

Wallops Island Protected Species Management Plan

2019

Prepared for:

National Aeronautics and Space Administration
Wallops Flight Facility
Wallops Island, Virginia



CHANGE RECORD SHEET

ISSUE	DATE OF RELEASE	REASONS FOR REVISION	APPROVAL
1	5/06/10	Baseline Document	Shane Whealton
2	2/02/11	Document amended to indicate intention to survey for additional species of interest.	Joel Mitchell
3	3/21/11	Addition of the Launch Range Biological Opinion Terms that were related to monitoring. Addition of Sea Turtle Hatchling and Live Hatchling Procedures.	Shane Whealton
4	5/2/11	Stranding Center's new phone number	Shane Whealton
5	12/22/11	Added POC phone numbers	Shane Whealton
6	12/5/12	Minor formatting, update Tylan Dean's contact info	Shane Whealton
7	11/19/12	Updated USFWS Field Office POC info	Shane Whealton
8	11/19/12	Updated Virginia Aquarium email	Shane Whealton
9	2/14/14	Updated Sections 3.2, 3.3, 4.1.1.2, 4.2.2, 6.0, 7.1, 8.0 and 9.0	Shane Whealton
10	2/26/14	Updated Figure 2-1	Shane Whealton
11	3/6/14	Updated Intro, Kemps Ridley added, formatting	Bundick/Silbert
12	6/23/14	Updated Cover Page	Chance
13	2/10/15	Updated Red Knot Listing, formatting	Whealton/Silbert
14	1/19/16	Updated Sarah Nystrom@fws.gov Edited Section 5.0	Whealton
15	12/6/16	Added 2016 BO requirements and northern long eared bat information	Bonsteel/Miller/ Mitchell/Whealton
16	5/21/18	Updated virginiafieldoffice@fws.gov email	Whealton
17	9/5/2018	Updated website training link; updated virginiafieldoffice@fws.gov email; formatting	Miller

TABLE OF CONTENTS

SECTION	PAGE
1.0 INTRODUCTION	1
2.0 PROTECTED SPECIES MONITORING AREAS	2
2.1 <i>NORTH END</i>	2
2.2 RECREATIONAL BEACH	3
2.3 <i>SEAWALL/CONSTRUCTED BEACH</i>	3
2.4 <i>SOUTH END</i>	3
3.0 PROTECTED SPECIES MONITORING	5
3.1 <i>PIPING PLOVER</i>	5
3.1.1 <i>Description of Piping Plover</i>	5
3.1.2 <i>Piping Plover Monitoring</i>	5
3.1.2.1 <i>Pre-nesting Season</i>	6
3.1.2.2 <i>Nest Locating and Monitoring</i>	6
3.1.2.3 <i>Brood Monitoring</i>	7
3.2 <i>RED KNOT</i>	8
3.2.1 <i>Red Knot Description</i>	8
3.2.2 <i>Red Knot Monitoring</i>	8
3.3 <i>NORTHERN LONG-EARED BAT</i>	9
3.3.1 <i>Northern Long-eared Bat Description</i>	9
3.3.2 <i>Northern Long-eared Bat Monitoring</i>	10
3.3 <i>SEA TURTLES</i>	11
3.3.1 <i>Sea Turtle Descriptions</i>	11
3.3.2 <i>Sea Turtle Monitoring</i>	14
3.3.2.1 <i>Crawl & Nest Searches</i>	15
3.3.2.2 <i>Nest Protection</i>	15
3.3.2.3 <i>Hatching Procedures</i>	16
3.3.2.4 <i>Live Hatching Procedures</i>	17
3.4 <i>SEABEACH AMARANTH</i>	17
3.4.1 <i>Seabeach Amaranth Description</i>	17
3.4.2 <i>Seabeach Amaranth Monitoring</i>	18
3.5 <i>OTHER SPECIES OF INTEREST</i>	18
4.0 MARINE MAMMAL STRANDING MONITORING	18
4.1 <i>DECEASED STRANDED MARINE MAMMALS</i>	18
4.2 <i>LIVE STRANDED MARINE MAMMALS</i>	19
5.0 MISSION-SPECIFIC MONITORING	19
6.0 VEHICLE USE DURING MONITORING	20
6.1 <i>VEHICLE USE DURING SEA TURTLE HATCH WINDOW</i>	20

7.0 SECURITY AND EMPLOYEE REPORTING 20

8.0 TRAINING AND CERTIFICATION 21

9.0 PREDATOR CONTROL 21

10.0 PLAN REVIEW AND RECORD RETENTION 21

11.0 REPORTING AND ANALYSIS 21

12.0 POINTS OF CONTACT 22

13.0 REFERENCES 23

TABLE OF FIGURES

Figure 2-1 Four Protected Species Monitoring Areas on Wallops Island 2

Figure 2-2 North End and Recreational Beach Monitoring Areas..... 4

Figure 3-1 Piping Plover 6

Figure 3-2 Predator Exclosure 7

Figure 3-3 Red Knot in Breeding Plumage..... 9

Figure 3-4 Northern Long-eared Bat 10

Figure 3-5 Green Sea Turtle..... 12

Figure 3-6 Leatherback Sea Turtle..... 12

Figure 3-7 Loggerhead Sea Turtle 13

Figure 3-8 Kemp’s ridley Sea Turtle 14

Figure 3-9 Loggerhead Crawl & Nest..... 15

Figure 3-10 Sea Turtle Nest Protection..... 16

Figure 3-11 Seabeach Amaranth (scale in inches)..... 17

Figure 4-1 Deceased Stranded Leatherback..... 19

APPENDICES

Appendix A Monitoring Field Forms

ACRONYMS

DGIF	Virginia Department of Game and Inland Fisheries
cm	centimeter
CNWR	Chincoteague National Wildlife Refuge
ESA	Endangered Species Act
GPS	Global Positioning System
km	kilometer
NASA	National Aeronautics and Space Administration
ORV	Off-Road Vehicle
UAS	Uninhabited Aerial System
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VAQ	Virginia Aquarium
WFF	Wallops Flight Facility

1.0 INTRODUCTION

Section 7 of the Endangered Species Act (ESA) directs all federal agencies to use their existing authorities to conserve threatened and endangered species and, in consultation with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service, to ensure that their actions do not jeopardize listed species or destroy or adversely modify critical habitat. Section 7 applies to management of federal lands as well as other federal actions that may affect listed species.

