ENVIRONMENTAL APPENDIX

NORFOLK HARBOR NAVIGATION IMPROVEMENTS GENERAL REEVALUATION REPORT/ ENVIRONMENTAL ASSESSMENT

VIRGINIA

APPENDIX E2 BIOLOGICAL ASSESSMENT: NOAA: National Marine Fisheries Service

May 2018

U.S. Army Corps of Engineers
Norfolk District

THE PORT OF VIRGINIA®

NORFOLK HARBOR NAVIGATION IMPROVEMENTS

BIOLOGICAL ASSESSMENT

Submitted To:
National Oceanographic and Atmospheric Administration
National Marine Fisheries Service
Greater Atlantic Field Office

U.S. Army Corps of Engineers
Norfolk District
803 Front Street
Norfolk, Virginia 23510

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US Army Corps of Engineers ®

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1.0 INTRODUCTION, PURPOSE, AND, NEED

The Norfolk Harbor and Channels consists of a network of multiple channel and anchorage elements that provide two-way, full-width navigation from the Atlantic Ocean into the Port of Hampton Roads. The harbor in which the Port of Hampton Roads facilities are located covers a 25 square mile area and serves the cities of Norfolk, Newport News, Portsmouth, Chesapeake, and Hampton in southeastern Virginia.

The purpose of the Norfolk Harbor Navigation Improvements Project is to improve the operational efficiency of commercial vessels currently using the Norfolk Harbor and Channels from the Atlantic Ocean Channel to the Lamberts Bend and commercial vessels projected to use the harbor in the future. The need for this project arises from inefficiencies currently experienced by commercial vessels in Norfolk Harbor and Channels. These inefficiencies are projected to continue in the future as vessel sizes are expected to increase.

2.0 PROJECT SCOPE

The Norfolk Harbor Project is a single purpose deep draft navigation project that consists of a network of federally improved channels extending from the Atlantic Ocean, through the Chesapeake Bay, and into the Port of Hampton Roads (Figure 1). Since the Water Resources Development Act (WRDA) of 1986, the project has been constructed in separable elements based on the needs of the port community and the financial capability of the non-federal sponsor, the Virginia Port Authority, agent of the Commonwealth of Virginia. The 50 Foot Outbound Element was completed in 1989; the 50 Foot Anchorage in 1999; and 50 Foot Inbound Element in 2007. The authorized project includes a system of two-way, full-width channels to a depth of 55 feet in the Norfolk Harbor and Thimble Shoal Channels and 57 feet in the Atlantic Ocean Channel.

