BIOLOGICAL ASSESSMENT

WALLOPS FLIGHT FACILITY SHORELINE RESTORATION AND INFRASTRUCTURE PROTECTION PROGRAM

Prepared for

National Aeronautics and Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337

In cooperation with

U.S. Department of the Interior, Minerals Management Service and
U.S. Army Corps of Engineers

February 2010

Prepared by

URS Group, Inc.
200 Orchard Ridge Drive, Suite 101
Gaithersburg, MD 20878
15301785

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ACS	American Cetacean Society
BA	Biological Assessment
BO	Biological Opinion
ºC	degrees Celsius
CFR	Code of Federal Regulations
dB	decibel
DTRU	Dry Tortugas Recovery Unit
EIS	Environmental Impact Statement
ESA	Endangered Species Act
GSFC	Goddard Space Flight Center
GCRU	Greater Caribbean Recovery Unit
Hz	hertz
kHz	kilohertz
MALSF	Marine Aggregate Levy Sustainability Fund
MARS	Mid-Atlantic Regional Spaceport
MMS	Minerals Management Service
msl	mean sea level
NASA	National Aeronautics and Space Administration
NGMRU	Northern Gulf of Mexico Recovery Unit
NMFS	National Marine Fisheries Service
NPS	National Park Service
OCS	Outer Continental Shelf
PFRU	Peninsular Florida Recovery Unit
SAV	Submerged Aquatic Vegetation
SRIPP	Shoreline Restoration and Infrastructure Protection Program
TED	Turtle Exclusion Device
UAS	Unmanned Aerial Systems
UAV	Unmanned Aerial Vehicle
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WFF	Wallops Flight Facility

SECTION ONE: INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

Section 7(c) of the Endangered Species Act (ESA) of 1973 requires that a Biological Assessment (BA) be prepared for all Federal actions that may affect federally listed endangered or threatened species. The Federal action considered in this BA is the funding, authorization, and implementation of the Shoreline Restoration and Infrastructure Protection Program (SRIPP) at the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center's (GSFC) Wallops Flight Facility (WFF) on Wallops Island, Virginia.

The U.S. Army Corps of Engineers (USACE), Norfolk District, and the U.S. Department of the Interior, Minerals Management Service (MMS) are assisting NASA in preparing this BA. The USACE will design the SRIPP and serve in a construction management capacity during project implementation. The USACE also has permitting authority for the project under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. MMS has jurisdiction over mineral resources on the Federal Outer Continental Shelf (OCS). Public Law 103-426, enacted October 31, 1994, gave MMS the authority to convey, on a noncompetitive basis, the rights to OCS sand, gravel, or shell resources for shore protection, beach or wetlands restoration projects, or for use in construction projects funded in whole or part or authorized by the Federal government. MMS would issue a negotiated agreement with NASA to authorize the dredging of sand from the OCS for the SRIPP.

In cooperation with MMS and the USACE, NASA has prepared this BA to consider the potential impacts to listed species under the jurisdiction of the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) that may occur within the proposed Action Area. Generally, the USFWS manages land and freshwater species, while NMFS manages marine and anadromous fish species. Anadromous species are fish, such as the shortnose sturgeon, that live their adult lives in the ocean but move into freshwater streams to reproduce or spawn. The USFWS and NMFS have joint jurisdiction of sea turtle species.

The Action Area is comprised of onshore and offshore components. The onshore Action Area (land) is located in Accomack County, Virginia. Federally listed species that may occur within the vicinity of the onshore and offshore Action Area are listed below in Table 1.

Table 1: Protected Species That May Occur in the Action Area

Common Name	Scientific Name	Likelihood of Occurrence Within Onshore Action Area[2]	Likelihood of Occurrence Within Offshore Action Area[2]	Expected Seasonal Presence	Federal Status	Jurisdiction
Seabeach amaranth	*Amaranthus pumilus*	possible	n/a	All	Threatened	USFWS
Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*	highly unlikely	n/a	n/a	Threatened	USFWS
Delmarva Peninsula fox squirrel	*Sciurus niger cinereus*	highly unlikely	n/a	n/a	Endangered	USFWS
Red knot[1]	*Calidris canutus rufa*	known to occur	n/a	Spring/Fall Migration	Candidate [1]	USFWS
Piping plover	*Charadrius melodus*	known to occur	n/a	All	Threatened	USFWS
Shortnose sturgeon	*Acipenser brevirostrum*	n/a	highly unlikely	n/a	Endangered	NMFS
Humpback whale	*Megaptera novaeangliae*	n/a	possible	All	Endangered	NMFS
Fin whale	*Balaeanoptera physalus*	n/a	possible	Spring/Summer	Endangered	NMFS
Right whale	*Eubalaena glacialis*	n/a	possible	Fall/Winter	Endangered	NMFS
Sei whale	*Balaenoptera borealis*	n/a	highly unlikely	n/a	Endangered	NMFS
Leatherback sea turtle	*Dermochelys coriacea*	possible	possible	Summer	Endangered	NMFS/ USFWS
Hawksbill sea turtle	*Eretmochelys imbricate*	highly unlikely	highly unlikely	n/a	Endangered	NMFS/ USFWS
Kemp's ridley sea turtle	*Lepidochelys kempi*	possible	possible	Spring/Summer	Endangered	NMFS/ USFWS
Loggerhead sea turtle	*Caretta caretta*	likely	likely	Spring/Summer	Threatened	NMFS/ USFWS
Atlantic green sea turtle	*Chelonia mydas*	possible	possible	Summer	Threatened	NMFS/ USFWS

[1]Although candidate species are not protected under the ESA, NASA was requested by the USFWS to include the Red Knot.
[2]n/a = not applicable; Highly unlikely = habitat not available and species is not documented in the Action Area; Possible = habitat available but species is rarely, if ever, documented in the Action Area; Likely =habitat available and species is occasionally documented in the Action Area; Known to occur = habitat available and species regularly documented in the Action Area.
Sources: USFWS, 2000; USFWS, 2009; NASA, 2007; NASA, 2009

As shown in Table 1, several species are highly unlikely to occur in the Action Area. The northeastern beach tiger beetle has a historic range from New Jersey to Cape Cod and along much of the eastern and western shorelines of the Chesapeake Bay from southern Maryland to Virginia. Although the northeastern beach tiger beetle was present historically on the Atlantic coast beaches, especially in the northeast, it is extirpated from nearly this entire region. It has not been documented within the Action Area, but is found on Chesapeake Bay beaches (Fenster et al., 2006; Dean, 2009).

The Delmarva Peninsula fox squirrel lives in mature forests of mixed hardwoods and pines with a closed canopy and open understory on the Delmarva Peninsula and does not inhabit the beaches which comprise the onshore Action Area. The shortnose sturgeon does not often occur within the offshore Action Area or within the waters of adjacent wildlife refuges. Because it is unlikely or highly unlikely that these species occur in the Action Area, they will be excluded from further discussion in this BA.

During previous consultation with the NMFS in 2007 regarding the SRIPP, NMFS issued a Biological Opinion (BO) that excluded sperm whales, sei whales, blue whales, and hawksbill sea turtles from further consideration due to the very low probability that any of these species would be present within the Action Area and/or affected by the Proposed Action. Because no protected populations of these species exist within the Action Area, and because it is unlikely or highly unlikely that these species occur in the Action Area, they will be excluded from further discussion in this BA.

1.2 ENDANGERED SPECIES ACT

This BA is a component of the formal consultation process provided under Section 7 of the ESA. More detailed procedures for this formal consultation process are defined in 50 CFR 402.14(c). Early consultation is conducted when the action agency is planning a project or program that may affect protected species; however, not every project detail may be known. During previous consultations for the SRIPP, the specific borrow area(s) off the coast of Wallops Island had not been identified. However, NASA completed early consultation for potential dredging within a broad area of State waters east of Wallops Island for the SRIPP by submitting a BA in May 2007. NASA received a BO from NMFS on September 25, 2007.

In a letter to USFWS dated March 1, 2007, NASA transmitted a BA addressing potential impacts of the SRIPP on the Piping Plover. In a letter dated April 24, 2007, USFWS stated that the Proposed Project would not adversely affect threatened or endangered species under their jurisdiction.

With the preparation of this BA, NASA, in conjunction with MMS and USACE, is continuing the Section 7 consultation process by submitting additional project information to NMFS and USFWS. Once NMFS and USFWS issue a BO, NASA will finalize the consultation process by obtaining any required incidental take permits from NMFS and USFWS.

Binding clauses may be built into a BO resulting from this BA requiring NASA to consult again for future dredging activities; however, this document, the March 2007 BA and the September 2007 BO lay the groundwork for the consultation process and allow all three agencies to efficiently finalize future consultations for this project. It is anticipated that the dredging would continue at varying degrees of intensity for the next 50 years, with renourishment cycles approximately every 5 years.

In addition to Section 7 consultation, NASA is preparing a Programmatic Environmental Impact Statement (PEIS) to assess the impacts from the SRIPP on the human environment.

1.3 LOCATION AND NEED FOR PROPOSED ACTION

WFF facilities and those of its tenants are located on the Eastern Shore of Virginia facing the Atlantic Ocean. WFF is comprised of three distinct land masses: the Main Base, the Mainland, and Wallops Island. SRIPP activities would be limited to Wallops Island. Wallops Island is a barrier island bounded by Chincoteague Inlet to the north and Assawoman Inlet (now closed) to the south (Figure 1). WFF has been occupied by NASA since the 1940s. During this time WFF has experienced erosion along the coast. The ocean has encroached substantially toward launch pads, infrastructure, and test and training facilities belonging to NASA, the U.S. Navy, and the Mid-Atlantic Regional Spaceport (MARS). These assets are valued at over $1 billion and are increasingly at risk from storm waves. The potential risks to infrastructure from wave impacts are two-fold: first is the interruption of NASA, U.S. Navy, and MARS missions supported from Wallops Island facilities due to temporary loss of facility functions; and second is the potential for complete loss of these unique facilities. If no protective measures are taken, then the assets on Wallops Island will be increasingly at risk from even moderate storm events.

The purpose of the proposed project is to reduce the potential for storm damage to facilities by restoring the beach with sand dredged from offshore in order to move the zone of wave breaking well away from the infrastructure. The project would not protect against flooding or other impacts during major hurricanes and nor'easters.

Shoreline retreat on Wallops Island has averaged about 3.7 meters (12 feet) per year since 1857. The first attempt to reduce erosion occurred in 1961 with the construction of a wooden seawall. As erosion continued and the seawall deteriorated, stone rubble-mound rocks were used as a replacement for the wooden seawall. The current stone seawall, completed in 1999, temporarily fixed the shoreline in place. However, because the seawall is porous, it has allowed sediment to flow out of the area, without allowing replenishment. The integrity of the seawall is at risk due to the lack of protective beach sand, which results in waves breaking directly on the rocks. The seawall extends approximately 4,600 m (15,100 ft) along the shoreline. Currently, beach only exists seaward of the northern portion of the seawall. There is no beach along approximately 4,250 m (14,000 ft) of the seawall. The current shoreline is at an elevation of 2.1 meters (6.9 feet) above mean sea level (msl).

The proposed project would involve the use of one or two borrow sites located in Federal waters to provide fill for the initial and future nourishment of the beach. Initially, sand would be obtained from one of two offshore shoals: Unnamed Shoal A. Future renourishment material would be dredged from Unnamed Shoal A, Unnamed Shoal B, or the northern portion of Wallops Island which is experiencing accretion. The southwest end of Unnamed Shoal A is located approximately 11 kilometers (7 miles) east of Assateague Island and approximately 18 kilometers (11 miles) from the north tip of Wallops Island. The southwest end of Unnamed Shoal B is located approximately 19 kilometers (12 miles) east of Assateague Island and approximately 26 kilometers (16 miles) from the north tip of Wallops Island (Figure 1).

1.4 ACTION AREA

The Action Area is defined in 50 Code of Federal Regulations (CFR) 402.02 as “All areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” The Action Area for this BA includes the following:

- The northern portion of Wallops Island
- The portion of Wallops Island shoreline that will be affected by the extended seawall and the beach fill
- The area affected by the nearshore pump-out or booster station
- Offshore borrow sites
- The waters between and immediately adjacent to the above areas, where project vessels will transit and dredged material will be transported
- 1,219 meters (4,000 feet) in all directions from the area to be dredged to account for the sediment plume generated during dredging activities.

Figure 2 shows the Action Area for the SRIPP.

1.4.1 Wallops Island

WFF is located in the northeastern portion of Accomack County, Virginia, on the Delmarva Peninsula, and is comprised of the Main Base, Wallops Mainland, and Wallops Island. Wallops Island is a barrier island approximately 11 kilometers (7 miles) long and 800 meters (2,650 feet) wide. It is bordered by Chincoteague Inlet to the north, Assawoman Inlet to the south, the Atlantic Ocean to the east, and marshland to the west. The mainland area to the west is comprised mainly of rural farmland. South of Wallops Island are Assawoman Inlet (now closed) and Assawoman Island, a 576-hectare (1,424-acre) island managed as part of the Chincoteague National Wildlife Refuge by the USFWS. A string of undeveloped barrier islands extends further south, down the coast to the mouth of Chesapeake Bay. Southern Wallops Island includes the permitted open burn area, the launch complexes, and the Unmanned Aerial Systems (UAS) runway and associated structures. Northern Wallops Island includes rocket storage facilities and the Navy’s AEGIS and Ship Self Defense System Facilities.

As noted above, the existing seawall on Wallops Island is approximately 4,600 meters (15,100 feet) in length. Without an existing beach currently in front of it, the seawall is the primary shoreline protection feature for Wallops Island and consists of large stone and riprap piled to a height of approximately 4.6 meters (15 feet) (Figure 3). Sand in front of the seawall has eroded and five sections of the seawall are currently in need of repair.