The National Aeronautics and Space Administration (NASA) Goddard Space Flight Center's Wallops Flight Facility (WFF) owns and manages Wallops Island in Accomack County, Virginia. Wallops Island provides habitat to a variety of protected species, some of which are Federally-listed and afforded protection under the ESA. Wallops Island is also home to many of WFF's operational activities that could affect these same species, requiring ESA consultation with USFWS. A key component of conducting an ESA consultation is to understand the status of listed species within the area potentially affected by the action. To this end, the need for a protected species monitoring program at WFF was initially identified during two programmatic ESA consultations between NASA and the USFWS Virginia Field Office and finalized in a consolidated effort. Once a monitoring program was developed, its implementation at WFF became a condition for complying with the USFWS Consolidated Biological Opinion (USFWS 2016a) resulting from the multiple consultations.

This monitoring plan details a methodology to monitor ESA-protected species under the jurisdiction of USFWS within the property boundaries of Wallops Island. Species covered by this plan include the federally endangered green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), and Kemp's ridley sea turtle (*Lepidochelys kempii*); the federally threatened piping plover (*Charadrius melodus*), loggerhead sea turtle (*Caretta caretta*), seabeach amaranth (*Amaranthus pumilus*), the rufa subspecies of red knot (*Calidris canutus rufa*), and the northern long eared bat (*Myotis septentrionalis*). Also included in the monitoring plan is the marine mammal and sea turtle stranding program protocols managed at WFF in cooperation with the Virginia Aquarium (VAQ). Monitoring on the WFF Main Base and Mainland are not included as part of this plan as no habitat exists on either of these properties to support protected species.

2.1 PROTECTED SPECIES MONITORING AREAS

Protected species monitoring will be conducted on four areas of the Wallops Island Shoreline: the North End, Recreational Beach, Constructed Beach, and the South End. These four monitoring areas are illustrated in Figure 2-1.

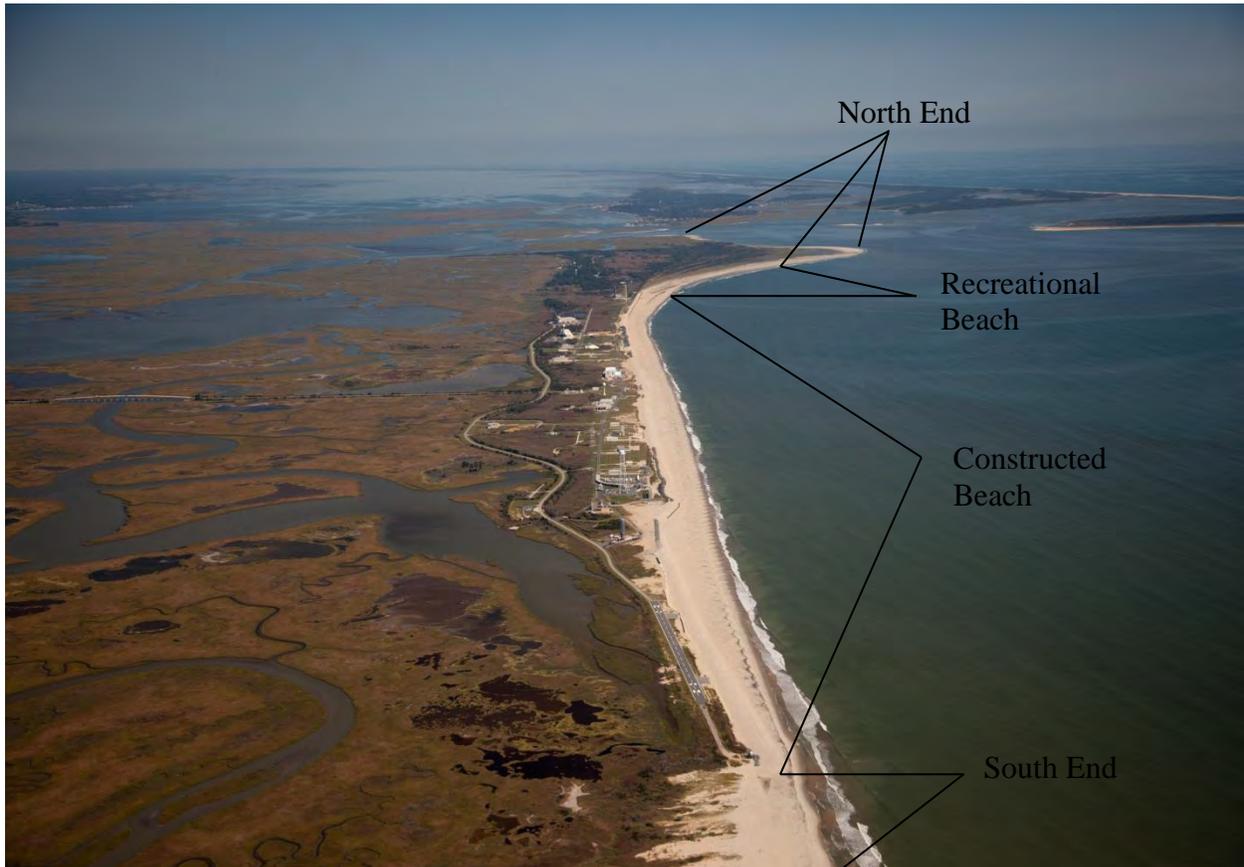


Figure 2-1 Four Protected Species Monitoring Areas on Wallops Island

2.2 North End

The North End refers to the beach on the northern tip of Wallops Island facing the Atlantic Ocean. The monitoring area begins at the northernmost point of Wallops Island and extends south to the pedestrian barrier for the Piping Plover Nesting Area, making up 3.9 kilometers (km; 2.4 miles) of coastline. It is comprised of tidal flats and pools, a large tidal pool, small-vegetated dunes, wide beach areas, and shrub-scrub habitat. This area is favored by piping plovers and red knots. It is closed to all recreational use and designated as the Piping Plover Nesting Area from March 16 through August 31, or until the last plover chicks fledge. During this time, “Area Closed” signs connected by cable are posted perpendicular to the ocean to restrict pedestrian access.