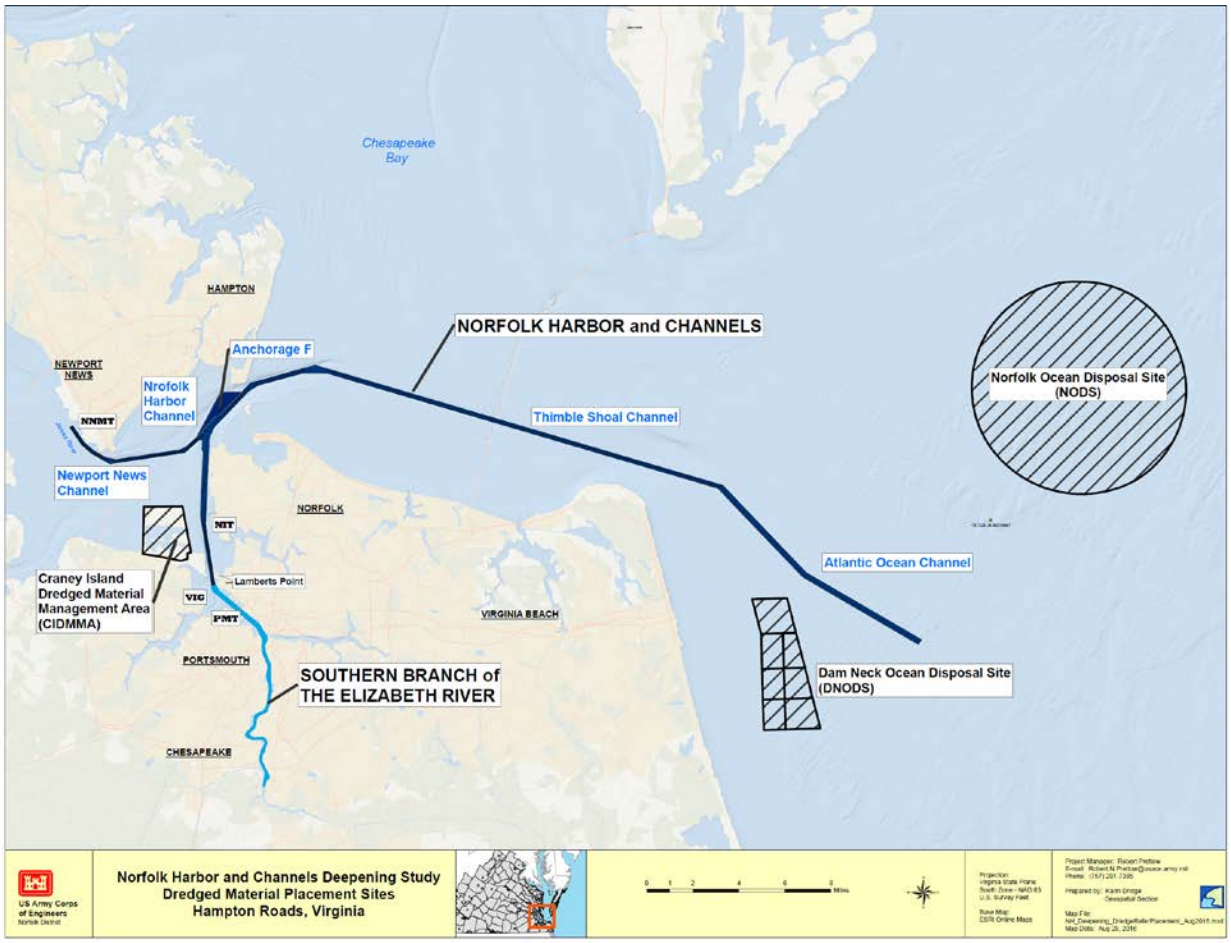

Figure 1. The Norfolk Harbor and Channels from the Atlantic Ocean Channel to the Lamberts Bend is the subject of this Biological Assessment (navy). Location of the Norfolk Harbor and Channels within the Elizabeth River is shown for reference but is not in the Action Area (light blue). Dredged material placement/disposal sites within the Action Area for this project are also shown.

2.1 CURRENT NORFOLK HARBOR PROJECT DREDGING AND DREDGED MATERIAL PLACEMENT/DISPOSAL PRACTICES

Atlantic Ocean Channel

The Atlantic Ocean Channel, off the eastern coast of Virginia (Figure 2), was authorized by the WRDA of 1986. The WRDA authorized the U.S. Army Corps of Engineers (USACE) to construct the Atlantic Ocean Channel which consists of a channel 11.1 miles long, 1,300 feet wide, and 57 feet deep. Please note that depths described in this document are provided in Mean Lower Low Water (MLLW). As part of the 50-foot inbound construction effort in 2006, the channel was deepened to provide for a required depth and width of 52 feet and 1,300 feet, respectively. The Atlantic Ocean Channel is part of the Port of Virginia and Baltimore system of channels, and is the segment providing access for all ships calling on port facilities, naval bases, and shipyards in the Hampton Roads, York River and Baltimore areas. All commercial tonnage entering and leaving the Ports of Virginia and Baltimore pass through this channel. The channel is currently maintained to a full width and a required depth of 52 feet to enable

loaded colliers, container ships and military vessels to transit the channel with ship drafts as great as 50 feet.

Material is typically dredged via hopper dredge from this channel. Dredged material is placed at Dam Neck Ocean Disposal Site (DNODS). Dredged material also has been used for beneficial uses for the Virginia Beach Hurricane Protection project and the Craney Island Eastern Expansion (CIEE) Project. The sediment composition in this channel segment is largely fine sand (85%) with some silt (15%). The channel has been utilized as a sand borrow source for hurricane protection projects and port development projects, therefore maintenance of the channel has not been required.