Development is relatively sparse along the Atlantic Ocean coastline on the Eastern Shore of Virginia because most of the barrier islands in this region are protected by either Federal agencies (USFWS, National Park Service [NPS]) or conservation organizations (e.g., The Nature Conservancy). Chincoteague Inlet and Chincoteague Island are located to the north of Wallops Island. The currently closed Assawoman Inlet defines the southern end of Wallops Island.

1.4.2 Atlantic Ocean Offshore Areas

Nearshore state jurisdictional waters extend 5.5 kilometers (3 nautical miles) offshore of the Wallops Island coast. Water depth in state waters ranges up to approximately 12 meters (40 feet). This zone is located on the inner portion of the outer continental shelf and extends to about 130 to 160 kilometers (80 to 100 miles) off the mid-Atlantic Coast.

Borrow area depths range from approximately 6 to 21 meters (20 to 70 feet). In May and June of 2007, core samples were collected by the USACE to evaluate the sediment grain size in areas offshore of Wallops Island and identify suitable sand types. These samples showed that the nearshore ocean substrate consists of deposits of fine sand and shell. Sediment texture varies from gravel patches and a fine sand mixture inshore, to medium sand offshore. The sediments in the Action Area are typical of the nearshore and inner continental shelf in this region, consisting of fine quartz sand with a patchy veneer of shells.

Numerous invertebrate species are present in the unconsolidated substrate and open waters of the nearshore zone. Common species include annelid worms, bivalves, crabs, sand dollars, gastropods, comb jellies, and jellyfish. Many of these organisms are an important food source for fish, birds, and sea turtles.

The project area contains a broad diversity of fish species. The MAB contains over 300 species of fish, most of which are seasonal migrants with only a few species considered endemic to the area (Sherman et al., 1996). The diversity results from the MAB being an area of transition from cold water in the north and warmer waters to the south. Boreal (northern) species are present in the winter and warm-temperate/sub-tropical species are present in the summer (Musick et al., 1986). Many of the species migrate from nearshore to areas offshore or southward seasonally, as dictated by temperature cycles, feeding opportunities, and spawning cycles (MMS, 1999). Generally, fish abundance is low in the winter with a progressive influx in the spring and peak abundances in the fall. In addition, diversity is highest in September and lowest in late winter (February/March) (MMS, 1999).

SECTION TWO: PROPOSED ACTION

The objective of the SRIPP is to reduce physical damage to Wallops Island infrastructure incurred during normal coastal storms and nor'easters by moving the zone of breaking waves away from vulnerable infrastructure.

The Proposed Action would involve an initial construction phase with follow-on renourishment cycles. The initial phase would include two distinct elements:

1. Extending Wallops Island's existing rock seawall a maximum of 1,400 meters (4,600 feet) south of its southernmost point; and
2. Placing sand dredged from Unnamed Shoal A, located offshore in Federal waters, on the Wallops Island shoreline in front of the seawall.

2.1 SEAWALL EXTENSION

The rock seawall extension would be implemented first and would consist of the placement of 1,400 meters (4,600 feet) of 4.5 to 6.4 metric tons (5 to 7 tons) of rocks parallel to the shoreline. The seawall extension would be placed in line with and adjacent to the end of the existing seawall and would be installed in a straight line parallel to the shoreline. It would be placed in the beach (some rock slightly below the beach surface, the majority of rock sitting on top of the beach surface), and would be approximately 5 meters (14 feet) above the normal high tide water level, depending on the extent of existing shoreline retreat at the time of construction.

2.2 BORROW SITES

In 2007 and 2008, the USACE conducted sediment sampling to identify potential offshore borrow sites with compatible grain size and adequate volume for use as beach fill. Three offshore shoals in Federal waters, referred to as Unnamed Shoals A and B, and Blackfish Bank Shoal were identified as potential borrow sites. The evaluation of the sediment grain size and bathymetry, conducted by the USACE, indicate that Shoals A and B would provide adequate sand volumes and appropriately sized sediment (grain size greater than 0.20 mm for nourishment of the beach throughout the SRIPP's 50-year design life. Blackfish Bank Shoal, initially identified as a potential sand source, has since been eliminated as a potential borrow site for the SRIPP due to: (1) concerns expressed during the scoping process over potential impacts to commercial and recreational fishing; and (2) potential adverse impacts to Assateague Island due to increased wave energy resulting from lowering of the shoal.

North Wallops Island

The north Wallops Island borrow site is a beach area where sand has accreted as a result of regional longshore sediment transport. Due to concerns regarding potential species habitat, the total potential area estimated for sand removal is approximately 60 hectares (150 acres).

Offshore Shoals

The southwest end of Unnamed Shoal A is located approximately 11 kilometers (7 miles) east of Assateague Island and approximately 18 kilometers (11 miles) northeast of the north tip of

Wallops Island. The total predicted volume of Unnamed Shoal A is approximately 31 million cubic meters (40 million cubic yards). This shoal covers an area of approximately 700 hectares (1,800 acres).

The southwest end of Unnamed Shoal B is located approximately 19 kilometers (12 miles) east of Assateague Island and approximately 26 kilometers (16 miles) northeast of the north tip of Wallops Island. The total predicted volume of Unnamed Shoal B is approximately 57 million cubic meters (70 million cubic yards). This shoal covers an area of approximately 1,600 hectares (3,900 acres).

2.3 INITIAL BEACH NOURISHMENT

Under the Proposed Action, 2.4 million cubic meters (3.2 million cubic yards) of sand would be placed seaward of the seawall along 6.8 kilometers (4.2 miles) of shoreline during the initial nourishment. The beach fill would extend 21 meters (70 feet) from the present shoreline in a 1.8-meter-high (6-foot-high) berm, and then would slope underwater for an additional 52 meters (170 feet) seaward; the total distance of the fill profile from the current shoreline would be 73 meters (240 feet). During storm events, the new beach would provide a surface to dissipate wave energy and provide additional sediment in the nearshore system.

Sand for both the initial beach nourishment and all renourishment cycles would be dredged from within an approximately 520-hectare (1,280-acre) area of offshore Unnamed Shoal A.

2.4 RENOURISHMENT EVENTS

Under the Proposed Action, subsequent beach re-nourishment cycles would vary throughout the expected 50-year life of the SRIPP as determined by the proposed monitoring program. The exact locations and magnitude of renourishment cycles may fluctuate due to the frequency and severity of storm activity and subsequent shoreline erosion. Each renourishment cycle would require approximately 616,000 cubic meters (806,000 cubic yards) of sand be placed on the beach approximately every 5 years. The length of a beach fill is a key parameter in determining how long the fill will last. A “full” beach fill loses much less of a percentage of its volume in a given time interval than a shorter, or “reduced” fill (USACE, 2006). At Wallops Island, a rectangle-shaped fill’s half-life (the time it would take for the fill to lose 50 percent of its volume) is estimated to be 8.7 years for the full 6.8 kilometers (4.2 miles) of fill. The topography and bathymetry of the beach would be monitored on a regular basis to determine sand movement patterns and to plan when renourishment is needed.

Renourishment fill volumes could be borrowed from Unnamed Shoal A, Unnamed Shoal B, or a combination of one of these two shoals and the north Wallops Island borrow site. It is anticipated that approximately half of the fill volume for each renourishment cycle could be provided by the north Wallops Island borrow site.

2.5 SAND REMOVAL METHODS

2.5.1 North Wallops Island

Excavation depth for sand removal in the north Wallops Island proposed borrow site area would be limited to approximately 1 meter (3.5 feet) below the ground surface due to tidal fluctuations and the high permeability of the soil (USACE, 2009b). Based on target depth of sediment removal, the area to be excavated would vary. For example, excavating to a depth of 1 meter (3.5 feet) would require a 28.3-hectare (70-acre) area to provide a renourishment volume of 308,000 cubic meters (403,000 cubic yards).

Sand from north Wallops Island would be removed from land using a pan excavator. Because this excavator runs on several rubber tires with a low tire pressure, it can work in areas of the beach where typical equipment may be bogged down in unstable sand. The pan excavators would stockpile the sand, which would be loaded onto dump trucks that would transport the fill material up and down the beach. Bulldozers would then be used to spread the fill material once it is placed on the beach. All heavy equipment would access the beach from existing roads and established access points. No new temporary or permanent roads would be constructed to access the beach or to transport the fill material to renourishment areas.

2.5.2 Offshore Dredging Operations

Offshore dredging would be accomplished using a trailer suction hopper dredge (equipped with a turtle deflector), which is a ship capable of dredging material, storing it onboard, transporting it to the placement area, and pumping it on-shore. The hopper dredge fills its hoppers by employing large pumps to create suction in pipes that are lowered into the water to remove sediment from the shoal bottom (the process very closely resembles that of a typical vacuum cleaner). The hopper dredges likely to be used typically remove material from the bottom of the sea floor in layers up to 0.3 meter (1 foot) in depth (Williams, personal comm.).

Once the dredge hopper is filled, the dredge would transport the material to a pump-out buoy or station which would be anchored just offshore of the placement area. The distance from Unnamed Shoal A to a theoretical average location for a pump-out buoy placed at a water depth of 9 meters (30 feet), which is reached approximately 1,830 meters (6,000 feet) offshore, is 26 kilometers (16 miles). The corresponding transit distance from Unnamed Shoal B and the theoretical pump-out buoy is 34 kilometers (21 miles).

The dredge would then mix the sand with water to form a slurry, and pump the slurry from its discharge manifold through a submerged or floating pipeline. Discharge at the beach would occur at a fixed point in tandem with contouring of the deposited sand by bulldozers. Based on previous offshore dredging operations along the east coast, it is assumed that dredgers with a hopper capacity of approximately 3,000 cubic meters (4,000 cubic yards) would be used; however, because this volume is a slurry and not all sand, it is assumed that the actual volume of sand that each dredge would transport during each trip would be approximately 2,300 cubic meters (3,000 cubic yards).

Because of overflow from the hopper dredge at the offshore borrow site(s) during dredging, and losses during pump-out and placement, a larger volume of material would need to be dredged to meet the targeted fill volume. Based on information from other shoreline restoration projects, sediment losses during dredging and placement operations may be up to 25 percent. Dredge volumes for the offshore borrow sites are shown below in Table 2.

Table 2: Maximum Sand Removal Volumes

Nourishment Event	Possible Sources of Fill[1]	Volume of Sand Removed cubic meters (cubic yards)
Initial Nourishment	Shoal A	3,057,500 (3,998,750)
Single Renourishment Event	Shoal A or Shoal B	770,000 (1,007,500)
	North Wallops Island	308,000 (403,000)
Project Lifetime	Shoal A	9,990,000 (13,066,250)
	Shoal B	6,933,000 (9,067,500)
	North Wallops Island	2,773,000 (3,627,000)

[1]The north Wallops Island Borrow Site could provide up to about half of the renourishment fill per cycle.

Source: USACE, 2009

2.6 SAND PLACEMENT

Once the dredge hopper is filled, the dredge would transport the material to a pump-out buoy or station that would be anchored just offshore of the placement area. The distance from Unnamed Shoal A to a theoretical average location for a pump-out buoy placed at a water depth of 9 meters (30 feet), which is reached approximately 1,830 meters (6,000 feet) offshore, is 26 kilometers (16 miles). The corresponding transit distance from Unnamed Shoal B and the theoretical pump-out buoy is 34 kilometers (21 miles).

Once the dredge arrives at the pump-out buoy, it would connect to the discharge pipeline on the buoy. The dredge would then mix the dredged sand with water to form a slurry, and pump the slurry from its discharge manifold through a submerged or floating pipeline. Discharge at the beach would occur at a fixed point in tandem with contouring of the deposited sand by bulldozers.

All heavy equipment would access the beach from existing roads and established access points. No new temporary or permanent roads would be constructed to access the beach or to transport the fill material to renourishment areas.

SECTION THREE: AFFECTED SPECIES

3.1 SPECIES POTENTIALLY AFFECTED BY PROPOSED ACTION

The primary concern of this BA is whether impacts associated with the Proposed Action will "jeopardize" the continued existence of protected species that may exist in the Action Area. The Endangered Species Act (50 CFR 402.02) defines "jeopardize" as "engaging in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the listed species in the wild by reducing the reproduction, numbers, or distribution of that species."

Table 3 below includes federally listed species identified as potentially affected by the Proposed Action by NMFS, USFWS, or other agencies during previous and ongoing discussions and consultations regarding the SRIPP. These include those species whose probability of occurring in the Action Area is likely and possible. No critical habitat for any species, as defined by the ESA, has been designated within the Action Area; therefore, no critical habitat would be affected by the Proposed Action (NMFS, 2007). The projected timeline for this project in its entirety is 50 years.

Table 3: Potentially Affected Protected Species

Common Name	Scientific Name	Federal Status	Expected Seasonal Presence
Seabeach amaranth	*Amaranthus pumilus*	Threatened	All year
Red knot	*Calidris canutus rufa*	Candidate[1]	May - June
Piping plover	*Charadrius melodus*	Threatened	All year
Humpback whale	*Megaptera novaeangliae*	Endangered	September - April
Fin whale	*Balaenoptera physalus*	Endangered	October - January
Right whale	*Eubalaena glacialis*	Endangered	November - May
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	April - November
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	April - November
Loggerhead sea turtle	*Caretta caretta*	Threatened	April - November
Atlantic green sea turtle	*Chelonia mydas*	Threatened	April - November

[1]Although candidate species are not protected under the ESA, NASA was requested by the USFWS to include the Red Knot.

3.2 SEABEACH AMARANTH

3.2.1 Description

Seabeach amaranth (*Amaranthus pumilus*) is an annual plant that grows on sandy beaches along the mid-Atlantic coast of the United States. It is an herbaceous reddish-colored, prostrate, highly branched stems that form clumps, often reaching 30 centimeters (12 inches) in diameter (NatureServe, 2009). Leaves are spinach-green and clustered toward the tips of the stems. Flowers and fruits are inconspicuous. 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 100 stems which branch from the center and attain a diameter of over a meter, although plants are typically 20 to 40 centimeters (8 to 16 inches) in diameter. Flowering begins in June with seed production in July and until senescence in early winter. Plants are monoecious (having male and female flowers on the same plant).