Vehicle use extends as far north as the large tidal pool and then an all-terrain vehicle may be used to monitor areas north of that point. Monitoring staff will not proceed past the explosion hazard signs that are placed on the northern end of the beach where the primary dune begins. The North End monitoring area is illustrated in Figure 2-2.

The North End has been identified as a potential source of sand to replenish other beach areas on Wallops Island. If this alternative is pursued, sand will be excavated from the north Wallops Island borrow area for beach nourishment outside of plover and sea turtle nesting season (March 15 through November 30 or the last date of potential sea turtle hatchling emergence based on laying dates of all nests). Sand will be stockpiled outside the north Wallops Island borrow area, and outside potential nesting habitat for plovers and sea turtles prior to placement for nourishment.

2.3 Recreational Beach

From the pedestrian barrier (seaward of the helipad), south to the sea wall (seaward of the Navy Aegis Building V-24), the Recreational Beach consists of approximately 1.6 km (1 mile) of primary and secondary dunes with a flat sandy beach along the ocean. This area has been historically used by sea turtles for nesting. The recreational beach area may be used only during non-operational hours: weekdays sunrise to 7:30 am and 3:00 to midnight, as well as weekends and holidays sunrise to midnight. Launch activities may require additional closure of the recreational beach area outside of normal working hours. Recreational beach users are required to notify the Island Gate security if anyone is observed violating WFF's use policy by littering; having open fires, pets, or weapons; or accessing other areas that are off limits due to operations or explosion hazards. Failure to comply with beach use restrictions will result in closure of the Island for recreational use. The Recreational Beach monitoring area is illustrated in Figure 2-2.

2.4 Seawall/Constructed Beach

The Seawall/Constructed Beach extends from the Recreational Beach south to the Z-100 camera stand. This area consists of approximately 5.9 km (3.7 miles) of rock seawall approximate 4.3 meters (14 feet) high with the new replenished beach on the ocean side that protects the island from the constant wave action of the Atlantic Ocean. The Seawall/Constructed Beach monitoring area is illustrated in Figure 2-1.

2.5 South End

The South End extends from the Z-100 camera stand to the Wallops Island property boundary. The South End consists of approximately 0.4 km (0.25 miles) of steep and narrow sandy beach and a low dune line to the west. The property boundary is marked by a row of short, white stakes placed perpendicular to the ocean approximately 0.4 km (0.25 miles) south of Z-100. The South End is highly vulnerable to adverse weather conditions; erosion and flooding are common occurrences. The South End is closed to recreational use year-round; however, USFWS officials are permitted through the area to gain access to Assawoman Island. The South End monitoring area is illustrated in Figure 2-1.



Figure 2-2 North End and Recreational Beach Monitoring Areas

3.1 PROTECTED SPECIES MONITORING

Care must be taken handling any dead specimens of proposed or listed species that are found to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead specimen, notify the Service's Virginia Law Enforcement Office at 804-771-2883, 7721 South Laburnum Avenue, Richmond, Virginia 23231, and the Service's Virginia Field Office at 804-693-6694, 6669 Short Lane, Gloucester, Virginia 23061.

3.2 Piping Plover

3.2.1 Description of Piping Plover

The Atlantic Coast piping plover population became federally listed as threatened on January 10, 1986. Piping plovers are small, beige and white shorebirds with a black band across their breast and forehead. The piping plover breeds on coastal beaches from Newfoundland and southeastern Quebec to North Carolina and winters primarily on the Atlantic Coast from North Carolina to Florida, although some migrate to the Bahamas and West Indies. Plovers typically feed on invertebrates such as marine worms, fly larvae, beetles, crustaceans, and mollusks. Feeding areas include intertidal portions of ocean beaches, wash-over areas, mudflats, sand flats, wrack lines, and shorelines of coastal ponds, lagoons, or salt marshes.

After they establish nesting territories and conduct courtship rituals beginning in late March or early April, piping plover pairs form shallow depressions (nests) in the sand to lay eggs. Nests are situated above the high tide line on coastal beaches, sand flats at the ends of sand spits and barrier islands, gently sloping dunes, blowout areas behind primary dunes, and wash over areas cut into or between dunes. Nest sites are shallow scraped depressions in substrates ranging from fine grained sand to mixtures of sand and pebbles, shell or cobble. They may also nest on areas where suitable dredge material has been deposited. Nests are usually found in areas with little or no vegetation, although on occasion, plovers will nest under stands of American beachgrass (*Ammophila breviligulata*) or other vegetation, typically laying four eggs that hatch in about 28 days. Figure 3-1 is a photo of a piping plover.

3.2.2 Piping Plover Monitoring

Monitoring activities within piping plover nesting habitat will include conducting pre-nesting surveys, nest searches, erecting predator proof nest exclosures, brood monitoring, and removal of predators. Use of Wallops Island Beach by field personnel, security and employees will also be monitored.



Figure 3-1 Piping Plover

3.2.2.1 Pre-nesting Season

During the pre-nesting season, field personnel will conduct surveys to document the arrival of piping plovers. Beginning in early March, all four beach monitoring areas will be surveyed three times per week, as practicable, for piping plover arrival, establishment of territories, courtship display, and preliminary nest scrapes. Plovers usually nest in April and May at Wallops. Each beach monitoring area of Wallops Island will be surveyed for feasible habitat in the event habitat may increase or decrease in a particular area (i.e. constructed beach monitoring area may have beach habitat in the future). Monitoring results will be recorded in the Monitoring Field Form (see Appendix A).

3.2.2.2 Nest Locating and Monitoring

Three times per week, as practicable, nest locating and monitoring will begin when territorial pairs are firmly documented and will continue to August 31, or until the last chick fledges. Monitoring results will be recorded in the Monitoring Field Form. Field personnel will use binoculars and spotting scopes to observe plovers from a vehicle or dune. As mating pairs are identified, field personnel will walk through nesting areas at a slow pace looking for scrapes and plover tracks. Scrapes and plover tracks concentrated in an area indicate that eggs may be laid soon. To find eggs, field personnel will rely on piping plover behavior such as mating, territorial displays, feigning a broken wing, piping or calling, false brooding, and slinking away quietly. Weather conditions, time, and potential stress on the bird will be taken into consideration while nest searching. Nest locating and monitoring will not occur in high wind, extreme heat, rain, or foggy conditions. Monitoring staff may install an infrared game camera to monitor the nest.