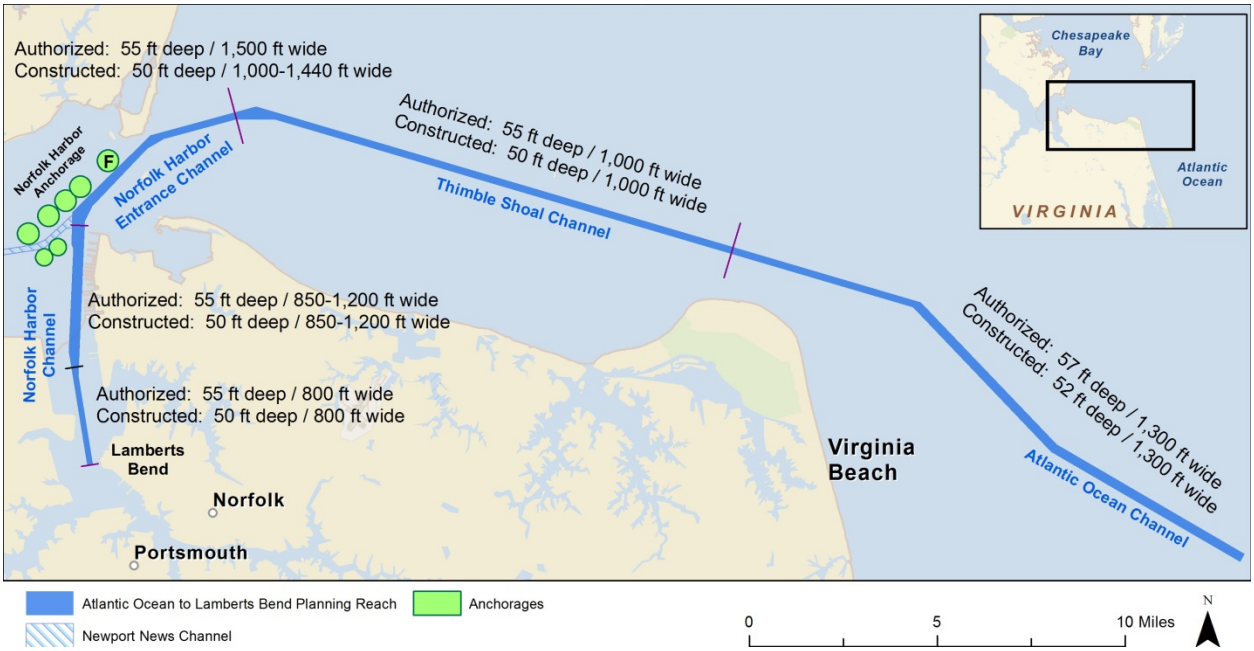

Figure 2. Segment 1 includes the Atlantic Ocean Channel, the Thimble Shoal Channel, and the Norfolk Harbor Channel. Authorized dredging depths and the existing dredging depths that have been constructed to date are depicted.

Thimble Shoal Channel

The Thimble Shoal Channel is located in the southern part of the Chesapeake Bay, just off the shoreline of Norfolk and Virginia Beach, east of the Craney Island Dredged Material Management Area (CIDMMA) (Figure 2). This project was originally authorized by the River and Harbor Act of 1917. The authorized channel dimensions are 13.4 miles long, 1,000 feet wide, between the 55 foot contours, to a depth of 55 feet. Although the channel is authorized to be dredged to 55 feet, the channel is currently maintained to a required depth of 50 feet. Thimble Shoal Channel extends from the deep water to the east of Hampton Roads to the deep water at the mouth of the Chesapeake Bay.

Material dredging is via hopper dredging. Dredged material is placed at the DNODS. The sediments of Thimble Shoal Channel to the west of the Chesapeake Bay Bridge Tunnel are predominantly clays and silts (50-75%). In contrast, sediments in the eastern portion of channel are largely fine to medium-grained sand (75-90%).

Channel to Newport News and Anchorages

The Channel to Newport News and associated Newport News anchorages segment (Figure 3) of the Norfolk Harbor Project is authorized to 55 feet deep by 800 feet wide from Norfolk Harbor Channel in Hampton Roads to Newport News and the Newport News Anchorages. However, the channel is currently maintained to a required depth of 50 feet. Material dredging is via hydraulic and/or mechanical dredging methods. Material dredged from this area is then placed at the CIDMMA.