3.2.2 Distribution

Seabeach amaranth habitat includes barrier islands, mainly on coastal overwash flats at the accreting ends of the islands and lower foredunes and on ocean beaches above mean high tide (occasionally on sound-side beaches). It is intolerant of competition and does not occur on well-vegetated sites. According to Weakley and Bucher (1991), this species appears to need extensive, dynamic, natural areas of barrier island beaches and inlets. Within this dynamic landscape, seabeach amaranth functions as a fugitive species, occupying suitable habitat as it becomes available. Seeds may survive many years buried in the sand and then germinate when brought near the surface by severe storms

3.2.3 Potential Direct and Indirect Effects of the Proposed Action

There have been no recorded occurrences of seabeach amaranth on Wallops Island to date, and no designated protected populations exist in the SRIPP Action Area. However, there is potential habitat on the north end of Wallops Island within the Action Area. As a precautionary measure, NASA has determined that the Proposed Action may affect, but is not likely to adversely affect the seabeach amaranth.

3.2.4 Actions to Reduce Adverse Effects

Since seabeach amaranth does occasionally establish small temporary populations in areas of potential habitat, the potential habitat areas on the north end of the island would be surveyed immediately prior to beach placement activities and prior to excavation in connection with renourishment activities to ensure that the species is not present. In the event that the seabeach amaranth is encountered during project activities, NASA will work with the USFWS to ensure appropriate measures are taken to protect the species and its habitat.

3.3 RED KNOT

3.3.1 Description

The Red Knot is a medium sized, bulky sandpiper. It is a relatively short bird, with short legs. The head and breast are rusty in breeding plumage and grey the rest of the year. Outside of the breeding season, it is found primarily in intertidal, marine habitats, especially near coastal inlets, estuaries, and bays. The Red Knot breeds in drier tundra areas, such as sparsely vegetated hillsides. The Red Knot typically feeds on invertebrates, especially bivalves, small snails, and crustaceans. During the breeding season, the Red Knot also eats terrestrial invertebrates (Harrington, 2001). The species is currently a candidate for Federal listing under the ESA.

3.3.2 Life History and Distribution

The Delaware Bay stopover is the final and spring stopover during the northern migration, because the birds feed on the eggs of spawning horseshoe crabs in preparation for their nonstop flight from there to the Arctic. The birds rest and feed in the Delaware Bay between late April and early June with the population peaking May 15th through 30th (Baker et al., 2004). A study by Cohen et al (2009) reports that the Red Knot population in the Mid-Atlantic Region of the US has declined by 67-88 percent since the 1980's. The population decline has been linked to a decline in horseshoe crabs in the Delaware Bay area

During its northern migration, the Virginia barrier islands provide an important stopover area for a large number of red knots. In the mid-1990s, 3 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 reach 8,000 to 10,000 individuals (Watts and Truitt, 2000). During the 2009 migration season, flock sizes of 100 to 145 birds were observed in the Overwash and Hook areas of Assateague Island. In late May 2009, flocks of 5 to 30 individuals were observed on south Assawoman Island. On May 8, 2009, USFWS observed a flock size of almost 1,300 individuals on north Wallops Island (USWS, 2009c). In late May 2009, flocks of approximately 20 to 200 red knots were observed on north Wallops Island (USFWS, 2009c).

3.3.3 Potential Direct and Indirect Effects of the Proposed Action

Temporary noise disturbances from the construction machinery used for seawall extension, movement of beach sand, excavation of the north Wallops Island borrow site, and the dredges could potentially cause adverse effects to these birds; however, these noise levels would be similar to existing noise from daily operations, including occasional flights and rocket launches on Wallops Island. Birds which are startled by construction and dredge noise are likely to temporarily vacate the immediate area, which could disrupt foraging activities. Due to the temporary nature of the noise disturbances, impacts on shore birds like the Red Knot are considered minimal (NASA, 1997). The continued presence of Red Knots at WFF suggests that noise levels from daily operations and construction over the past few decades have not significantly disturbed birds on the island.

Another potential adverse impact on the Red Knot is the disturbance of beach habitat during the placement of sand on Wallops Island shoreline, which may temporarily disturb feeding activities. During beach nourishment, the large amount of sand placed on the beach is anticipated to smother some Red Knot prey species such as crabs and worms, which inhabit the surface layer of sand. However, studies by Nelson (1985, 1993) and Hackney et al., (1996) report an infaunal recovery time ranging from 2 to 7 months following beach nourishment. Therefore, no long-term adverse affects to Red Knot foraging capabilities are anticipated; in fact, the expansion of the beach may lead to additional suitable habitat for many shorebirds, including the Red Knot.

3.3.4 Actions to Reduce Adverse Effects

During the times when the Red Knot may be present, a qualified biologist would conduct surveys and monitor the project area to ensure no birds are directly affected during construction activities.

3.4 PIPING PLOVER

3.4.1 Description

Piping Plovers are small, beige and white shorebirds with a black band across their breast and forehead. Plovers typically feed on invertebrates such as marine worms, fly larvae, beetles, crustaceans, and mollusks. Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines, and shorelines of coastal ponds, lagoons, or salt marshes (USFWS, 2000b). The Atlantic Coast Piping Plover population was listed as threatened on January 10, 1986.

3.4.2 Life History and Distribution

The Piping Plover breeds on coastal beaches from Newfoundland and southeastern Quebec to North Carolina and winter primarily on the Atlantic Coast from North Carolina to Florida, although some migrate to the Bahamas and West Indies.

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, sandflats at the ends of sand spits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, and washover 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, shells 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, Piping Plovers will nest under stands of American beachgrass (*Ammophila breviligulata*) or other vegetation (USFWS, 2000b) and typically lay four eggs that hatch in about 25 days (USFWS, 2007).

WFF has been monitoring the Piping Plover on Wallops Island since 1986. Piping Plover nesting habitat has been delineated on Wallops Island dune and overwash areas at the northern and southern reaches of the property. As southern Wallops Island has experienced substantial erosion (3.3 meters [11 feet]/year), suitable habitat is shrinking. According to Mitchell (2009, pers. comm.), no nesting plovers have been observed on south Wallops Island since at least 2000. Simultaneously, north Wallops Island has been accreting, thus presenting additional potential habitat for plover nesting.

Annually between 1996 and 2008, Piping Plovers were observed feeding, although exact numbers were not recorded. Five nesting attempts were made on north Wallops Island during 2007 and 2008, but none were successful in producing fledglings. During 2006, one pair of plovers nested but the nest was abandoned due to attempted predation by a fox. Nests were also observed in 2005 (2 pairs, 1 nest lost to fox predation and second pair of chicks were lost); 2004 (1 pair with 3 chicks fledged); 2001 (1 pair unsuccessful); 1998 (1 pair unsuccessful); 1996 (3 pairs with 2 chicks total fledged). There were no nests observed in 2003, 2002, 2000, 1999, and 1997 (Table 4).

In 2009, four Piping Plover pairs attempted nests on north Wallops Island. Of these, three have been successful, producing a total of at least seven fledglings (Scharle, 2009).

Table 4: Record of Piping Plover Pairs and Number of Young Fledged at WFF

Year	# Pairs	# Young Fledged	Comments
1986	2	0	All at south end of Island
1987	2	3	1.5 young fledged/pair; All at south end
1988	0	0	No nesting
1989	5	Unknown	All at south end
1990	5	Unknown	All at south end
1991	3	Unknown	All at south end
1992	4	5	1.25 young fledged/pair; All at south end
1993	3	4	1.33 young fledged/pair; All at south end
1994	3	2	0.67 young fledged/pair; All at south end
1995	2	4	2.00 young fledged/pair; All at south end of Island
1996	3	2	0.67 young fledge/pair; 1 pair, 0 fledged at south end
1997	0	0	No nesting
1998	1	0	
1999	0	0	No nesting
2000	0	0	No nesting
2001	1	0	
2002	0	0	No nesting
2003	1	0	A pair of plovers scraped, but made no other attempts at nesting
2004	1	3	3.00 young fledged/pair
2005	2	0	One nest was predated (fox), the other nest hatched but the chicks were later lost
2006	1	0	Nest was set up with enclosure; a fox tried digging under enclosure to get nest but did not succeed. The nest however was abandoned due to this event.
2007	3	0	All nests were enclosed. One nest was predated by a fox, one nest lost to tide
2008	2	0	2 pairs of plovers scraped at north end, but made no other attempts at nesting
2009	4	7	3 pairs successfully produced fledglings, all on the north end.

NASA, 2008

3.4.3 Potential Direct and Indirect Effects of the Proposed Action

The Piping Plover occasionally breeds, nests, and forages along the shoreline of Wallops Island. Temporary noise disturbances from the construction machinery used for seawall extension, movement of beach sand, excavation of the north Wallops Island borrow site, and the dredges could potentially cause adverse effects to these birds; however, these noise levels would be similar to existing noise from daily operations, including occasional flights and rocket launches on Wallops Island. Birds which are startled by construction and dredge noise are likely to temporarily vacate the immediate area, which could disrupt foraging and nesting activities. Due to the short duration of the noise disturbances, impacts on the Piping Plover are considered minimal (NASA, 1997). The continued presence of Piping Plovers at WFF suggests that occasional loud noises over the past few decades have not significantly disturbed plovers on the island.

Another potential adverse impact to the Piping Plover is the disturbance of beach habitat during the placement of sand on Wallops Island shoreline, which may temporarily disturb breeding, nesting, and feeding activities. As described earlier, there is no beach along a large (approximately 4,250 m [14,000 ft]) portion of the existing shoreline. Therefore, the initial sand placement will only disturb the existing beach habitat at the northern and southern extremes of the project area. Sand placed on the beach is anticipated to smother some Piping Plover prey species such as crabs and worms, which inhabit the surface layer of sand. However, studies by Nelson (1985, 1993) and Hackney et al., (1996) report an infaunal recovery time ranging from 2 to 7 months following beach nourishment. Therefore, no long-term adverse affects to foraging capabilities are anticipated, in fact, the expansion of the beach may lead to additional suitable habitat for many shorebirds, including the Piping Plover.

3.4.4 Actions to Reduce Adverse Effects

To ensure that no Piping Plovers are adversely affected, a qualified biologist would conduct regular surveys during sand placement activities. If Piping Plovers or nests are identified, mitigation measures such as avoidance of the nesting area would be implemented to avoid potential impacts.

If north Wallops Island is used for beach renourishment, NASA would work with USFWS to ensure adequate protection for any observed Piping Plovers in the area. In addition, the sand would be transported from the area only during the non-nesting season (September-March).

3.5 HUMPBACK WHALE

3.5.1 Description

The humpback whale is one of the rorquals, a family that also includes the fin whale and blue whale among others. Rorquals have two characteristics in common: dorsal fins on their backs and ventral pleats running from the tip of the lower jaw back to the belly area. The humpback whale was listed as endangered in 1973.

3.5.2 Life History and Distribution

The shape and color pattern on the humpback whale’s dorsal fin and flukes (tail) are as individual in each animal as are fingerprints in humans. This discovery changed the course of cetacean research and the new form of research known as “photo-identification,” in which individuals are identified, catalogued, and monitored, has led to valuable information about humpback whale population sizes, migration, sexual maturity, and behavior patterns (ACS, 2004a).

Humpback whales feed primarily on small schooling fishes including Atlantic herring, mackerel, pollock, and the American sand eel or sand lance (Gaskin, 1982; Katona et al., 1983; Watkins and Schevill, 1979; Wynne and Schwartz, 1999).

Humpback whales are found throughout the oceans of the world, migrating from tropical and subtropical breeding grounds in winter to temperate and arctic feeding and calving grounds in summer (Swingle et al., 1993). Several stocks occur in the northwestern Atlantic. Humpbacks use the Mid-Atlantic as a migratory path to and from calving and mating grounds. Adults and newborns of the Gulf of Maine feeding group migrate from summer feeding grounds off the coast of New England to winter breeding grounds along the Antillean Chain of the West Indies, primarily on the Silver Bank and Navidad Bank north of the Dominican Republic. Some individuals remain in the Gulf of Maine throughout the year.

Until recently, it was thought that humpback whales in the Mid-Atlantic were transients. Few were seen during aerial surveys conducted in the early 1980s (Shoop et al., 1982). However, since 1989, sightings of feeding juvenile humpbacks have increased along the coast of Virginia, peaking from January through March in 1991 and 1992 (Swingle et al., 1993). Studies conducted by the Virginia Marine Science Museum indicate that the whales are feeding on, among other things, bay anchovies and Atlantic menhaden. It is currently believed that non-reproductive animals may utilize the Mid-Atlantic area as a winter feeding range since they do not take part in reproductive activities in the Caribbean. Whales present in the Mid-Atlantic in winter were found to be members of both the Gulf of Mexico and Atlantic Canada feeding groups indicating a mixture of feeding populations in this region. In concert with the increased sightings, strandings of whales increased in the Mid-Atlantic during the same time period, with 32 strandings reported between New Jersey and Florida since January 1989. Sixty percent of those strandings that were closely investigated showed either signs of entanglement or vessel collision (Wiley et al., 1992). Humpback whales can be found in proximity to the Action Area from September to April.

3.5.3 Potential Direct and Indirect Effects of the Proposed Action

Major causes of anthropogenic mortality to humpback whales include collisions with ships and fishing net entanglements. During the dredging cycle, numerous round trips between the borrow area and the pump-out buoy at the placement site will be required. When viewed cumulatively over the 50-year project life, a potential exists for collisions between the dredge ship and humpback whales.

Another potential direct adverse effect to humpback whales is the noise associated with dredging operations. Noise from the dredge may have an effect on whale species that are sensitive to low frequency sound. The noise emitted by a dredge depends on the local environment, especially the sea-bed type. Variability in noise levels is also associated with the different parts of the dredging operations, such as the dredger dragging against the sea floor; the sound of the pump driving the suction through the pipe; noise from deposition of sand into the hopper; and the noise associated with the dredging ship itself. Meteorological conditions will also influence the noise emitted by the dredging operations (MALSF, 2009).