Once located, a nest will be marked using GPS. The number of eggs and a descriptive location of the nest will be documented on a Monitoring Field Form (see Appendix A). From a distance, monitoring staff will check nests three times per week, as practicable, for incubating adults until chicks hatch. If nests or eggs are missing or destroyed, personnel will briefly search the area to determine the cause of nest loss.

Predator-proof exclosures will be placed around nests. Exclosures will consist of welded wire encircling piping plover nests, providing a barrier between incubating adults and predators. The 5.1 centimeters (cm; 2 inches) by 10.2 cm (4 inches) openings in the welded wire allow plovers to access nests but prevent raccoons and foxes from reaching the nests (USFWS, 2008). Monitoring staff will place nylon fish netting with a 3.8 cm (1.5 inch) mesh over the top of the welded wire to deter avian predators from diving into the exclosures. Time constructing the exclosures and the time the incubating adult spends off the nest will be recorded on a Monitoring Field Form to determine if nest abandonment is related to excessive exclosure set up time (USFWS, 2008). If a nest is located on the Recreational Beach, signage will be placed around the nest in addition to an exclosure. A photo of a predator exclosure with signage is shown in Figure 3-2.



Figure 3-2 Predator Exclosure

3.1.2.3 Brood Monitoring

After the eggs hatch, field personnel will record the number of eggs remaining in the nest cup for an accurate count of eggs hatched and to determine how many chicks are in a brood. Broods will be located three times per week, as practicable, until the chicks either fly or reach 25 days in age (USFWS, 2008). When feasible, observations of chicks will be made from a vehicle using spotting scopes and binoculars. If this method proves ineffective because of visual obstructions such as vegetation and dunes, searches will be conducted on foot. To reduce potential stress to broods, chick observations will be attempted during morning hours and last only as long as necessary to count the number of chicks. Brood monitoring will not be conducted in extreme weather conditions, such as excessive heat, rain, fog, or high winds.

3.2 Red Knot

3.2.1 Red Knot Description

The red knot is a medium sized, bulky sandpiper. It is a relatively short bird with short legs. The head and breast are reddish in breeding plumage and grey the rest of the year. Of its six subspecies, only the rufa red knot has the potential to occur at WFF. It was listed as threatened on January 12, 2015.

The rufa subspecies breeds in the low and mid-Arctic in drier tundra areas, such as sparsely vegetated hillsides. Outside of breeding season, it is found primarily in intertidal, marine habitats, especially near coastal inlets, estuaries, and bays. The rufa red knot primarily overwinters in Florida, the Caribbean, and South America. Primary prey species are aquatic invertebrates, especially bivalves, small snails, and crustaceans. Along the Virginia Coast, coquina clams (*Donax variabilis*) and crustaceans are likely the most important sources of forage (Cohen et al. 2010). During breeding season, rufa red knots also eat terrestrial invertebrates.

Following their migration from southern overwintering areas, the majority of rufa red knots arrive in the Mid-Atlantic between late April and early June. The Delaware Bay stopover is the final and most crucial during the springtime northern migration. At this stopover the birds gorge on the eggs of spawning horseshoe crabs (*Limulus polyphemus*) in preparation for their nonstop flight to the Arctic (Karpanty et al. 2006). Rufa red knot populations typically peak in the Delaware Bay between May 15 and May 30 of each year.

Most of the rufa red knot conservation efforts to date have focused on the Delaware Bay. In the mid-1990s, three years of aerial surveys showed that numbers of red knots moving through the barrier islands of Virginia, between mid-May and the second week of June reached a peak of 8,000-10,000 birds. Surveys in 2005 and 2006 recorded comparable numbers (USFWS, 2007). These findings suggest that the Virginia barrier islands may have more significance to the species than previously believed. USFWS in cooperation with other federal and state agencies have been banding and tracking these shorebirds to obtain more information. Figure 3-3 is a photo of a red knot.

3.2.2 Red Knot Monitoring

Monitoring for red knots will take place simultaneously with the piping plover monitoring. Monitoring will be recorded in the monitoring data form in Appendix A with the following information:

1. Date, Time, Observer, and Place of Encounter – The date, time, observer name, and place of encounter will be recorded. Place of encounter will include a general location (e.g., north end, recreational beach) and when possible a global position system (GPS) position.
2. Flock size – Flock size will be estimated and recorded.

3. Number of banded birds – The number of banded red knots will be recorded.



Figure 3-3 Red Knot in Breeding Plumage

3.3 Northern Long-eared Bat

3.3.1 Northern Long-eared Bat Description

The northern long-eared bat (also known as northern myotis) is a medium-sized bat about 7.6 to 9.4 cm (3 to 3.7 inches) in length but with a wingspan of 22.9 to 25.4 cm (9 to 10 inches). As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*, which are noted for their small ears (“myotis” means mouse-eared). The species’ range includes 37 states. White-nose syndrome, a fungal disease known to affect bats, is currently the predominant threat to this bat, especially throughout the Northeast where the species has declined by up to 99 percent from pre-white-nose syndrome levels at many hibernation sites. White-nose syndrome has currently spread throughout all or most of the states within the species’ range except North Dakota, Montana, South Dakota, and Wyoming (USFWS 2016b).

The northern long-eared bat’s range includes Accomack County. In 2015, the U.S. Geological Survey Cooperative Fish and Wildlife Research Unit deployed acoustic detectors at multiple locations in the state of Virginia. Through this effort, researchers obtained acoustic evidence suggesting the presence of northern long-eared bats on the Delmarva Peninsula, including Northampton County (Ford 2016). Although northern long-eared bats were not detected in northern Accomack County in 2015, it does not disprove the potential for the species to occur there, especially within wooded areas (Ford 2016). Furthermore, specific to WFF, in 2008,

acoustic bat surveys were conducted in the marshes on Wallops Island, with 0.3 percent of the calls identified attributable to myotids (Stantec Consulting 2008). While northern long-eared bats were not separated from the rest of the guild, based on the foregoing information it is reasonable to assume that this species could occur in the vicinity of WFF, even if in low numbers.