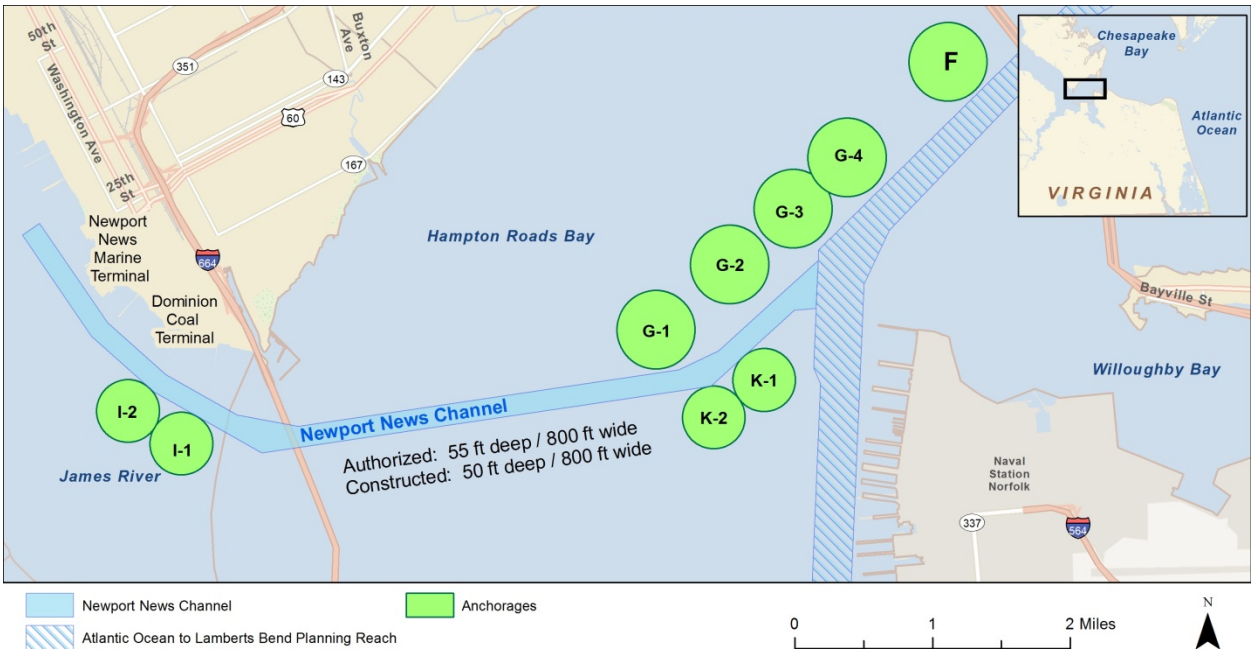

Figure 3. Segment 2 is the Newport News Channel. The authorized dredging depth and the existing dredging depth that has been constructed to date is depicted. Anchorages are also shown for reference. Deepening of Anchorage F is being considered for this project.

Norfolk Harbor Channel - Sewells Point to Lamberts Bend and Norfolk Harbor Anchorages

The Sewells Point to Lamberts Bend reach of the Norfolk Harbor Project is located in Norfolk between Sewells Point and Lamberts Bend. This segment of the project is approximately eight miles long and varies in width between 800 feet to 1,200 feet. This reach also consists of: Anchorage F, Sewells Point East Anchorage (includes the Naval Maneuvering Area and Approach Areas), Sewells Point West Anchorage and (Approach Area), Anchorage G, and all approach areas.

The authorized project dimensions for this reach include a channel 55 feet deep and 1,200 feet wide from that depth in Hampton Roads to a point approximately 6.0 miles upstream from the Hampton Roads Bridge-Tunnel; thence 55 feet deep and 800 feet wide to Lambert Point. The Sewells Point to Lamberts Bend Channel is currently maintained to a required depth of 50 feet MLLW from the 55-foot contour in Hampton Roads (near the Hampton Roads Bridge Tunnel) to Lamberts Point.

Material is dredged from this area via hydraulic cutterhead pipeline dredge and/or a clamshell dredge. Material dredged from this area is then placed at the CIDMMA. The consistency of the dredged material in the Sewells Point to Lamberts Bend Channel is primarily silt and clay

(85%), with some sand (15%). The consistency of the Elizabeth River sediment is predominantly clay in the Town Point area of Norfolk. However, as you travel south along the Elizabeth River (towards Chesapeake), the sediments become increasingly more coarse and sandy.

Dam Neck Ocean Disposal Site

The DNODS is located three nautical miles east of Virginia Beach (Figure 1). The DNODS area was first utilized as an ocean placement site in 1967. This ocean placement site was designated by the administrator of the U.S. Environmental Protection Agency (USEPA) in March of 1988. The DNODS runs parallel to Virginia Beach, covering about eight square nautical miles. Water depths at DNODS vary between 31 to 49 feet deep. The remaining DNODS capacity is estimated to be about 63 million cubic yards. The site is the primary dredged material disposal site for the Thimble Shoals Channel, Cape Henry Channel, and Atlantic Ocean Channel.