Marine mammals use hearing and sound transmission for all aspects of their life including reproduction, feeding, predator and hazard avoidance, communication and navigation. The introduction of sound into the marine environment from anthropogenic sources has the potential to cause long term or short term effects. Short term effects can include behavioral disruption or temporary habitat displacement; and long-term effects can include extended habitat displacement, physical injury to the auditory system, or in some cases mortality (Richardson et al. 1995). The behavioral responses of marine mammals to noise are highly variable and may depend upon individual hearing sensitivity (animals respond only to sounds they can directly detect), past exposure and habituation to noises, and demographic factors such as the age and sex of the animal. Other factors include the duration of the sound, whether the sound is moving, and environmental factors that affect the sound including habitat characteristics (National Research Council [NRC] 2003).

Under the MMPA, NMFS has defined levels of harassment for marine mammals. Level A harassment is defined as "…any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild." Level B harassment is defined as "…any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."

Since 1997, NMFS has been using generic sound exposure thresholds to determine when an activity in the ocean that produces sound might result in impacts to a marine mammal such that a take by harassment might occur (NMFS 2005). NMFS is developing new science-based thresholds to improve and replace the current generic exposure level thresholds, but the criteria have not been finalized (Southall et al. 2007). The current Level A (injury) threshold for impulse noise (e.g., impact pile driving) is 180 dB rms for cetaceans. The current Level B (disturbance) threshold for impulse noise is 160 dB rms for cetaceans.

Under the Proposed Action, underwater noise would be generated through the use of a hopper dredge. The primary noise from hopper dredging is created by the suction pipes used to remove the fill from the seabed. The noise generated by dredgers depends on their operational status, sea bed removal, transit and dumping. In general the noisiest activity is associated with the seabed removal. Dredge noise is strongest at low frequencies (below 1000 Hz). Greene (1987) reported received levels of 142 dB at 0.93 km for loading operations, 127 dB at 2.4 km while underway, and 117 dB at 13,3 km while pumping (at frequencies below 1000 Hz).

Based on these assumptions, underwater noise from the hopper dredge would not reach the Level A threshold and would, therefore, not result in any injury or mortality. Dredge noise may exceed the Level B threshold at a distance of approximately 15 m from the dredge during loading and at a distance of approximately 1 m from the dredge while underway or pumping. Noise from dredging would be audible to the species known to occur in the area and may result in some masking of vocal behavior of the humpback whale,

As summarized in Richardson et al. (1995), there are few studies documenting responses of humpback whales to dredging, other studies indicate responses of humpbacks to vessel depends heavily on their behavior (e.g., feeding humpbacks are less likely to react when actively feeding than when resting) Because dredging has occurred in this area previously and vessels are common, noise impacts are not expected to be significant

Dredging can indirectly affect the feeding ability of the humpback whale by temporarily decreasing feeding success and prey availability in areas of increased turbidity. Turbidity plumes caused by offshore dredging can lead to decreased visibility, which in turn can affect foraging ability by those species that use sight as a primary means to locate prey. These effects can also be expected outside the immediate vicinity of the dredging activity.

Operations using hopper dredges tend to be discontinuous and associated plumes would be dispersed over a larger area. Hopper dredges trigger a small plume at the seabed from the draghead and a larger surface plume from the discharge of overspill of water with suspended sediment from the hopper (MMS 1999). The length and shape of the surface plume generated by the overspill depends on the hydrodynamics of the water and the sediment grain size.

Although the volume of discharged material is much higher, findings about the plume dynamics of suspended sediments are much the same as plumes from trailing hopper dredges during construction aggregate mining (MMS 1999). Detailed investigation of these types of operations off the coast of the UK found that most sediments in the plume settle out within 300 to 500 meters (984 to 1,640 feet) from the dredge over a period of roughly 20 to 30 minutes and that suspended sediment concentrations returned to concentrations close to background level within an hour after completion of dredging (Hitchcock et al., 1998, cited in MMS, 1999). The distance and time increased with decreasing sediment size. In a study off the French coast, particles larger than 0.40 millimeter (0.02 inch) settled within 1.5 kilometers (0.9 mile) from the site. Considering that the average grain size of the potential borrow sites is estimated to range from 0.34 to 0.42 millimeter (0.01 to 0.02 inches), it can be assumed that surface plumes from the hopper dredge should last for no more than a few hours and be no larger than 5 kilometers (3.1 miles).

Because the concentration of the suspended particles in the plume diminishes rapidly with time and distance from the source, the effects on fauna further away from the activity are reduced.

In general, the effects of turbidity on phytoplankton due to light reduction or on pelagic fish and invertebrates, due to gill irritation and reduction of light levels for visual feeders, are considered small (MMS 1999). A suction hopper dredge is usually on-site for 3 to 4 hours during a 24-hour period, with the remaining time spent in travelling and unloading sand. This discontinuous method of offshore dredging allows suspended sediments to dilute, dissipate, and settle. The Action Area could be avoided by whales, which could easily feed in adjacent areas until the disturbance ceased.

No impacts on humpback whales from the construction of the seawall or the placement of sand on the beach are anticipated because the activities will occur in water depths too shallow for these whales to occur.

Therefore, the operations under the Proposed Action of the SRIPP are not anticipated to cause long-term adverse impacts on the habitat, calving areas, or the food resources of the humpback whale.

3.5.4 Actions to Reduce Adverse Effects

According to the September 25, 2007, NMFS BO on the SRIPP, the potential of marine mammal strikes would be mitigated by operating the dredge at speeds below 14 knots. Since the issuance of the 2007 NMFS BO, a Final Rule has been issued regarding vessel speeds along the east coast of the Atlantic seaboard; this rule restricts speeds to no more than 10 knots for all vessels 65 feet or greater (50 CFR 224.105, issued October 10, 2008). Compliance with this rule is expected, as the speed of the dredge is not anticipated to be greater than 3 knots while dredging and 10 knots while empty; therefore, the risk of vessel strike to marine mammals is insignificant. At this low speed, operators would be able to avoid humpback whales by maneuvering the dredge vessel to avoid a whale strike. In addition, there is currently no information to suggest that dredge vessels have ever collided with humpback whales while operating in Atlantic waters.

3.6 FIN WHALE

3.6.1 Description

The fin whale is considered one of the more abundant large whale species, with a worldwide population estimated at around 120,000. In 1970, NMFS declared one population of fin whales in the North Atlantic to be endangered (Waring et al. 1998). This grouping is found from Cape Hatteras northward. The fin whale was placed on the list of federally endangered species in 1973. Perhaps 40,000 are located in the Northern hemisphere; however, only a few thousand fin whales are believed to exist in the North Atlantic (NMFS, 2009a). Estimates of the western North Atlantic population range from 2,362, which is believed to be a low estimate (Waring et al., 2001), to 3,590 to 6,300 (Perry et al., 1999). Hain et al. (1992) put the figure at 5,000.

The fin whale is another member of the rorqual family which exhibits a dorsal fin and throat grooves that expand when the animal is feeding. The fin, or finback whale, is second only to the blue whale in size and weight. It is a swift, streamlined whale 18 to 24 meters (60 to 80 feet) long. Among the fastest of the great whales, it is capable of bursts of speed of up to 37 kilometers per hour (23 miles per hour), resulting in its description as the “greyhound of the sea.” Its most unusual characteristic is the asymmetrical coloring of the lower jaw, which is white or creamy yellow on the right side and mottled black on the left side. A single ridge extends from the blowhole to the tip of the rostrum (upper jaw). There is a series of 50 to 100 pleats or grooves on the underside of its body extending from under the lower jaw to the navel (ACS, 2004b).

3.6.2 Life History and Distribution

Fin whales are found in all oceans of the world, though they seem to prefer temperate and polar waters to tropical seas. They exhibit more complex migratory patterns than humpback or right whales. During the summer in the eastern North Atlantic, fin whales can be found along the North American coast to Greenland. In the winter, their range may extend from the ice edge of the Greenland continental glacier south to the Caribbean and the Gulf of Mexico.

Fin whales are baleen whales and feed mainly on krill and schooling fish. They have been observed circling schools of fish at high speed, rolling the fish into compact balls, and then turning on their right side to engulf the fish. Their color pattern, including their asymmetrical jaw color, may somehow aid in the capture of such prey. They can consume up to 1,800 kilograms (2 tons) of food a day. As a baleen whale, it has a series of 262 to 473 fringed overlapping plates hanging from each side of the upper jaw, where teeth would otherwise be located. These plates consist of a fingernail-like material called keratin that frays out into fine hairs on the ends inside the mouth near the tongue. The baleen on the left side of the mouth has alternating bands of creamy-yellow and blue-gray color. During feeding, large volumes of water and food can be taken into the mouth because the pleated grooves in the throat expand. As the mouth closes, water is expelled through the baleen plates, which trap the food on the inside near the tongue to be swallowed. Fin whales feed on herring, cod, mackerel, pollock, sardines, and capelin, as well as squid (ACS, 2004b).

In the North Atlantic, peak months for breeding are December and January. A single calf, averaging about 6 meters (19 feet) in length, is produced after a gestation period of a little more than 11 months. Fully mature females may reproduce every 2 to 3 years. In the Northern Hemisphere, females reach maturity at lengths of over 18 meters (59 feet); males reach maturity at lengths slightly less than 18 meters. Although fin whales are sometimes found singly or in pairs, they commonly form larger groups of 3 to 10 animals, which may in turn coalesce into larger aggregations, especially in the feeding grounds (Wynne and Schwartz, 1999). After Norway developed the explosive harpoon in 1864, the fin whale became a prime target for commercial whaling and, subsequently, the number of whales in the North Atlantic was quickly depleted.

Fin whales are often spotted in Mid-Atlantic waters. Fin whales are thought to use North Atlantic waters for feeding and southern waters for calving. Evidence supporting this view is scarce, however. Some fin whales were seen off the Delmarva Peninsula during aerial surveys conducted in the early 1980s (Shoop et al., 1982). Since 1989, sightings of feeding juvenile fin whales have increased along the coast of Virginia in the same area as sightings of humpback whales. Strandings of neonate fin whales along the Mid-Atlantic Coast may indicate an offshore calving area (Hain et al., 1992). Fin whales are difficult to study due to their speed. They are larger and faster than humpback or right whales and, therefore, less likely to be found in nearshore areas. However, it is worth noting that a pair of fin whales was spotted approximately 1.5 miles offshore of Wallops Island as recently as December 2006. Fin whales can be found in proximity to the Action Area from October to January.

3.6.3 Potential Direct and Indirect Effects of the Proposed Action

During the dredging cycle, numerous round trips between the borrow area and the pump buoy at the placement site will be required. Major causes of anthropogenic mortality to fin whales include collisions with ships and fishing net entanglements. It is thought that fin whales are struck by large vessels with greater frequency than any other large whale species (Laist et al., 2001). When viewed cumulatively over the 50-year project life, a potential exists for collisions between the dredge ship and fin whales; however, there is currently no information to suggest that dredge vessels have ever collided with fin whales while operating in Atlantic waters.

Another potential direct adverse effect to fin whales is the noise associated with dredging operations. As described in Section 3.5.3, noise from dredging operations may have a similar effect on the fin whale. It should be assumed that dredge noise would cause an avoidance response in the fin whale (MMS, 1999).

Dredging can indirectly affect the feeding ability of the fin whale in several ways. Decreased feeding success and prey availability may temporarily occur in areas of increased turbidity. Turbidity plumes caused by offshore dredging can lead to decreased visibility, which in turn can affect the feeding ability of the fin whale because it uses sight as a primary means to locate and round up schooling fish. This is especially true for this species in the North Atlantic, because they are baleen whales. Increased turbidity can also be expected outside the immediate vicinity of the dredging activity. Operations using hopper dredges tend to be discontinuous and associated plumes would be dispersed over a larger area. However, because the concentration of the suspended particles in the plume diminishes rapidly with time and distance from the source, the effects on fauna further away from the activity are reduced. In general, the effects of turbidity on phytoplankton due to light reduction or on pelagic fish and invertebrates, due to gill irritation and reduction of light levels for visual feeders, are considered small (MMS 1999). A suction hopper dredge is usually on-site for 3 to 4 hours during a 24-hour period, with the remaining time spent in travelling and unloading sand. This discontinuous method of offshore dredging allows suspended sediments to dilute, dissipate, and settle.

No impacts on fin whales from the construction of the seawall or the placement of sand on the beach are anticipated because the activities will be in shallow water, and it is very rare for these whales to occur at those depths.

Therefore, the operations under the Proposed Action of the SRIPP are not anticipated to cause long-term adverse effects on the habitat, calving areas, or the food resources of the fin whale.

3.6.4 Actions to Reduce Adverse Effects

The potential of marine mammal strikes would be mitigated by operating the dredge at speeds below 10 knots. Since the issuance of the 2007 NMFS BO, a Final Rule has been issued regarding vessel speeds along the east coast of the Atlantic seaboard; this rule restricts speeds to no more than 10 knots for all vessels 65 feet or greater (50 CFR 224.105, issued October 10, 2008). Compliance with this rule is expected, as the speed of the dredge is not anticipated to be greater than 3 knots while dredging and 10 knots while empty; therefore, the risk of vessel strike to marine mammals is insignificant. At this low speed, operators would be able to avoid fin whales by maneuvering the dredge vessel to avoid a whale strike.

3.7 RIGHT WHALE

3.7.1 Description

The right whale may have received its name from whalers who thought that it was the “right” whale to harvest because it was correct commercially (oil came from whales), or because it was considered “proper” or “true” which meant typical of whales in general. Right whales were relatively easy targets; they swim slowly and float when dead. The exploitation of the right whale began in the Bay of Biscay in Spain in the 12th century and continued, especially in the North Atlantic, for many centuries. Despite being protected since the 1930s, the right whale is today the most endangered of all the great whales (ACS, 2004c). Current estimates place the total number of remaining animals at less than 600 (NMFS, 1991), with the western North Atlantic population estimated at 300 (+/-10 percent) (Best et al., 2001). Right whales have been protected from commercial whaling in the U.S. since 1949. The right whale was listed as endangered in 1973.