Northern long-eared bats likely do not overwinter near WFF, as they prefer hibernating in caves and mines (USFWS 2016b). During the fall months, individuals enter hibernacula and remain there until spring or early summer (Caceres & Barclay 2000). In summer, individuals disperse throughout their range, roosting in tree cavities, crevices, and under exfoliated bark (Foster & Kurta 1999). The species is insectivorous, foraging nocturnally on prey both while in flight as well as gleaning prey items from surfaces (e.g., leaves, standing water) under the forest canopy (Faure et al. 1993). Breeding occurs prior to winter hibernation, and females give birth to a single pup the following summer (Caceres & Barclay 2000). Figure 3-4 depicts a Northern long-eared bat.



Figure 3-4 Northern Long-eared Bat

3.3.2 Northern Long-eared Bat Monitoring

The ESA Final 4(d) Rule prohibits incidental take of Northern long-eared bats caused by tree removal within a 45-meter (150-foot) radius of a known occupied maternity roost tree during the pup season (June 1 – July 31). Monitoring for northern long-eared bats will be undertaken if tree removal is proposed on the Facility.

- To the extent practicable, all tree removal activities will be conducted outside of June 1 to July 31.
- If it is determined that it is necessary to remove trees of 3 inches diameter at breast height (DBH) or greater between June 1 and July 31, either:
 1. A bat emergence survey will be conducted (1 surveyor per 10 trees) 1 to 2 days prior to the scheduled tree removal; or

2. A presence/absence survey of the affected area will be conducted within a 45-meter (150-foot) radius, employing a qualified bat surveyor.
 - All survey results will be provided to the Service in digital format, at virginiafieldoffice@fws.gov.
 - If Northern long-eared bats are identified, maternal roost tree removal planned between June 1 and July 31 will require additional consultation with the Service.

In addition, WFF will conduct a nine month acoustic survey to determine absence/presence of protected bat species at various projected construction sites on Wallops Island/Mainland and the Main Base.

Activities conducted by NASA consistent with the conservation measures outlined in the ESA 4(d) rule for the NLEB (81 Federal Register 1900- 1922) are addressed under the Service's January 5, 2016, "Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Exempted from Take Prohibitions."

3.3 Sea Turtles

3.3.1 Sea Turtle Descriptions

Green sea turtles are the largest of all the hard-shelled sea turtles, but have a comparatively small head. While hatchlings are just 50 millimeters (2 inches) long, adults can grow to more than 0.91 meters (3 feet) long and weigh 136 to 159 kilograms (kg; 300 to 350 pounds). Adult greens are unique among sea turtles in that they are herbivorous, feeding primarily on sea grasses, sea lettuce, and algae. Other organisms living on sea grass blades and algae add to the diet. This diet is thought to give the turtles greenish colored fat, from which they take their name. A greens' carapace (top shell) is smooth and can be shades of black, gray, green, brown, and yellow. Their plastron (bottom shell) is yellowish white. Figure 3-5 is a photo of a green sea turtle.

Greens are considered threatened throughout the U.S., but the breeding colonies on the Pacific coast of Mexico and along the Florida coast are considered endangered. The Atlantic green was listed as a threatened species in 1978, with the exception of the above-mentioned breeding populations.



Figure 3-5 Green Sea Turtle

The National Marine Fisheries Service Northeast Region considers all of the greens in the Chesapeake Bay as endangered because it is impossible to distinguish between those individuals which overwinter in Florida waters and those which overwinter outside those waters. Atlantic greens are rare in the mid-Atlantic portion of their range and are extremely rare in Virginia.

The **leatherback sea turtle** was federally listed as endangered in 1970. It is the largest, deepest diving, most migratory, and widest ranging of all sea turtles. The adult leatherback can reach 1.3 to 2.4 meters (4 to 8 feet) in length and weigh between 226 to 907 kg (500 to 2000 pounds), with an average weight of 300 kg (660 pounds). Its shell is composed of a mosaic of small bones covered by firm, rubbery skin with seven longitudinal ridges or keels. This blue-black shell may also have variable white spotting; the plastron is white. A tooth-like cusp is located on each side of the gray upper jaw; the lower jaw is hooked anteriorly. The paddle-like clawless limbs are black with white margins and pale spotting. Hatchlings are predominantly black with white flipper margins and keels on the carapace. Figure 3-6 shows a photo of a leatherback sea turtle.



Figure 3-6 Leatherback Sea Turtle

The **loggerhead sea turtle** was federally listed as threatened in July 1978. This species is perhaps the most common of the sea turtles and the only one that still regularly nests on the U.S. Atlantic Coast, on beaches from New Jersey to Texas. This reddish-brown turtle averages 0.9 meters (3 feet) in length and 136 kg (300 pounds) in weight. The loggerhead's powerful jaws are well suited to eating hard-shelled prey. It feeds on crabs and other crustaceans, mollusks, jellyfish, and sometimes fish and eelgrass.

The distinctly heart-shaped carapace of the adult loggerhead averages 80 cm (31 inches) in length. Exclusive of hatchlings, loggerheads in Virginia's waters are mostly juveniles with carapace lengths from 20 cm (7.8 inches) to more than 120 cm (47 inches) and weighing between 20 to 40 kg (44 to 88 pounds). The carapace and top of the appendages are reddish brown to mahogany, and the plastron and bottom of the appendages are cream to yellow. It is common to find barnacles and other organisms encrusted on the carapace. Four scutes (plates) occur between the eyes (prefrontals), and there are five lateral carapacial scutes on each side. Loggerheads usually have three bridge scutes. Figure 3-7 is a photo of a loggerhead sea turtle.



Figure 3-7 Loggerhead Sea Turtle

Kemp's ridley sea turtles are federally endangered. Adult Kemp's ridley sea turtles are considered the smallest of all sea turtles; growing to 70 cm (28 inches) long and weighing up to 45 kg (100 pounds). They have a relatively round shape, with five pairs of costal scutes. Each front flipper has one claw, while back flippers may have one or two claws. Kemp's ridleys feed on crabs, fish, jellyfish, and mollusks. They range from the Gulf of Mexico to the U.S. Atlantic seaboard from Florida to Maine. They are found in the neritic zone; that is, in areas that typically contain muddy or sandy bottoms where their prey can be found. Kemp's ridley turtles nest from May to July, laying two to three clutches of about 100 eggs. These turtles utilize synchronized

nesting techniques, where many females come ashore to nest along the same beach at the same time. Large groups are known to nest in the state of Tamaulipas, Mexico, where 95% of the worldwide nesting of Kemp's ridley turtles occurs. Nests have been documented in Virginia, North Carolina, South Carolina, and Gulf and Atlantic Coasts of Florida (NFMS 2012; USFWS 2012). Figure 3-8 is a photo of a Kemp's ridley sea turtle.