Norfolk Ocean Disposal Site

The NODS (Figure 1) was officially designated as an ocean placement site in 1993, pursuant to Section 102 (c) of the Marine Protection, Research, and Sanctuaries Act of 1972 (as amended, 33 U.S.C. 1401 *et seq*). This ocean placement site was designated by the administrator of the USEPA in December of 1986. The site is authorized to receive new work and maintenance dredged material from the lower Chesapeake Bay. This site is also authorized to receive appropriate dredged material from the Thimble Shoal, Cape Henry, Atlantic Ocean Channel, Hampton Roads, and York Spit channels. An Environmental Impact Statement, titled: “Final Environmental Impact Statement for the Designation of an Ocean Dredged Material Disposal Site Located Offshore Norfolk Virginia” was finalized in November of 1992.

The center of the NODS is located 17 nautical miles from Virginia Beach. Water depths near the center of the site vary between 65 to 80 feet. Up to approximately 250 million cubic yard of dredged material from dredging projects (public and private) may be disposed at the site over the next 49 years. The quantity of material to be placed at the site depends on the quality of the dredged material. Only material that meets ocean dumping criteria will be disposed at the designated site. This includes unconsolidated fine to medium grain sands, silts, and clays.

Craney Island Dredged Material Management Area

The CIDMMA is located in the City of Portsmouth in the eastern portion of the Atlantic Coastal Plain and adjacent to the confluence of the James River, Elizabeth River, and Nansemond River, and is in close proximity to the Chesapeake Bay and the Atlantic Ocean. The CIDMMA is a 2,500 acre confined disposal facility in the Hampton Roads area of Virginia. The CIDMMA was authorized by the River and Harbor Act of 1946 and constructed from 1956-1958. The federally owned facility is operated by USACE and is used by private interests, local municipalities, federal and Commonwealth of Virginia government agencies for the disposal of dredged material from Norfolk Harbor and its adjacent waterways.

Dredged material is received in two different ways at the CIDMMA. It is either pumped directly into one of three upland containment cells or it is deposited in the rehandling basin and then pumped into the facility. The Craney Island Rehandling Basin is a large deeper area off the southeast shoreline of the island that can be filled with material and then dredged once filled. Since it began operation, the CIDMMA has received, on average, 3.5 million cubic yards of dredged material per year. However, there have been several years when it has received more than 10 million cubic yards. At present, the USACE estimates that the facility has a

realistic timeline lasting until 2030. However, this may change as newer technologies and/or new management techniques are employed at the facility.

2.2 DREDGING AND DREDGED MATERIAL PLACEMENT PRACTICES FOR THE PREFERRED ALTERNATIVE

This Biological Assessment was developed to describe the potential impacts that could occur to federally listed threatened and endangered species under the jurisdiction of the National Oceanographic and Atmospheric Administration, National Marine Fisheries Service (NMFS) from implementation of the Preferred Alternative. The Preferred Alternative consists of constructing and maintaining the following features:

- Deepening the Atlantic Ocean Channel to a required depth of approximately 59 feet;
- Deepening the Thimble Shoal Channel to a required depth of approximately 56 feet;
- Deepening the Norfolk Harbor Channel to a required depth of approximately 55 feet;
- Deepening the Norfolk Harbor Entrance Channel to a required depth of approximately 55 feet;
- Deepening the Newport News Channel to a required depth of approximately 55 feet;
- Widening the Thimble Shoal Channel east of the Chesapeake Bay Bridge Tunnel to approximately 1,300 feet;
- Widening Anchorage F to approximately 3,620 feet and associated modifications of the Approach Area; and
- Deepening Anchorage F to a required depth of approximately 51 feet.

The Preferred Alternative includes construction and maintenance of these features. Dredged material placement/disposal could occur at the DNODS, the NODS, the CIDMMA, and/or upland disposal sites for this project (if needed). Portions of the dredged areas may be suitable for beneficial use projects and beneficial use projects would be coordinated separately from this project. General operation and maintenance of the CIDMMA will continue with or without implementation of the Preferred Alternative.