A distinguishing feature of these large baleen (plankton-feeding) whales is that they lack a dorsal fin and ventral grooves. The body is black with various white markings comprising 28 to 33 percent of the body. The rostrum is narrow and highly arched, giving a distinct curvature to the top of the head. There are paired blowholes on the top of the head. The baleen plates are gray with fine bristles; 200-260 plates per side and 2.2 meters (7.2 feet) long (Wynne and Schwartz, 1999). Adult right whales are generally 10.7 to 16.8 meters (35 to 55 feet) long. The largest individuals have measured 18.3 meters (60 feet) long and weighed 106,500 kilograms (117 tons). Females are larger than males.

3.7.2 Life History and Distribution

Western North Atlantic subpopulations of right whales are often found near shore in shallow water and occur from the southeast U.S. to Canada (Waring et al., 2002). They may also be sighted in large bays. Populations concentrate in these areas: coastal Florida; coastal Georgia; the Great South Channel east of Cape Cod (May-June); Cape Cod Bay (February-April); the Bay of Fundy between New Brunswick and Nova Scotia (summer and fall); Stellwagen Bank and Jeffery's Ledge and Browns and Baccaro Banks, south of Nova Scotia (summer and fall). The population appears to migrate seasonally between low latitude winter calving grounds and high latitude summer foraging grounds (Perry et al., 1999). Right whales may be found over the continental shelf during the summer (Mate et al., 1997) as well as in deep water off the continental shelf. Right whales feed upon swarms of planktonic animals, primarily calanoid copepods.

The bulk of their feeding takes place in colder waters off the New England and Nova Scotia coasts, where the dissolved oxygen content is greater than in warm waters, and plankton is most abundant. Migration of the animals occurs in autumn, when they begin their trek south toward Georgia and Florida. In late March and through the spring, they rendezvous off the Nova Scotia coast and the Great South Channel once more, where they spend the summer replenishing their fat stores by feeding on plankton. They also breed during this time.

According to the ESA, as of 1994 three critical habitat areas are designated for the right whale. The areas include portions of Cape Cod Bay and Stellwagen Bank, the Great South Channel, and coastal waters off the eastern coasts of Georgia and Florida. Several studies have indicated a decline in right whale survival in the 1990s compared to the 1980s, especially for females (Caswell et al., 1999; Best et al., 2001; Waring et al., 2002). Clapham et al. (1999) examined modeling data and determined that whale survival rates, especially of females, have declined. These declining survival rates may be due to the fact that this subpopulation is being affected by decreased reproductive rates (Best et al., 2001; Krause et al., 2001) which may be related to a reduction in genetic diversity, pollutants, and nutritional stress.

In February 1983, an animal stranded in New Jersey was identified as a 2-year-old northern right whale that had first been photographed in the Bay of Fundy in 1981 (NMFS, 1991). It is now believed that a portion of the North Atlantic right whale population is migrating along the U.S. East Coast each year from Iceland to Florida. There is growing evidence that calves are born when the whales are at the southern end of their migration, in the Atlantic off northeastern Florida, Georgia, and possibly the Carolinas, from December through March. Very little feeding occurs during this time due to plankton scarcity in these relatively oxygen-poor waters.

A ship strike was likely the cause of death of a pregnant right whale that washed ashore on the Outer Banks of North Carolina in February 2004, after being sighted off the Virginia Beach oceanfront as a floating carcass. It was identified as a previously tagged female known as "Slumpy," an individual documented as having previously given birth to at least five calves (Hampton Roads Pilot Online, 2004a; Federal Register, 2004).

A ship strike was also the suspected cause of the death of another pregnant right whale in November 2004. First sighted by a recreational boater, the injured whale was seen at the mouth of the Chesapeake Bay in Virginia; its tail had been sliced partly off. A necropsy conducted at Ocean Sands, North Carolina, showed that a large vessel had struck the animal in several areas of the body (Hampton Roads Pilot Online, 2004b).

Ship collisions are likely the leading human-caused source of mortality for the right whale. Large, rapidly moving vessels can travel at speeds in excess of 22 knots when at sea. Of 31 animals examined between 1970 and 2002, ship strike was the primary cause of death in 15 cases. More than one-third of all right whale deaths in the Mid-Atlantic, between the years 1991 and 2002, were the result of ship strikes. However, collisions and net entanglements are not necessarily fatal. A study of data from 1935 to 1990 estimated that 61.6% of living right whales show entanglement injuries and 6.4% display collision injuries. The long-term consequences associated with these events are unknown (Hamilton et al., 1998). The right whale north-south migration movement off the Virginia coast takes place from November through April. Right whales can be in proximity to the Action Area between November and May. There is no designated critical habitat for right whales within the Action Area

3.7.3 Potential Direct and Indirect Effects of the Proposed Action

The primary source of potential for a direct effect on right whales would be collision with the dredge vessel. During the dredging cycle, the dredge vessel would make numerous trips between the borrow area and the pump buoy at the placement site. The vessels have the potential to collide with right whales.

Another potential direct adverse effect to right whales is the noise associated with dredging operations. Noise from the dredge may have an affect on whale species that are sensitive to low frequency sound. As with the humpback whale, it should be assumed that this noise would cause an avoidance response in the right whale (MMS, 1999).

Dredging can indirectly affect the feeding ability of the right whale in several ways. Decreased feeding success and prey availability may temporarily occur in areas of increased turbidity. As described previously, turbidity plumes caused by offshore dredging can lead to decreased visibility, which in turn can affect the feeding ability of the right whale, which primarily feeds on plankton and shrimp. Increased turbidity can also be expected outside the immediate vicinity of the dredging activity. Operations using hopper dredges tend to be discontinuous and associated plumes would be dispersed over a larger area. However, because the concentration of the suspended particles in the plume diminishes rapidly with time and distance from the source, the effects on fauna further away from the activity are reduced. In general, the effects of turbidity on phytoplankton due to light reduction are considered small (MMS 1999). A suction hopper dredge is usually on-site for 3 to 4 hours during a 24-hour period, with the remaining time spent in travelling and unloading sand. This discontinuous method of offshore dredging allows suspended sediments to dilute, dissipate, and settle.

No impacts on right whales from the construction of the seawall or the placement of sand on the beach are anticipated because the activities will occur in water depths too shallow for these whales to occur. Therefore, the operations under the Proposed Action of the SRIPP are not anticipated to cause long-term adverse effects on the habitat, calving areas, or the food resources of the right whale.

3.7.4 Actions to Reduce Adverse Effects

The potential of marine mammal strikes would be mitigated by operating the dredge at speeds below 10 knots. Since the issuance of the 2007 NMFS BO, a Final Rule has been issued regarding vessel speeds along the east coast of the Atlantic seaboard; this rule restricts speeds to no more than 10 knots for all vessels 65 feet or greater (50 CFR 224.105, issued October 10, 2008). Compliance with this rule is expected, as the speed of the dredge is not anticipated to be greater than 3 knots while dredging and 10 knots while empty; therefore, the risk of vessel strike to marine mammals is insignificant. At this low speed, operators would be able to avoid right whales by maneuvering the dredge vessel to avoid a whale strike.

3.8 GENERAL SEA TURTLE INFORMATION

Sea turtles, air-breathing reptiles with streamlined bodies and large flippers, are well adapted to life in the marine environment. They inhabit tropical and subtropical ocean waters throughout the world (NMFS, 2009b).

There are two families of sea turtles (Wynne and Schultz, 1999). The Cheloniidae family contains six genera and six distinct species. These species are loggerhead, green, flatback, hawksbill, Kemp's ridley, and olive ridley. The family Dermochelyidae is comprised of only one genus and species, commonly referred to as the leatherback sea turtle.

Sea turtles have short, thick, incompletely retractile necks and legs that have been evolved to become flippers (Bustard, 1972). All species, excepting the leatherback, have a hard, bony carapace (top shell) modified for marine existence by streamlining and weight reduction (Bustard, 1972). The leatherback lacks shell scutes, head and body scales. The shell is covered by leathery skin. The Carapace is divided longitudinally by 7 ridges (Wynne and Schwartz, 1999). These physiological differences are the reason for their separate designation as the only species in the family Dermochelyidae.

Much of a sea turtle's life is spent in the water and males of many species may never leave an aquatic environment (Wynne and Schwartz, 1999). The recognized life stages for these turtles are egg, hatchling, juvenile/subadult, and adult (Hirth, 1971). Reproductive cycles in adults of all species involve some degree of migration in which the animals endeavor to return to nest at the same beach year after year (Hopkins and Richardson, 1984). The nesting season ranges from April through September (Hopkins and Richardson, 1984; Nelson, 1988). It is believed that mating occurs just off the nesting beach, although solid evidence of this is lacking. After mating, the nesting female emerges from the water and digs a flask-shaped nest in the sand with her hind slippers, then lays 50 to 170 (depending on the species) ping-pong ball-shaped eggs. After covering the eggs with sand, she returns to the water. The female sea turtle will nest several times in one season. Incubation periods for sea turtles will vary by species from 45 to 65 days (Nelson, 1988, Wynne and Schwartz, 1999).

Hatchlings break their shells and dig their way out of the nest at night (Wynne and Schwartz, 1999). They orient themselves toward the sea by following the reflected light from the breaking surf (Hopkins and Richardson, 1984). After entering the surf, hatchlings engage in behavior referred to as "swim frenzy," during which they swim in a straight line for many hours (Carr, 1986). Once into the waters off the nesting beach, hatchlings enter a period referred to as the "lost years" where many species live and feed in floating sargassum (Wynne and Schwartz,

1999. They “reappear” as juveniles in feeding grounds shared with adults, or in some cases, migrate to developmental feeding grounds. Some species, such as the leatherback, spend their entire lives in a pelagic existence, coming inshore only to mate and nest (Wynne and Schwartz, 1999).

The functional ecology of sea turtles in the marine and/or estuarine ecosystem varies by species. The Kemp’s ridley sea turtle is omnivorous and feeds on swimming crabs and crustaceans. The green turtle is an herbivore and grazes on marine grasses and algae, while the leatherback is a specialized feeder preying primarily upon jellyfish. The loggerhead is primarily carnivorous and has jaws well-adapted to crushing mollusks and crustaceans, and grazing on organisms attached to reefs, pilings, and wrecks.

Sea turtles are believed to play a significant role in marine and estuarine ecosystems. This role has likely been greatly reduced in most locations as a result of declining turtle populations. Population declines are a result of numerous factors, such as disease and predation, habitat loss, commercial fisheries conflicts, and inadequate regulatory mechanisms for their protection. As a result, all sea turtle species have been classified as endangered or threatened.

Due to complex life histories and multiple habitats used by the various species, sea turtle populations have proven difficult to accurately census (Meylan, 1982). Because of these problems, estimates of population numbers have been derived from various indices, such as numbers of nesting females, numbers of hatchlings per kilometer of nesting beach, and number of subadult carcasses washed ashore (Hopkins and Richardson, 1984).

In a BO issued on September 25, 2007, for the SRIPP activities which included dredging of borrow sites in State waters, NMFS determined that dredging may adversely affect, but is not likely to jeopardize the continued existence of the loggerhead sea turtle; and is not likely to adversely affect the Kemp’s ridley, leatherback, or green sea turtles. The BO included an Incidental Take Statement for loggerhead sea turtles which could be entrained in dredges. Dredging operations that take place inshore (e.g., in a channel), where turtles are known to nest and breed, are more likely to result in significant impacts on sea turtles compared to dredging at offshore sites.

3.8.1 Leatherback Sea Turtle

3.8.1.1 Description

The leatherback 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 226 to 907 kilograms (500 to 2000 pounds) in weight. 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 (Pritchard, 1983); the plastron is white. Leatherbacks normally weigh up to 300 kilograms (660 pounds), and attain a carapace length (straight line) of 140 centimeters (55 inches) (Pritchard, 1983; Hopkins and Richardson, 1984). 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. The leatherback sea turtle was listed as endangered in 1970.

Morphologically this species can be easily distinguished from the other sea turtles by the following characteristics: 1) a smooth unscaled carapace; 2) a carapace with seven longitudinal ridges; 3) head and flippers covered with unscaled skin; and, 4) no claws on the flippers (Nelson, 1988; Pritchard 1983; Wynne and Schwartz, 1999).

3.8.1.2 Life History and Distribution

Leatherbacks occur in the Atlantic, Indian, and Pacific Oceans. They range as far north as Labrador and Alaska to as far south as Chile and the Cape of Good Hope. They are found farther north than other sea turtle species, probably because of their ability to maintain a warmer body temperature over a longer period of time. They migrate between boreal, temperate, and tropical waters. The diet of the leatherback consists primarily of soft-bodied animals, such as jellyfish and tunicates, with juvenile fishes, amphipods, and other organisms (Hopkins and Richardson, 1984) but they also feeds on sea urchins, squid, crustaceans, blue-green algae, and floating seaweed (USFWS, 2006a).

Recent estimates of global nesting populations indicate 26,000 to 43,000 nesting females annually, which is a dramatic decline from the 115,000 estimated in 1980. This is due to exponential declines in leatherback nesting that have occurred over the last two decades along the Pacific coasts of Mexico and Costa Rica. The Mexico leatherback nesting population, once considered to be the world’s largest leatherback nesting population (65 percent of worldwide population), is now less than one percent of its estimated size in 1980. The largest nesting populations now occur in the western Atlantic in French Guiana (4,500 to 7,500 females nesting/year) and Colombia (estimated several thousand nests annually), and in the western Pacific in West Papua and Indonesia (about 600 to 650 females nesting/year). In the United States, small nesting populations occur on the Florida east coast (35 females/year), New Jersey’s Sandy Point, the U.S. Virgin Islands (50 to 100 females/year), and Puerto Rico (30 to 90 females/year) (USFWS 2006a).