Figure 3-8 Kemp's ridley Sea Turtle

3.3.2 Sea Turtle Monitoring

Virginia is considered the northernmost extent of the loggerhead nesting range. One green nested at Virginia Beach, Virginia in 2005 (MTN 2006) and no leatherback nests have been recorded in the state. The first documented Kemp's ridley sea turtle nest occurred at Virginia Beach in summer 2012 (USFWS 2012). However, nesting activity was observed on nearby Assateague Island in 1996 (Rabon et al. 2003). Therefore, it may be concluded that nesting by any species of sea turtle other than loggerhead would be considered a rare and unlikely occurrence. However, all four species of sea turtles are found off the Atlantic Coast from Florida to Nova Scotia (USFWS, 2008) and the potential for nesting at Wallops Island exists. Given the rare nature of a non-loggerhead sea turtle nesting event, monitoring will report any evidence of potential nesting activity of green, leatherback, or Kemp's ridleys to the Virginia Field Office, within five business days of observation.

Monitoring activities within sea turtle nesting habitat on Wallops Island Beach include crawl track observations, nest searches and nest protection. Sea turtles to be monitored are the federal endangered green and leatherback sea turtles and the federally threatened loggerhead sea turtle.

3.3.2.1 Crawl & Nest Searches

Sea turtle crawl track and nest searches will be conducted simultaneously with piping plover monitoring. Sea turtle crawl and nesting activity typically occurs in Virginia from May through August (USFWS, 2008). Monitoring for sea turtles will be completed three times per week, as practicable, from May through August. When a sea turtle crawl track is found on the beach, monitoring staff will determine whether the crawl resulted in a nest. Staff will gently dig by hand into the body pit to locate the egg chamber, to determine if eggs were laid. Once the first layer of eggs is seen or felt, digging will cease. Staff will cover the eggs with moist sand and replace the layer of dry sand over the nest. The GPS location and date of the crawl will be recorded in a Monitoring Field Form (Appendix A) regardless if a nest is found. The presence of a body pit in a sea turtle crawl indicates the turtle attempted to lay eggs. Monitoring staff will notify CNWR at 757-336-6122 (ext. 320 Emarie Ayala) of the nest for possible DNA sample. Nest searches will not occur during inclement weather such as rain or high winds. A photo of a crawl track and nest is shown in Figure 3-9.



Figure 3-9 Loggerhead Crawl & Nest

3.3.2.2 Nest Protection

A variety of predators such as raccoon and fox prey on incubating turtle eggs. A predator screen will be positioned over all nests. The screen consists of a piece of welded wire with 5.1 cm (2 inches) by 10.2 cm (4 inches) openings held in place with small metal stakes (USFWS, 2008). The 10.2 cm (4 inch) openings will be placed parallel to the water's edge. The predator screen will allow hatchlings to leave the nest cavity, yet prevent raccoon and fox from reaching the eggs.

Monitoring staff will sweep a dusting of sand over the screen to hide it from predators and trespassers. Excess sand can make hatchling emergence difficult or impossible. Sand accumulation of 30.5 cm (12 inches) or more over the predator screen will be removed as the hatching window approaches (USFWS, 2008). Nests will be marked, thus establishing a buffer zone, to protect the nest from human activity. Staff will place a minimum of four informative “Area Closed” signs forming a perimeter around the nest. Rope will be strung between the signs to discourage vehicles and pedestrians from trespassing into the nest site. The nest will be monitored three times per week, as practicable. A photo of a protected nest is shown in Figure 3-10.



Figure 3-10 Sea Turtle Nest Protection

3.3.2.3 Hatching Procedures

The incubation rate for the northern range of the loggerhead sea turtle is estimated at 60 to 90 days from egg deposition, 45 to 95 days for leatherbacks, and 45 to 75 days for greens. One week prior to the predicted hatch window, staff will rake and sweep away tire tracks and debris east of a turtle nest to insure hatchlings will have a clear path to the ocean. NASA will coordinate turning off appropriate building lights and install turtle friendly amber LED lights on nearby buildings. Staff will excavate nests a minimum of 90 days after egg deposition to determine hatching and emergence success. A staff member will dig the nest area by hand. When sand gives way to the nest chamber, the staff member will tally the nest contents such as dead hatchlings, pipped eggs, unhatched eggs, and eggshells. Once recorded, the nest contents will be placed back in the nest and recovered. If live hatchlings are encountered during a nest excavation, follow the Live Hatchling Procedures, below.

3.3.2.4 Live Hatching Procedures

If a mix of live hatchlings and unhatched eggs are encountered during nest excavation, staff will immediately recover the egg chamber with moist sand and return the nest site to its original condition. Staff will wait a minimum of 72 hours before attempting excavation again.

However, if hatchlings are found at the bottom of an excavated nest under eggshells during daylight, staff will release the hatchlings later the same night. Staff will line a sturdy plastic container with moist sand and place the live hatchlings inside. A moist cloth will be attached over the top opening of the container. The container will be placed in a quiet, dark room with the door closed. A staff member will release live hatchlings at their original nest location after dark.

3.4 Seabeach Amaranth

3.4.1 Seabeach Amaranth Description

Seabeach amaranth is an annual plant that grows on sandy beaches along the mid-Atlantic coast of the United States. It is an herbaceous reddish-colored ground cover with highly branched stems that can form clumps reaching up to 30 cm (12 inches) in diameter. The leaves are spinach-green and clustered towards the tips of the stems, with inconspicuous flowers and fruits. Plants germinate from April to July, initially forming a small sprig but soon branch and form a clump which binds sand that accumulates at its base. Larger plants may contain over one hundred stems which branch from the center and attain a diameter of over 1 meter (3.3 feet), although plants are typically 20 to 40 cm (8 to 16 inches) in diameter. Flowering begins in June with seed production in July until senescence in early winter. Plants are monoecious (having male and female flowers on the same plant) (USFWS, 2008). Seabeach amaranth is shown in Figure 3-11.



