as storms and events have historically affected these refuge resources the most. Refuge leadership will utilize the best climate change science and adaptive management strategies available to inform any proposed management actions for coastal environments. 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. The current recreational beach will be managed by the NPS until the new beach area is designed, approved, and completed; thus, transition from one beach location to the other will not have any loss of access.

### 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.
- Provide interpretive exhibits to encourage visitors to become citizen scientists and report their observations around the refuge using the National Phenology Network to gather data on climate change effects on the plants and animals they observe on the refuge.
- 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.
- 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, will work with others (such as NASA, which is currently exploring solar panels) to determine the feasibility of becoming a pilot site for mitigation research, such as testing the impacts of renewable energy on wildlife. In the event of natural or manmade disasters, we will continue to pursue resources as they become available for restoration and research. Any ensuing projects will likely require NEPA compliance.

### **4.6 Refuge Operational Plans (“Step-down” Management Plans)**

The Service Manual lists more than 25 step-down management plans that may be required on refuges to complement a CCP. Those plans contain specific strategies and implementation schedules for achieving refuge goals and objectives. Some plans require annual revisions; others require revision every 5 to 10 years. Some plans require additional NEPA analysis, public involvement, and compatibility determinations (CDs) before they can be implemented (602 FW 4).

This document incorporates by reference those step-down plans that were previously highlighted by the refuge as necessary for enhanced management. These plans are necessary to continue proper management of the refuge, and should be carried forth in the future. The following step-down plans are complete or updated annually, and consequently are consistent with current management. These will be revised as necessary per this plan.

#### **4.6.1 Fire Management Plan**

We completed the most recent Fire Management Plan for Chincoteague NWR in 2009; the plan is updated every 5 years and is currently being updated. The Fire Management Plan addresses wildland fire events with guidelines on the level of protection needed to ensure personal and public safety, and to protect facilities and resources. We have incorporated fire programs needed to mimic natural processes and manage habitats, and other pertinent portions of the fire management, into this CCP.

#### **4.6.2 Prescribed Fire Plan**

We require a Prescribed Fire Plan for each prescribed fire on the refuge, and such plans are to be updated every 2 to 5 years. Each plan lays out the management objectives for the prescribed fire,

specific prescriptions to achieve the objectives, and contingency planning for managing the fire. We prepared the most recent prescribed fire plans for the refuge in 2009 for the Wash Flats and Fire Management Unit 2 (refuge impoundments), and the plan is currently being updated.

### **4.6.3 Annual Habitat Work Plans**

For each NWR, we develop Annual Habitat Work Plans (AHWP) that review habitat management activities from the previous year, evaluate monitoring programs, and make recommendations for habitat management strategies and prescriptions for the upcoming year. The AHWP incorporates adaptive management practices by evaluating success of management programs on an annual basis. We prepared the most recent comprehensive AHWP for Chincoteague NWR in January 2006, followed by a streamlined version annually.

### **4.6.4 Predator Management Plan**

We manage mammalian and certain avian predators to minimize losses to federally listed species and other ground-nesting birds using an Annual Predator Management Program that we develop each year prior to the nesting season. The Program evaluates the prior year's results and outlines methods for the upcoming year—protective enclosures, trapping, and shooting—to protect nesting species (USFWS 2012g). This annual plan is tied to the Final Environmental Assessment for the Management of Predation Losses to Native Bird Populations on the Barrier and Chesapeake Bay Islands and Coastal Areas of the Commonwealth of Virginia, prepared by the USDA Wildlife Service (USDA 2005).

### **4.6.5 Hunt Management Plans**

We prepared the current Chincoteague and Wallops Island NWR Hunt Management Plans in September 2007 and April 2007, respectively. These plans outline population objectives, identify areas to be open for hunting, and describe how the hunts will be administered for big game (i.e., deer and sika) and migratory birds.

### **4.6.6 Annual Hunt Program**

Each year, we develop the Annual Hunt Program, which is a written document detailing specifics of each year's hunt.

### **4.6.7 Inventory and Monitoring Plan**

The 1993 Chincoteague NWR Wildlife Inventory Plan describes surveys and protocols to monitor population numbers and trends. The information obtained from these surveys and programs is used to guide management decisions. We are currently reviewing the plan for consistency with national and regional guidance; once the Habitat Management Plan (HMP) and CCP are finalized, the inventory and monitoring plan will be revised and finalized.

### **4.6.8 Pony Management Plan**

Chincoteague NWR has resident horses known as Chincoteague ponies on Assateague Island that are owned and managed by the Chincoteague Volunteer Fire Company and that graze in 2 large designated areas on the refuge under a special use permit. In partnership with the Fire Company, we have drafted an Interim Chincoteague Pony Management Plan (2013; Appendix D), which replaces the 1990 Plan. It outlines refuge and Fire Company responsibilities in managing the ponies (USFWS 2013c).

### 4.7 Plans to be Developed

We will develop the following plans after the CCP is finalized:

#### *Habitat Management Plan (HMP)*

We intend the HMP to be a dynamic working document that provides long-term vision, specific guidance, continuity, and consistency for managing habitat on the refuge. The document sets a direction for the next 15 years, with reviews every 5 years and the use of adaptive management to assess and modify management activities as research, monitoring and priorities may require. HMPs are often step-down plans from the CCP, but can also be prepared prior to or in conjunction with the CCP/EIS. We developed a draft HMP during the pre-planning phase of the CCP/EIS and incorporated its content, including wildlife habitat goals, objectives, and strategies, into this CCP. We will revise it as necessary to be consistent with the selected alternative and finalize it after the CCP is complete.

In 1992, we completed the Upland Habitat Management Plan for Chincoteague NWR, outlining goals, objectives, and management actions for 3,440 acres of forest and shrub habitats on Assateague Island (USFWS 1992b). Unfortunately, reductions in staff and changing priorities curtailed our implementation of the plan. We reviewed the plan during preparation of the draft HMP, and incorporated applicable portions into it.

The Virginia Ecological Services Field Office in Gloucester, Virginia, prepared several Biological Opinions which spell out terms, conditions, and conservation recommendations for various management activities on Chincoteague NWR. The most comprehensive and detailed one is the 2008 Biological Opinion (USFWS 2008b; Appendix F). It addresses the timing, location, and types of beach use permitted in areas that harbor piping plover, sea turtles, and seabeach amaranth. It also requires specific monitoring and protective measures (USFWS 2008b). Elements of the Biological Opinion were incorporated into the draft HMP. Biological Evaluations prepared by staff under Section 7 of the ESA (and concurred by USFWS Endangered Species Offices in Virginia and Maryland) also set management guidance for other activities in Delmarva Peninsula fox squirrel habitat.

#### *Visitor Services Plan*

This plan will be a step-down plan to the CCP and will build upon other management plans, namely the Hunt Management Plan (2007), to document approved recreational activities and identify the structure of the visitor services program. The plan will include visitor services data and research to evaluate and plan for visitor services programs, and will assist in the implementation of the CCP.