The leatherback may inhabit nearshore environments if there is an abundant jellyfish population. Leatherbacks are susceptible to line entanglements in fishing gear including long-line operations, gillnets, and trawling gear. This may be due to their large size and attraction to potential prey species found on buoy lines or lured by light sticks. Entanglements may result in a decreased ability to feed, dive, or breathe (Balazs, 1985). The U.S. shrimp trawling industry is required to utilize Turtle Exclusion Devices (TEDs) featuring a large enough opening to provide leatherback turtles with an escape route. The species also appears to be very susceptible to marine debris ingestion of plastic and other marine debris which may resemble jellyfish (Balazs, 1985).

Leatherback turtle mating and nesting occurs from April to November on east coast of Florida and the Caribbean and sometimes, though rarely, in Texas, Georgia, South Carolina and North Carolina. Mature females may lay eggs more than 6 times per year, laying 50-170eggs per clutch. Incubation lasts 53-74 days. Little is known about hatchlings and juvenile movements (Wynne and Schwartz, 1999).

3.8.1.3 Leatherback Turtles in the Action Area

The leatherback turtle may pass through the mid-Atlantic during migration. Concentrations may be found between the Gulf of Maine and Long Island (Shoop and Kenney, 1992), in coastal areas of New Jersey and Delaware, and around the mouth of the Delaware Bay (USACE, 1995).

3.8.1.4 Potential Direct and Indirect Effects of the Proposed Action

The proposed dredging is not anticipated to directly affect any leatherback turtles that might enter the Action Area. Being a pelagic species, leatherback turtles prefer habitat located further offshore than the proposed Action Area. Members of the species that move across the Action Area when migrating may risk being struck by a dredge. Leatherback turtles are generally too large to be entrained in the dredge drag head. Dredging and initial placement of the material in the beach restoration area is unlikely to impact nesting areas.

Because leatherbacks occasionally feed on jellyfish in nearshore areas of the Mid-Atlantic, the placement of sand on Wallops Island shoreline could temporarily impair their ability to locate prey in this area due to the temporary increase in turbidity. However, because the leatherback is primarily a pelagic feeder and relatively uncommon in the Wallops Island nearshore area, this is unlikely to lead to adverse impacts on the leatherback. No long-term adverse affects to foraging capabilities in the nearshore area are anticipated.

Leatherback nests are not commonly found as far north as Virginia. In addition, because there is no beach habitat present seaward of the seawall, the proper beach nesting environment for sea turtles is not present. Therefore, it is unlikely that the Proposed Action will adversely impact leatherback nesting activities.

3.8.2 Kemp’s Ridley Sea Turtle

3.8.2.1 Description

The Kemp’s ridley is the smallest and most seriously endangered of the sea turtles. The species was listed as endangered in 1970. Nearly the entire world population of adult female Kemp’s ridley turtles nests annually on stretches of beach in Rancho Nuevo, Tamaulipas, Mexico (Wynne and Schwartz, 1999). A number of films made in 1947 of the nesting aggregations at Rancho Nuevo show that in the late 1940s the female population may have been greater than 40,000 (Hildebrand, 1963). Recent estimates of the total nesting population at this location number no more than 500 (Pritchard, 1990). A very small number of Kemp’s ridleys nest consistently at Padre Island National Seashore, Texas (USFWS, 2006b).

This species matures when carapace length reaches about 70 centimeters (27 inches). Weights of adults maximize at 50 kilograms (110 pounds) (Wynne and Schwartz, 1999). Those found in the Chesapeake Bay are juveniles with a carapace length of 20 to 58 centimeters (7 to 23 inches) and weighing less than 20 kilograms (44 pounds) (Lutcavage and Musick, 1985). The plastron and the ventral surfaces of the flippers are white, and the dorsal side of the carapace and the flippers are charcoal gray to an olive green. Older individuals have more white on their dorsal surfaces. The carapace is rounded; this differentiates the species from other sea turtles. Four prefrontal scutes are located on the top of the head, and the species is distinguished by five pleural scutes. In addition, the cervical scute touches the first pleural scute on each side. Kemp’s ridleys have four inframarginals each with a posterior pore (Musick, 1988).

3.8.2.2 Life History and Distribution

The migratory patterns of Kemp’s ridley hatchlings are not well-defined, although Meylan (1986) suggests that they may live within sargassum beds in the Gulf of Mexico and the North

Atlantic Ocean and move closer to shore as they age. The juveniles are thought to allow the Gulf Stream to transport them up the Atlantic coast. The range of the Kemp's ridley includes the Gulf coasts of Mexico and the U.S., and the Atlantic coast of North America as far north as Nova Scotia and Newfoundland (USFWS, 2006b). After leaving the nesting beach, hatchlings are believed to become trapped in eddies within the Gulf of Mexico, where they are dispersed within the Gulf and Atlantic by oceanic surface currents until they reach about 20 centimeters (7 inches) in length, at which size they enter coastal shallow water habitats**.** Morreale et al. (1992) disagrees, maintaining that this would result in very few individuals and that there must be another mode of transport.

Outside of nesting areas, the major habitat for the Kemp's ridley is the nearshore and inshore waters of the northern Gulf of Mexico, especially Louisiana waters. Kemp's ridleys are often found in salt marsh habitats. The preferred sections of nesting beach are backed up by extensive swamps or large bodies of open water having seasonal narrow ocean connections (USFWS, 2006b).

The Kemp's ridley is thought to actively move northward along the Atlantic Coast to reach the Chesapeake Bay, where they feed in shallow coastal waters. After loggerheads, this species is the second most abundant in Maryland and Virginia waters, with many juveniles entering the Chesapeake Bay. The turtles arrive during May and June (Keinerth et al., 1987; Musick and Limpus, 1997) to feed in the submerged aquatic beds. Their favored prey includes fish, crabs, and mollusks (Pritchard and Marquez, 1973; Bellmund et al., 1987). When approaching maturity, the individuals return to the Gulf of Mexico.

Kemp's ridleys have also been documented to die at sea and wash ashore. The NMFS Sea Turtle Salvage and Stranding Network collects stranded sea turtles along both the Atlantic and Gulf Coasts (NMFS, 1988). Based on 1987 data, 767 Kemp's ridleys were reported by the network. The largest portion was collected from the Gulf Coast (103 turtles) and mostly the western portion of the Gulf. Nearly equal numbers of Kemp's ridleys were reported from the northeast and southeast Atlantic Coasts (64 and 50 turtles, respectively).

Onboard observation of offshore shrimp trawling by NMFS in the southeast Atlantic indicated that over 2,800 Kemp's ridleys are captured in shrimp trawls annually. The estimated number of Kemp's ridley mortalities from this activity was estimated to be 767 turtles annually, and most of these (65 percent) occurred in the western portion of the Gulf of Mexico. TEDs are required on shrimp and other trawlers to reduce mortality. Based on these data it is evident that the population is in danger of extinction. However, under strict protection, the population appears to be in the early stages of recovery (NMFS and USFWS, 2007).

3.8.2.3 Kemp's Ridley Sea Turtles in the Action Area

The Wallops Island Action Area may contain both juvenile and adult Kemp's ridleys, usually during the months of May and June. Juveniles typically feed in inshore beds of submerged aquatic vegetation (SAV), which are not found in the Action Area. Adults are found further offshore and may feed on benthic organisms in the offshore shoal area.

3.8.2.4 Potential Direct and Indirect Effects of the Proposed Action

The hopper dredge's draghead has the potential to kill Kemp's ridleys by entrainment. The Kemp's ridley sea turtle may move across the Action Areas when migrating. The possibility exists that a dredge may strike individual Kemp's ridley turtles, although such incidents have not been documented in the Action Area.

Dredging and placement of the material in the beach restoration area is unlikely to create long-term impacts to food sources or nesting areas, though near shore feeding areas may be temporarily disturbed.

Indirect adverse impacts on Kemp's ridley sea turtles may occur at the offshore shoals due to the removal of benthic prey like crustaceans and mollusks during dredging activities, which may temporarily disturb feeding activities. However, studies by Nelson (1985, 1993) and Hackney et al., (1996) report an infaunal recovery time ranging from 2 to 7 months following beach nourishment. In addition, these turtles are highly motile and can easily forage in adjacent undisturbed areas. Therefore, no long-term adverse affects to foraging capabilities at the offshore shoals are anticipated.

Because the majority of Kemp's ridleys nest along a single stretch of beach in Mexico, it is unlikely that they will use Wallops Island to nest. No Kemp's ridley nests have been documented in the vicinity of the Action Area, so it is unlikely that the Proposed Action will adversely impact Kemp's ridley nesting activities.

3.8.3 Loggerhead Sea Turtle

3.8.3.1 Description

The loggerhead sea turtle is perhaps the most common of the sea turtles in U.S. waters 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 meter (3 feet) in length and weighs about 136 kilograms (300 pounds). The loggerhead sea turtle'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 (New York DEC, 2006a).

The distinctly heart-shaped carapace of the adult loggerhead turtle averages 92 centimeters (36 inches) in length (Wynne and Schwartz, 1999). Exclusive of hatchlings, loggerheads in Virginia's waters are mostly juveniles with carapace lengths from 20 centimeters (7.8 inches) to more than 120 centimeters (47 inches) and weights from 20 to 40 kilograms (44 to 88 pounds) (Lutcavage, 1981; Lutcavage and Musick, 1985). The top of the carapace and appendages are reddish brown to mahogany, and the plastron (bottom shell) and appendages are cream to yellow (Musick, 1988; Wynne and Schwartz, 1999). It is common to find barnacles and other organisms encrusted on the carapace. Four scutes occur between the eyes (prefrontals), and there are five lateral carpacial scutes on each side. Loggerheads usually have three bridge scutes (Musick, 1988; Wynne and Schwartz, 1999).

The loggerhead sea turtle was listed as threatened in 1978. Loggerheads are the most common of the sea turtles frequenting the Action Area each summer; therefore, they are the species of sea turtle most likely to be adversely impacted by hopper dredge entrainment.

3.8.3.2 Life History and Distribution

Loggerhead sea turtles are found globally, preferring temperate and subtropical waters. In the western Atlantic, they range from the Canadian Maritime Provinces south to Argentina. Within its range, this species inhabits warm waters on continental shelves and areas among islands. Estuaries, coastal streams, and salt marshes are preferred habitats. In the NMFS/USFWS 2008 loggerhead recovery plan, five recovery units for the Northwest Atlantic population of loggerhead sea turtles were designated based on the nesting groups and inclusive of a few other nesting areas. The first four of these recovery units represent nesting assemblages located in the southeast U.S. The fifth recovery unit is composed of all other nesting assemblages of loggerheads within the Greater Caribbean, outside the U.S., but which occur within U.S. waters during some portion of their lives. The five recovery units representing nesting assemblages are: (1) the Northern Recovery Unit (NRU: Florida/Georgia border through southern Virginia); (2) the Peninsular Florida Recovery Unit (PFRU: Florida/Georgia border through Pinellas County, Florida); (3) the Dry Tortugas Recovery Unit (DTRU: islands located west of Key West, Florida); (4) the Northern Gulf of Mexico Recovery Unit (NGMRU: Franklin County, Florida through Texas); and, (5) the Greater Caribbean Recovery Unit (GCRU: Mexico through French Guiana, Bahamas, Lesser Antilles, and Greater Antilles)..

From the beginning of standardized index surveys in 1989 until 1998, the PFRU, the largest nesting assemblage in the Northwest Atlantic by an order of magnitude, had a significant increase in the number of nests. However, from 1998 through 2008, there was a 41% decrease in annual nest counts from index beaches, which represents an average of 70% of the statewide nesting activity (NMFS and USFWS 2008). From 1989 to 2008, the PFRU had an overall declining nesting trend of 26% (95% confidence interval) (NMFS and USFWS, 2008). The NRU, the second largest nesting assemblage of loggerheads in the U.S., has been declining at a rate of 1.3% annually since 1983 (NMFS and USFWS 2008). The NRU dataset included 11 beaches with an uninterrupted time series of coverage of at least 20 years; these beaches represent approximately 27% of NRU nesting (in 2008). Overall, there is strong statistical data to suggest the NRU has experienced a long-term decline.

Loggerhead nesting in the U.S. typically occurs from Florida to Virginia Beach, Virginia. Musick (1988) concluded that occasional nests on beaches as far north as Virginia Beach are beyond the periphery of the normal breeding range. As is common with most turtle species, reproducing females tend to return to the beaches where they were hatched to lay their own eggs. Yntema and Mrosovsky (1979) have shown that incubation temperature is the determining factor in the sex ratio of loggerhead hatchlings. Temperatures between 26º C and 28º C produced all males and temperatures of between 32º C and 34º C produced all females. It is reasonable to conclude that male hatchlings are more likely to be produced north of the North Carolina border, with far fewer females of the species returning to these areas to lay eggs and far more females returning to beaches in more southern areas.

Survival of hatchlings in waters as far north as Wallops Island may be limited due to cold temperatures. Once the animals hatch, usually between August and October, they swim away from land for two or three days. Since the hatchlings have little control over their buoyancy, it is theorized that the nonstop swimming done at this time is an attempt to reach the sargassum rafts. Sea turtle hatchlings that leave Virginia and Maryland beaches must travel great distances to find sargassum rafts, approximately 199 to 399 kilometers (124 to 248 miles) offshore near the Gulf

Stream. During this journey, many are trapped by falling temperatures. Many hatchlings survive predation, only to be surrounded by cooler waters in the range of below 20º C by mid-October, 15º C by November, and as low as 10º C in winter. More fortunate hatchlings arriving from southern beaches probably rest and feed in the floating rafts, travel once or twice around the North Atlantic gyre, until they develop a carapace length of 20 to 40 centimeters (7 to 15 inches), and then move back into inshore benthic communities to feed.