Figure 3-11 Seabeach Amaranth (scale in inches)

3.4.2 Seabeach Amaranth Monitoring

Monitoring activities within seabeach amaranth habitat on Wallops Island will include plant searches, protection, and surveys. These activities will be completed in conjunction with monitoring the other protected species listed in this plan. One complete seabeach amaranth search will take place annually in August. Monitoring staff will walk a grid search pattern from the primary dune to the intertidal zone. The number of plants found and their locations will be recorded with a GPS unit. If any plants are found, they will be marked with informative “Area Closed” signs around plants. Rope will be strung between the signs to discourage trespassing.

The Wallops Island piping plover area on the North End will be closed from March 16 through August 31, or until the last plover chicks fledge each year. This closure will incorporate potential areas of seabeach amaranth habitat, offering additional protection to any plants found in that area.

3.5 Other Species of Interest

WFF realizes that there are other species of interest that either nest on or occupy Wallops Island for at least some portion of the year. Accordingly, the monitoring surveys will include monitoring for other species besides those on the Federal Endangered Species List. The protected species monitoring team will confer with the USFWS and the VDGIF to determine what other species will be surveyed and to confirm survey methods. At a minimum, the surveys will include:

- Wilson’s Plover (*Charadrius wilsonia*)
- American Oystercatcher (*Haemotopus palliates*)
- Colonial nesting birds such as tern spp.

4.1 MARINE MAMMAL STRANDING MONITORING

In conjunction with monitoring of the other protected species listed in this plan, marine mammal stranding monitoring will occur three times per week, as practicable, from May through September. The marine mammal stranding monitoring is coordinated with the VAQ. Procedures for marine mammal stranding monitoring include surveying for and reporting deceased or living sea turtles, seals, dolphins, porpoises, whales and manatees stranded on Wallops Island.

4.2 Deceased Stranded Marine Mammals

Upon locating a deceased mammal or sea turtle, monitoring staff will take a digital photograph of the animal and record the length and width of its body as well as its GPS coordinates. This information will be emailed to the VAQ at vaqstranding@gmail.com the same work day. Staff will move the deceased animal above the high tide line before the following high tide. The VAQ will schedule an appointment to obtain the stranded mammal. During the scheduled appointment, all VAQ personnel will obtain a temporary escort badge from security and will be escorted at all times while on NASA property. Should the VAQ be unable to schedule an appointment, they may request more information concerning the stranded mammal. After delivering the requested

information to VAQ, the stranded mammal will be spray painted to identify the stranding is case closed. A photo of a deceased stranded mammal is shown in Figure 4-1.



Figure 4-1 Deceased Stranded Leatherback

4.3 Live Stranded Marine Mammals

Should a live stranded marine mammal be encountered, VAQ will be notified at 757-385-7575 (office) or 757-437-6364 (24-hour pager). VAQ will ask for behavior and physical condition information about the stranded mammal. VAQ may or may not schedule an appointment to obtain the live stranded marine mammal depending on the circumstances of the particular stranded individual. Monitoring staff will monitor the live stranded mammal on a daily basis until the marine mammal has voluntarily left Wallops Island, VAQ has obtained it, or it has expired. A live stranded mammal should not be approached to ensure personnel safety. The WFF Security Office will be notified of the location of the live stranded mammal. Digital photographs will be taken and emailed to VAQ at vaqstranding@gmail.com.

5.0 MISSION-SPECIFIC MONITORING

The purpose of mission-specific monitoring is to survey the area adjacent to a planned rocket launch on Wallops Island for a protected species listed in this plan. As soon as safety permits following launches, monitoring staff will conduct surveys for injured, dead, or impaired birds and sea turtles. Post-launch beach surveys will be conducted between March 15 and November 30 of every year to coincide with plover and sea turtle nesting seasons. The survey area will include the beach within 1,000 feet, to the north and south, of the respective launch pad for sounding and orbital-class (ELV) rocket launches. Reports of survey results will be provided to the Service in digital format, at virginiafieldoffice@fws.gov, within 15 business days of each launch event.

6.1 VEHICLE USE DURING MONITORING

Security vehicle monitoring takes place three times daily and protected species vehicle monitoring is 3-5 times a week. Vehicle monitoring routes will be in areas where protected species will not nest, such as the intertidal zone. If a nest occurs near a survey route, a new route will be established to avoid disturbance. In the event that a piping plover or sea turtle nest is discovered on the Recreational Beach, the buffer areas will be marked as discussed earlier. Monitoring staff will inform the Protective Services Division and send notices to all WFF employees, contractors, and tenants warning recreational users not to approach these nests. In addition, beach vehicle users will be given protected species awareness brochures as they enter the Wallops Island security gate.

All special projects that plan on using the beach for a project will consult the Environmental Office for permission and may go through the NASA Facilities Utilization and Review Board (FURB) process before physical arrival on Wallops Island.

6.2 Vehicle Use During Sea Turtle Hatch Window

Pedestrians and vehicles accessing the area must avoid the nest and buffer zone established within the “Area Closed” signs. One week prior to a predicted sea turtle hatch window, monitoring staff will rake and sweep away tire tracks seaward of a turtle nest. The hatchlings will have a path clear of obstacles to the ocean. In the event that the above listed actions adversely affect sea turtle nests, proper adjustments in the program will be made or the actions reduced or discontinued.

7.0 SECURITY AND EMPLOYEE REPORTING

Should staff/employees observe anyone violating the protected areas, protected species, littering; having open fires, pets, or weapons, or accessing other areas that are off-limits due to operations or explosion hazards, they will report the violation by calling security at 757-824-2780 or 757-824-1111.

Protective Services Division personnel conducting patrols in areas where listed species may occur are trained in familiarization with these species. This training program includes basic biological information about all listed species, sufficient to allow personnel to tentatively identify a species and its likely habitat to allow them to incorporate appropriate avoidance and minimization measures into their patrol activities. Protective Services personnel are trained to report any protected species or nests, or anything that has the potential to negatively impact the habitat or species to Joel Mitchell at 757-824-1127 or Shane Whealton at 757-824-1090.

8.0 TRAINING AND CERTIFICATION

Monitoring staff will attend the marine mammal stranding training offered by the VAQ. Each season, new monitoring staff will shadow USFWS personnel as an apprentice, learning each monitoring activity for all protected species listed in this plan. For example, staff will accompany USFWS personnel during each pre-nesting, nesting, nest protection and brood monitoring activity for piping plovers.

All WFF employees are offered a natural resources training module that is available at <https://code200-external.gsfc.nasa.gov/sites/code250-wffe/files/documents/Wallops%20Island%20Protected%20Species%20Training%20Module%20for%20web.ppt>. Signs at the ORV access on Wallops Island will be installed providing protected species information. An annual special announcement will be provided to inform employees of the uses and guidelines of the recreational beach. Additionally, protected species fact sheets will be available at the Wallops Island security gate.

9.1 PREDATOR CONTROL

The USDA provides predator control and wildlife management services for NASA under their USFWS Wildlife Management Plan.

10.0 PLAN REVIEW AND RECORD RETENTION

This monitoring plan will be reviewed annually and revised if applicable. Monitoring activities will be assessed to determine if there are additional management actions to be taken for the listed species in this plan (i.e. alter the extent of the piping plover protection area). This plan and its records will be retained in accordance with NASA Procedural Requirement 1441.1 NASA Records Retention.

11.0 REPORTING AND ANALYSIS

Monitoring staff will compile an annual summary report of the monitoring results and events. The summary report should also include information on changes in habitat and mission impacts. This information is beneficial in aiding the USFWS and NASA in reassessing impacts on the take of protected species. This annual summary report will be sent in digital format by December 31 of each year to:

- Ruth Boettcher, Non-Game Wildlife Diversity Biologist
3801 John Tyler Memorial Highway
Charles City, VA 23030
ruth.boettcher@dgif.virginia.gov 757-787-5911

- USFWS Virginia Field Office
6669 Short Lane
Gloucester, VA 23061
virginiafieldoffice@fws.gov
Phone: 804-824-2413
FAX: 804-693-9032
Attn: Emily Argo

NASA shall report any evidence of previously undocumented listed species located on Wallops Island to the Service at virginiafieldoffice@fws.gov within five business days of observation.

12.0 POINTS OF CONTACT

- CNWR 757-336-6122
- VDGIF Eastern Shore 804-829-6580
- NASA Security 757-824-2222
- WFF USDA 757-824-1254
- USFWS VA Office 804-693-6694
- VAQ 757-385-7575

13.0 REFERENCES

Burger, J., Niles, L. J., Porter, R. R., Dey, A. D., Koch, S., & Gordon, C., 2012, Migration and over-wintering of Red Knots (*Calidris canutus rufa*) along the Atlantic Coast of the United States. *The Condor*, 114(2), 302-313.

Caceres, M. C., & Barclay, R. M. (2000). *Myotis septentrionalis*. Mammalian species, 1-4.

Cohen, J. B., Karpanty, S. M., Fraser, J. D., & Truitt, B. R. (2010). The effect of benthic prey abundance and size on red knot (*Calidris canutus*) distribution at an alternative migratory stopover site on the US Atlantic Coast. *Journal of Ornithology*, 151(2), 355-364.

Faure, P. A., Fullard, J. H., & Dawson, J. W. (1993). The gleaning attacks of the northern long-eared bat, *Myotis septentrionalis*, are relatively inaudible to moths. *Journal of Experimental Biology*, 178(1), 173-189.

Ford, W.M. (2016). Post-WNS survey of bats at NASA Wallops Island Flight Facility. Blacksburg, VA: Virginia Polytechnic Institute and State University, Department of Fisheries and Wildlife Conservation.

Foster, R. W., & Kurta, A. (1999). Roosting ecology of the northern bat (*Myotis septentrionalis*) and comparisons with the endangered Indiana bat (*Myotis sodalis*). *Journal of Mammalogy*, 80(2), 659-672.

Karpanty, S. M., Fraser, J. D., Berkson, J., Niles, L. J., Dey, A., & Smith, E. P., 2006, Horseshoe crab eggs determine red knot distribution in Delaware Bay. *Journal of Wildlife Management*, 70(6), 1704-1710.

Marine Turtle Newsletter (MTN). 2006. Rare Green Sea Turtle Lays Eggs on Virginia Beach. Issue 111. January.

National Marine Fisheries Service (NMFS). 2012. Office of Protected Resources – Sea Turtles. <http://www.nmfs.noaa.gov/pr/species/turtles/> Accessed 16 August.

Niles, L.J., Burger, J., Porter, R.R., Dey, A.D., Koch, S., Harrington, B., Iaquinato, K. and Boarman, M. 2012. Migration pathways, migration speeds and non-breeding areas used by northern hemisphere wintering Red Knots *Calidris canutus* of the subspecies *rufa*. *Wader Study Group Bull.* 119(2): 195–203.

Rabon Jr., D. R., Johnson, S. A., Boettcher, R., Dodd, M., Lyons, M., Murphy, S., and Stewart, K. 2003. Confirmed leatherback turtle (*Dermochelys coriacea*) nests from North Carolina, with a summary of leatherback nesting activities north of Florida. *Marine Turtle Newsletter*, 101, 4-8.

Stantec Consulting. (2008). Summer-fall 2008 passive acoustic monitoring bat survey report, Goddard Space Flight Center, Wallops Flight Facility.

United States Department of Agriculture (USDA), 2003, Wallops Island Piping Plover Plan, Wallops Island, VA.

United States Fish and Wildlife Service (USFWS). 2016a. Wallops Flight Facility Proposed and Ongoing Operations and Shoreline Restoration/Infrastructure Protection Program, Accomack County, VA, Project # 2015-F-3317.

USFWS. 2016b. Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions.

USFWS. 2012. Back Bay National Wildlife Refuge Annual Sea Turtle Program Report.

USFWS. 2010a. Biological Opinion for Expansion of Wallops Flight Facility and Ongoing Operations, Accomack County, VA, Project #2010-F-0105. May.

USFWS. 2010b. Programmatic Biological Opinion on the Wallops Flight Facility Shoreline Restoration and Infrastructure Protection Program. 30 July.

USFWS. 2008. Sea Turtle Biological Opinion-Draft, Assateague, VA., August.

USFWS. 2008. 2008 Piping Plover Biological Opinion, Assateague, VA., April.

USFWS, 2008. 2008 Seabeach Amaranth Biological Opinion, Assateague, VA., April.

USFWS, 2007. Virginia Red Knot Resighting Protocol, Assateague, VA., April.

Appendix A

Monitoring Field Forms