3.8.3.3 Loggerhead Sea Turtles in the Action Area

In Maryland and Virginia waters, loggerheads are the most common sea turtle species. Loggerheads can be found in the Chesapeake Bay from April through November, and the Bay is an important summer feeding ground. Loggerheads can be found in the Bay south of Baltimore within all the major tributaries, along the Virginia and Maryland Atlantic coast, and in the lagoons and channels in the barrier island systems (Lutcavage, 1981; Lutcavage and Musick, 1985; Byles and Dodd, 1989). The lower Chesapeake Bay estuary and the Atlantic Coastline provide important developmental habitat for immature sea turtles because of submergent vegetation beds and a rich diversity of bottom-dwelling fauna that afford cover and forage. Occasionally, adult females use Virginia’s ocean facing beaches as nesting sites (VDGIF, no date). The horseshoe crab is an important benthic food species. This crab species favors water depths from 4 to 20 meters (13 to 67 feet).

One loggerhead sea turtle nest was discovered on north Wallops Island in summer 2008; however, a fall storm inundated the nest and destroyed all of the 170 eggs. No nesting activity was observed on Wallops Island in 2009.

In October or November of each year when the first severe nor’easter arrives in the Bay (Musick, 1986) or when the water temperature drops to around 18º C (Keinath et al., 1987), sea turtles of all species migrate out of the Chesapeake Bay. According to a study conducted by Musick in 1986, loggerheads migrate south along the coast to Cape Hatteras and elsewhere. Some of these turtles from the Bay spend their winters in the warm waters of the Gulf Stream on the Florida continental shelf.

3.8.3.4 Potential Direct and Indirect Effects of the Proposed Action

The Wallops Island Action Area may contain both juvenile and adult loggerheads, depending upon the season and water temperature. The greatest potential for adverse impacts to loggerheads comes from the hopper’s drag head because the centrifugal force of the pump that brings the sand into the dredge hopper can possibly entrain (drawing into the hopper dredge) a turtle. The force of the centrifugal pump, located behind the intake pipe of the drag head, draws sand and any other material in its path into the pipe. Many entrained animals are killed by the pump before being pulled into the hopper. Entrainment is believed to take place primarily when the drag head is operating on bottom sediments; it is likely that the individual animals affected were feeding or resting near the bottom at the time the drag head moved along the bottom. In rare instances, suction can be created when currents flow around the drag head while it is being placed or moved. The feeding behavior of loggerheads also places them at greater risk of entrainment, as they are benthic feeders. However, USACE field tests demonstrated that a rigid turtle deflector, properly installed and operated, blocked 95 percent of mock turtles from entrainment in the dredge (USACE 1997).

Indirect adverse impacts on loggerhead sea turtles may occur in the nearshore environment as well as at the offshore shoals when dredging removes some non-motile benthic prey like crustaceans and mollusks, which cannot easily flee to escape the drag head. Some of these organisms will be killed while others may survive the dredging process only to be transported from the shoal area to the placement site on Wallops Island shoreline during beach nourishment. The large amount of sand placed on the beach is anticipated to smother some loggerhead prey species like crustaceans and mollusks which inhabit the surface layer of sand. This has the potential to temporarily disrupt loggerhead feeding activities. However, studies by Nelson (1985, 1993) and Hackney et al., (1996) report an infaunal recovery time ranging from 2 to 7 months following beach nourishment. Therefore, no long-term adverse affects to foraging capabilities in the nearshore area are anticipated.

The expansion of the beach may lead to additional suitable nesting habitat for sea turtles, including the loggerhead; this future habitat could be affected by the Proposed Action during future renourishment operations.

3.8.4 Atlantic Green Sea Turtle

3.8.4.1 Description

Green 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 meter (3 feet) long and weigh 136 to 159 kilograms (300 to 350 pounds). Adult green turtles are unique among sea turtles in that they are herbivorous, feeding primarily on seagrasses, sea lettuce, and algae. Other organisms living on sea grass blades and algae add to the diet (Mager, 1985). This diet is thought to give the turtles greenish colored fat, from which they take their name. A green turtle’s carapace is smooth and can be shades of black, gray, green, brown, and yellow. Their plastron is yellowish white (NMFS 2006).

Green sea turtles 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. However, pursuant to NMFS regulations and 50 CFR 223.205, the prohibitions of Section 9 of the Endangered Species Act apply to all green turtles, whether endangered or threatened. As it is difficult to differentiate between breeding populations away from the nesting beaches, NMFS considers green sea turtles in all waters as endangered. Atlantic green sea turtles are rare in the Atlantic portion of their range and are rare in Virginia outside of the Chesapeake Bay.

The carapace is round, and the dorsum of the carapace and the appendages are dark green to brown, often with lines radiating from the posterior margin of each scute. The plastron and the venter are white. The interface between the dorsal and ventral coloration is sometimes yellow. The species is characterized by two prefrontal and four lateral pleural scutes. The cervical scute does not touch the pleural scutes (Wynne and Schwartz, 1999). The species was for many centuries prized as a gourmet food item, with the fat a component of the clear soup that bears the species’ common name.

3.8.4.2 Life History and Distribution

The green turtle is globally distributed and generally found in tropical and subtropical waters along continental coasts and islands between 30 degrees North and 30 degrees south. Nesting occurs in over 80 countries throughout the year (though not throughout the year at each specific location). Green turtles are thought to inhabit coastal areas of more than 140 countries. In U.S. Atlantic and Gulf of Mexico waters, green turtles are found in inshore and nearshore waters from Texas to Massachusetts, the U.S. Virgin Islands, and Puerto Rico. In the western Atlantic, several major assemblages have been identified and studied (Carr et al., 1978).

In the continental U.S., however, the only known green turtle nesting occurs on the Atlantic coast of Florida (Mager, 1985) from June to September (Hopkins and Richardson, 1984). Mature females may nest three to seven times per season at about 10- to 18-day intervals. Average clutch sizes vary between 100 and 200 eggs that hatch usually within 45 to 60 days (Hopkins and Richardson, 1984; Wynne and Schwartz, 1999). Hatchlings emerge, mostly at night, travel quickly to the water, and swim out to sea. At this point, they begin a life stage that is poorly understood but is likely spent pelagically in areas where currents concentrate debris and floating vegetation such as sargassum (Wynne and Schwartz, 1999). When the juveniles reach 20 to 25 centimeters (7.8 to 9.8 inches) carapace length, they leave the pelagic habitat and enter benthic feeding grounds. Juveniles, like adults, are primarily herbivorous, avoiding crustaceans and feeding almost exclusively on algae and seagrasses with an occasional hydrozoan (Bellmund et al., 1987).

The population of green sea turtles before commercial exploitation and the total population since listing are unknown. Records show drastic declines in the Florida catch during the 1800s, and similar declines occurred in other areas (Hopkins and Richardson, 1984).

The principal cause of the historical, worldwide decline of the green turtle is long-term harvest of eggs and adults on nesting beaches and juveniles and adults on feeding grounds. These harvests continue in some areas of the world and compromise species recovery efforts. Incidental capture in fishing gear, primarily in gillnets, but also in trawls, traps and pots, longlines, and dredges is a serious ongoing source of mortality that also adversely affects the species' recovery. Green turtles are also threatened, in some areas of the world, by a disease known as fibropapillomatosis (NMFS, 2006).

The loss of many nesting beaches, and the smaller number of encounters between humans and green turtles over the past eight decades, provide inferential evidence that populations are generally declining (Hopkins and Richardson, 1984).

3.8.4.3 Atlantic Green Sea Turtles in the Action Area

Green sea turtles are occasionally encountered in the Action Area, but their occurrence is expected to be rare.

3.8.4.4 Potential Direct and Indirect Effects of the Proposed Action

The area being considered as a future sand source for the purpose of this BA is sufficiently offshore and deep enough to not provide a habitat for the SAV eaten by green sea turtles. Sea lettuce and algae do occur in these waters but are uncommon due to the water depths of the Action Area. A benthic study completed as part of the SRIPP studies confirmed that no SAV exists on either of the potential borrow sites. Therefore, there would be no direct effect on foraging habitat.

Green sea turtles move across the Action Area when migrating, though they rarely are seen. The possibility exists that a dredge may collide with a green sea turtle, but this is highly unlikely. The threat to individual green sea turtles of being entrained in the dredge drag head is not likely since turtle deflectors will be part of the normal operating equipment and since the green turtle is not often encountered in the area.

Dredging and placement of the material in the beach restoration area is unlikely to impact food sources or nesting areas.

3.8.5 Actions to Reduce Adverse Effects to Sea Turtles

NASA would conduct regular monitoring of the beach for potential nesting activity using a qualified biologist during sand placement activities if these activities take place during sea turtle nesting season. If a nest is detected, buffers would be established around the nest(s) where no sand placement activities would occur and NMFS/USFWS would be notified.

The greatest danger to sea turtles during dredging operations is entrainment in the hopper dredge. It is believed that entrainment primarily takes place when the drag head is operating on bottom sediments. Affected animals are usually feeding or resting near the bottom at the time the drag head moves along the bottom. In some rare instances, suction may be created when currents flow around the drag head as it is placed or moved.

The USACE has enacted contractual specifications for deflectors on all hopper dredges. They are as follows:

> "Hopper dredge drag heads shall be equipped with sea turtle deflectors that are rigidly attached. No dredging shall be performed without a turtle deflector device that has been approved by the Contracting Officer.
>
> The leading V-shaped portion of the deflector shall have an included angle of less than 90 degrees. Internal reinforcement shall be designed to have a plowing effect of at least 6 inches in depth when the drag head is being operated. Appropriate instrumentation or indicator shall be used and kept in proper calibration to ensure the critical 'approach angle,' which refers to the lower drag pipe relative to the plane of the sediment. If the lower drag head pipe angle varies significantly from the design approach angle, the 6-inch plowing effect does not occur and the deflector does not function to repel the sea turtles. When the deflector is in operation during dredging, operators need to make every effort to maintain the design approach angle and to ensure that the dredge is disengaged before it is lifted from the floor of the ocean."

In a USACE field test experiment, the rigid deflector, properly installed and operated, blocked 95 percent of mock turtles from entrainment in the dredge. This rate is probably lower than what would actually occur, given that live turtles have the ability to flee from danger (USACE 1997). It should be noted, however, that while turtle deflectors have been demonstrated to exclude 95 percent of mock turtles from the dredge, entrainment does still occur with these devices in place. According to NMFS, 55 of the 63 entrainments occurred in dredges with deflectors in place. The rate of entrainment (i.e., sea turtles compared to cubic yards) is much greater for projects within Chesapeake Bay than projects in other areas within the mid-Atlantic (NMFS, 2009c).

Turtle deflectors would be installed on the drag heads during dredging to reduce the risk of entrainment. In addition and as directed by the 2007 BO, NASA would implement the following measures to minimize impacts of incidental take of sea turtles:

1. NASA would ensure that during times of the year when sea turtles are known to be present in the Action Area, hopper dredges are outfitted with state-of-the-art sea turtle deflectors on the drag head and operated in a manner that will reduce the risk of interactions with sea turtles which may be present in the Action Area.
2. A NMFS-approved observer would be present on board the vessel for any dredging occurring in the April 1 – November 30 timeframe.
3. NASA would ensure that dredges are equipped and operated in a manner that provides endangered/threatened species observers with a reasonable opportunity for detecting interactions with listed species and that provides for handling, collection, and resuscitation of turtles injured during project activity.
4. NASA would ensure that all measures are taken to protect any turtles that survive entrainment in the dredge.
5. NMFS would be contacted before dredging commences and again upon completion of the dredging activity.

All interactions with listed species would be properly documented and promptly reported to NMFS/USFWS, as appropriate.

SECTION FOUR: CUMULATIVE EFFECTS

Cumulative effects include the effects of state, tribal, local, or private actions, not involving Federal activities that are reasonably certain to occur in the Action Area. Sources of human-induced adverse effects in cetaceans or turtles in the Action Area include incidental takes in state-regulated fishing activities and vessel collisions. In addition, ingestion of plastics, petroleum products, marine vessel-generated debris, and entanglement and drowning in crab pot lines can occur. The combination of these activities may affect populations of ESA-listed species, preventing or slowing a species recovery. Such incidents can be considered “takes,” but these takes are usually not reported or regulated. Turtles and whales can also be injured by boat propellers and during collisions with recreational vessels.

Dredging

The dredging of the offshore Wallops Island environment will neither diminish nor augment existing threats to fin whales, humpback whales, and right whales. The use of the dredge and associated tow vessels will temporarily increase boat traffic in the Action Area. Dredging operations will not significantly add pollutants or marine debris to the aquatic environment.

Dredging may impact marine mammals through noise generated during sand removal, changes to benthic habitats, and vessel collisions during transport of the material to a pump-out station offshore of the shoreline. Since dredging operations are generally relatively short duration, significant cumulative effects from associated noise are not anticipated. However, NASA would consult with NMFS on appropriate mitigation measures should multiple dredging operations overlap. It is assumed that noise would cause avoidance responses in species. Because the dredging operations will be limited to a small number shoals, it is not expected that multiple dredging operations would result in significant cumulative impacts to prey base of threatened and endangered marine mammals.

MMS (2004) reported on dredging and marine mammal collisions. Vessel collisions with endangered whales are one of the major factors limiting their recovery. There has never been a report of a whale strike or mortality by a hopper dredge in the U.S. (NMFS, 2004), although there is one report of a right whale calf mortality resulting from a strike by a dredging vessel in South Africa (MMS 2004). It is generally thought that hopper dredges move slow enough to minimize the risk of a strike with a marine mammal.

Cumulative effects to sea turtles may occur due to the multiple dredging operations planned in the offshore areas of Maryland and Virginia because turtles are more likely to be directly affected by dredging than other threatened and endangered species in the area. Although no specific data is available on the presence of sea turtles at the borrow sites, the characteristics of the areas to be dredged make them unlikely to be special or unique habitat for sea turtles. Due to depths at typical borrow sites that may be greater than 11 meters (35 feet) below msl, there is no abundant population of spider crabs (or rock crabs), which comprise the bulk of the diet for loggerheads and Kemp’s ridleys in the region (Burke et al., 1992), and no SAV or seagrass beds exist, which are used by green sea turtles. The coarse-grained sandy substrate is a result of strong tidal currents. Thus, within the possible dredge areas, the lack of abundant food resources makes it unlikely that turtles would remain any longer than it takes for them to travel through the area.

Table 5 summarizes the number of sea turtle takes, by month, from projects conducted in the Norfolk District from 1980 to 2009. For the 30 years reported, a total of 63 sea turtle takes were recorded. Of the 63 total takes, 53 were loggerheads. For 2000 to 2009, there have been no recorded takes of sea turtles for projects within the Norfolk District (USACE Sea Turtle Data Warehouse 2009, http://el.erdc.usace.army.mil/seaturtles/). The number of sea turtle takes from the SRIPP will be determined through consultation with NMFS.

Table 5: Sea Turtle Takes by Months Calendar Years 1980 – 2009, USACE Norfolk District

Cumulative Sea Turtle Takes for Norfolk District by Month and Species							
Month	**Greens**	**Hawksbills**	**Kemp's Ridley**	**Leatherbacks**	**Loggerheads**	**Unidentified**	**Total**
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	2	0	**2**
May	0	0	0	0	8	1	**9**
Jun	1	0	0	0	10	0	**11**
Jul	0	0	0	0	2	1	**3**
Aug	0	0	1	0	7	1	**9**
Sep	0	0	1	0	10	1	**12**
Oct	0	0	3	0	12	0	**15**
Nov	0	0	0	0	2	0	**2**
Dec	0	0	0	0	0	0	**0**
Totals	**1**	**0**	**5**	**0**	**53**	**4**	**63**

Source: USACE, 2009

Sand Placement

As a result of the initial beach placement, habitat may be created for the seabeach amaranth, Piping Plover, Red Knot, and nesting sea turtles in the area seaward of the seawall which currently contains no suitable habitat for these species. It is reasonable to assume these species may nest and utilize this additional habitat at some point after construction. However, it is not possible to predict at this time the potential number or locations of Piping Plover nests or sea turtle nests that may occur on the newly created beach from the restoration project.

Reasonably foreseeable projects such as NASA's Launch Range Expansion and additional rocket launches may result in potential impacts to Piping Plover nesting on this newly created habitat. It is not possible to predict the number of Piping Plover individuals or nests that may be impacted by these future activities.

Because it is not possible to predict which protected species would use the newly created beach in the future, NASA would re-initiate consultation with USFWS/NMFS as appropriate prior to renourishment activities.

SECTION FIVE: CONCLUSIONS

One plant, two birds, three whale species and four sea turtle species have been evaluated as part of this biological assessment for the Wallops Island Shoreline Restoration and Infrastructure Protection Program.

Since there is potentially suitable habitat for seabeach amaranth on north Wallops Island, NASA has determined that the proposed action may affect, but is not likely to adversely affect seabeach amaranth.

In the long term, the expansion of the beach would likely provide additional suitable habitat for shorebirds such as the Red Knot and the Piping Plover. Construction, excavation of the north Wallops Island area for renourishment fill, and beach fill placement activities would temporarily negatively impact shorebirds with construction noise levels and the movement of construction equipment on areas with existing beach habitat. For activities related to use of the north Wallops Island area for beach renourishment, NASA would work with USFWS on specifying and implementing mitigation measures to ensure adequate protection for Piping Plovers. Since the Red Knot only uses the Action Area as a stop over for migration, NASA has determined that project may affect but is not likely to adversely affect the Red Knot. Because the Action Area serves as a breeding and nesting area for the Piping Plover, NASA has determined that the project may affect and is likely to adversely affect this species.

The three listed whale species assessed in this BA (humpback, fin, and right whale) may traverse near or through the Action Area during migration although they tend to prefer deeper habitats than those of the Action Area. As such, there exists a small potential for incidental take should a collision with a dredge occur. However, dredge speeds are relatively low (no greater than 3 knots while dredging and 10 knots while empty). This should enable the operators to avoid whales by maneuvering to avoid a whale strike. Therefore, NASA concludes that the proposed action may affect, but is not likely to adversely affect the three listed whale species during the months they would possibly be in the Action Area.

Four listed sea turtle species (leatherback, Kemp’s ridley, loggerhead, and Atlantic green) were assessed in this BA. Because these turtles are not known to successfully nest on Wallops Island beaches, the Proposed Action would not affect sea turtle nesting. Entrainment in drag heads is the primary risk regarding incidental take of sea turtles, although for the larger leatherback this is not a concern. Turtle deflectors, although not 100 percent effective, have been successfully used on dragheads to reduce the risk of sea turtles being captured and killed. The ranges and migratory movements of sea turtles are largely correlated with water temperature. Sea turtles are likely to be found in the Action Area between April and November of each year. Leatherback turtles are less affected by cold water temperatures and may stay in northern regions throughout the year. Therefore, NASA has determined that the Proposed Action may affect, and is likely to adversely affect the loggerhead and Kemp’s ridley sea turtles, and may affect, but is not likely to adversely affect the leatherback or Atlantic green sea turtles.

Table 6 summarizes NASA’s determination of effects to federally protected species under the ESA.

Table 6: Determination of Effects to Federally Protected Species

Species	Jurisdiction	NASA's Determination
Seabeach amaranth	USFWS	May affect, not likely to adversely affect
Red knot	USFWS	May affect, not likely to adversely affect
Piping Plover	USFWS	May affect, likely to adversely affect
Humpback whale	NMFS	May affect, not likely to adversely affect
Fin whale	NMFS	May affect, not likely to adversely affect
Right whale	NMFS	May affect, not likely to adversely affect
Leatherback sea turtle	NMFS/USFWS	May affect, not likely to adversely affect
Kemp's ridley sea turtle	NMFS/USFWS	May affect, likely to adversely affect
Loggerhead sea turtle	NMFS/USFWS	May affect, likely to adversely affect
Atlantic green sea turtle	NMFS/USFWS	May affect, not likely to adversely affect

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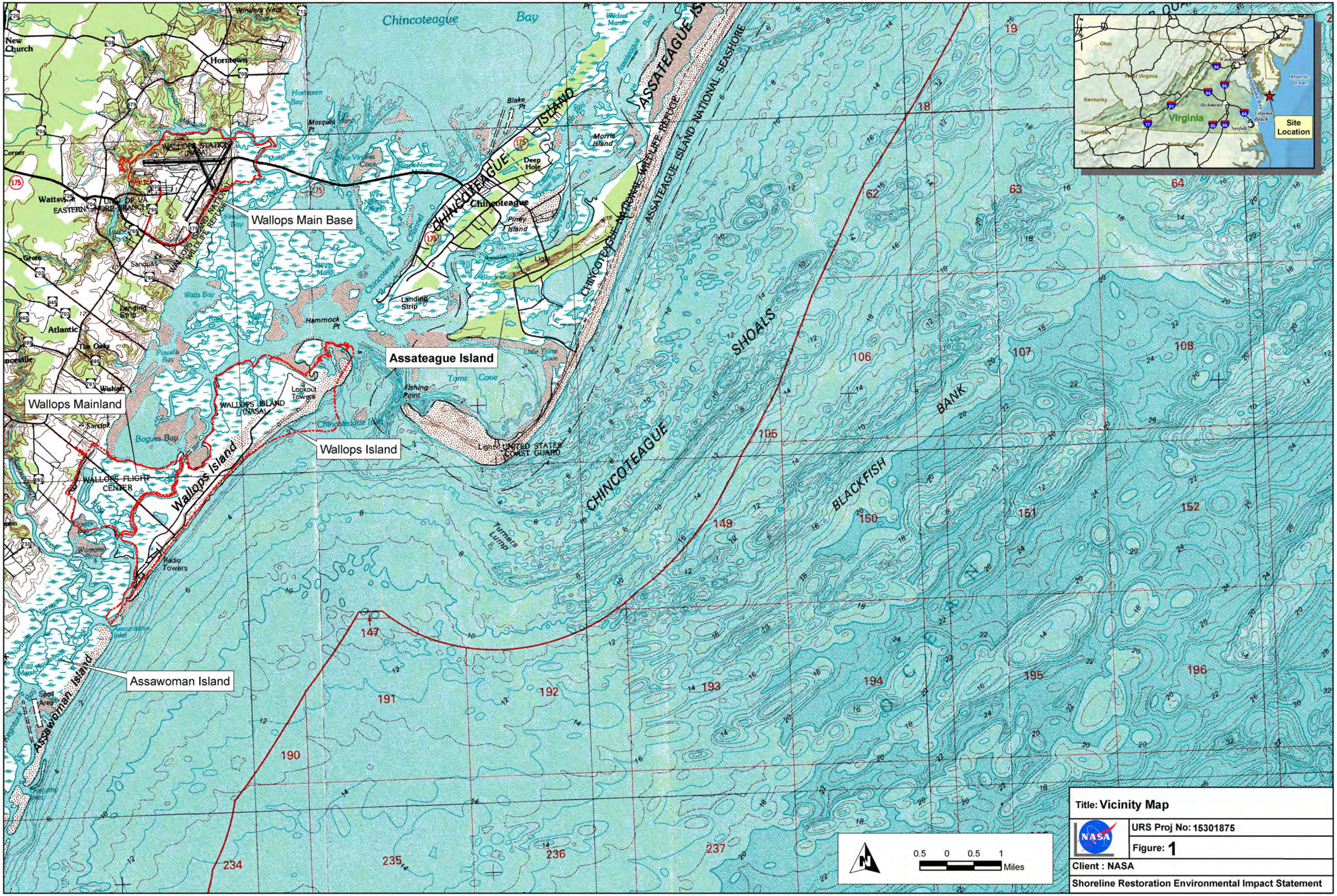
FIGURES



Title: Vicinity Map

URS Proj No: 15301875

Figure: 1

Client : NASA

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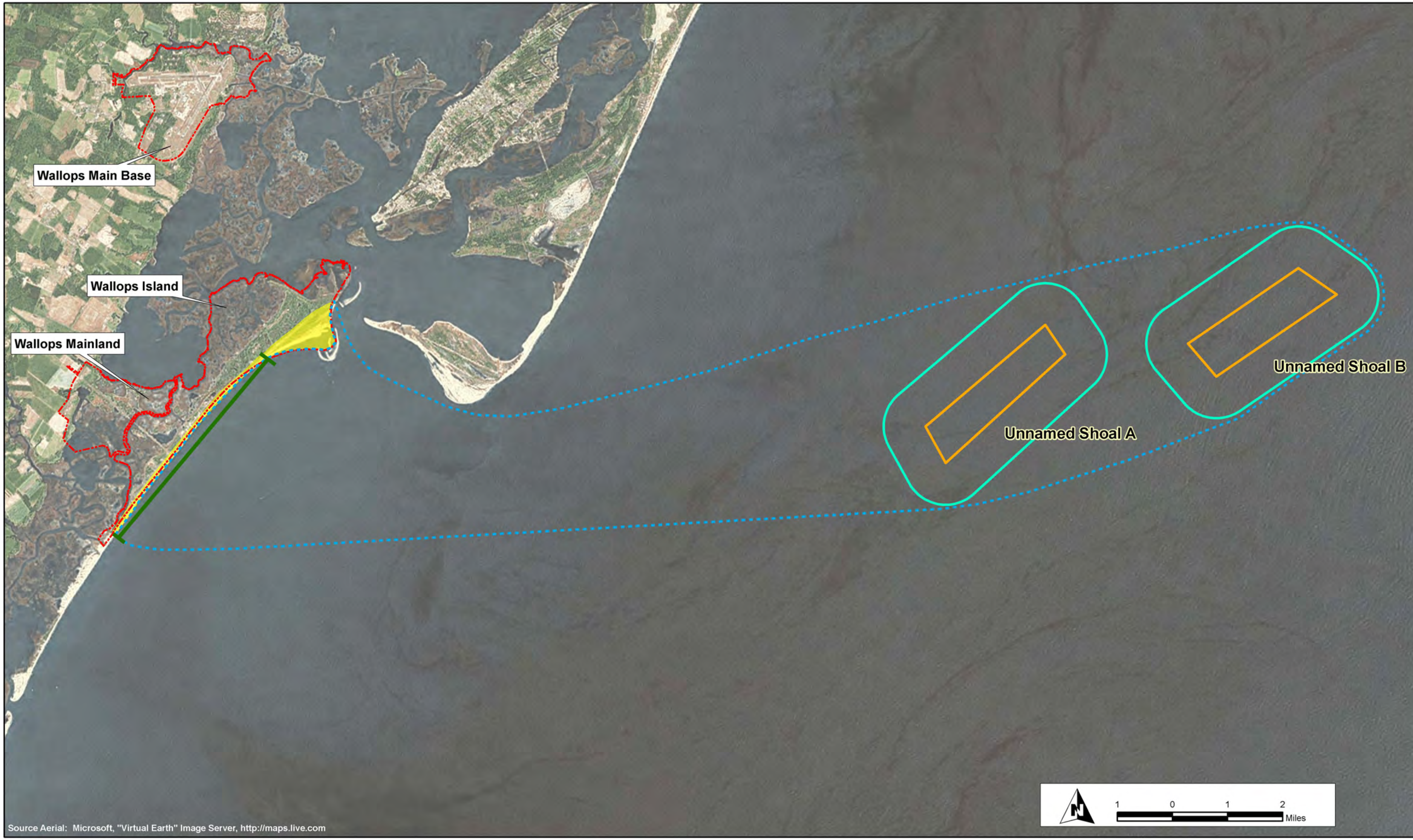

Beach Fill Extent

Shoal Location

4000 Foot Buffer Around Shoal

Shoreline Action Area

WFF Boundary

Offshore Action Area

Title:	Action Area
	URS Proj No: 15301785
	Figure: 2
Client : NASA	
Shoreline Restoration Environmental Impact Statement	

Title: Wallops Island Viewed from the South

URS Proj No:15301785

Figure: 3

Client : NASA

Shoreline Restoration Environmental Impact Statement

Title: **Protected Species in the Vicinity of Wallops Island**

URS Proj No: 15301785

Figure: 4

Client : NASA

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