It should also be noted that channel deepening in itself may also lead to some side sloping and widening of the channel, however, we would not estimate any of these impacts to range more than approximately 30 feet from the toe of each side of the channel. As optimization of the Preferred Alternative is ongoing, actual project depths and project deepening and widening features may vary slightly prior to construction.

The project also includes general operation and maintenance of the CIDMMA. The project also includes general operation and maintenance of the CIDMMA. General maintenance of the CIDMMA may include activities to maintain the placement/disposal site which include but would not be limited to:

- Integrated pest management practices to control invasive plant species;
- Planting of upland and wetland vegetation to enhance the site;
- Dike raising and other stabilization measures; and
- Maintenance of the breakwaters and shoreline.

The project construction is anticipated to begin in approximately 2023 and following construction, channel depths would be maintained over the 50 year lifecycle of the project.

One important consideration important in the impact analysis is that the actual dredged depths can be deeper than the required channel depths. Required depths do not necessarily indicate the maximum, potential dredging depths which may also include Advanced Maintenance Dredging (1 foot), Paid Allowable Overdepth Dredging (2 feet), and Non-Pay Allowable Overdepth dredging (2 feet) for the Norfolk Harbor Project. Please see Table 1 for an approximate estimate of estimated maximum, potential dredging depths that account for the overdepth and advanced maintenance dredging with implementation of the Preferred Alternative. For the purpose of this Biological Assessment we refer to required depths throughout the text but in terms of the environmental impact analysis (affect determination), the estimated maximum, potential impact depths and dredging volumes will be used (Table 1).

Dredges used for construction and maintenance of the Preferred Alternative would include hopper dredges, hydraulic cutterhead dredges, as well as mechanical dredges. Channel bed leveling equipment may also be used to flatten the channel bottom following dredging.

In the future, with or without implementation of the Preferred Alternative, vessel calls are anticipated to increase as compared to current conditions. However, when comparing the future with or without the project, there would be less vessel calls in the future with project as compared to the future without project because the existing, larger ships in the fleet would carry more goods, thus requiring fewer vessel calls to transport the same amount of goods.

Figure 4. Potential channel widening locations (also referred to as Meeting Area 1 and Meeting Area 2).

Table 1 summarizes the approximate dredging volumes, and durations with implementation of the No Action/Future Without Project Alternative and the Preferred Alternative.

Table 1. Summary of estimated dredging volumes and durations over the lifecycle of the No Action/Future Without Project Alternative and the Preferred Alternative (Action Alternative).

		Estimated Construction					Estimated Maintenance (50 Years)		Estimated Construction and Maintenance (50 Years)	
Alternative	**Required Depth (feet)**	**Estimated Maximum Depth (feet)**	**Estimated Maximum Dredging Volume- all allowable and nonpay (cubic yards)**	**Estimated Maximum Dredging Duration (months)**	**Estimated Total Land Disturbance - Maximum (square feet)**	**Change/Delta (increase) in Land Disturbance - Maximum (square feet)**	**Estimated 50 Year Total of Maintenance Volume (cubic yards)**	**Estimated 50 Year Total - Maintenance Dredging Duration (months)**	**Estimated Maximum Volume-Total Allowable and Non-pay + Maintenance Volume (cubic yards)**	**Estimated Maximum Construction + 50-year Maintenance Dredging Duration (months)**
NAA/FWOP-Segment 1 Atlantic Ocean Channel	52	57	2,152,820	6	76,166,690	0	8,217,950	33	10,370,770	39
NAA/FWOP-Segment 1 Thimble Shoals Channel	50	55	4,371,193	14	114,682,571	0	16,278,850	140	20,650,043	154
NAA/FWOP-Segment 1 Sewells Point to Lamberts Bend	50	55	4,460,147	4	52,664,951	0	36,681,500	68	41,141,647	72
NAA/FWOP-Segment 1 Anchorage F	50	55	210,956	2	24,930,676	0	6,851,800	14	7,062,756	15
NAA/FWOP-Segment 2 Newport News Channel	50	55	1,658,438	1	27,157,981	0	5,481,200	13	7,139,638	14
Total			**12,853,553**	**26**	**295,602,869**		**73,511,300**	**268**	**86,364,853**	**295**
PA-Segment 1 Atlantic Ocean Channel	59	64	16,074,736	42	78,738,613	2,571,924	15,191,112	62	31,265,848	104
PA-Segment 1 Thimble Shoals Channel	56	61	18,069,823	57	119,644,916	4,962,345	24,331,540	210	42,401,363	267
PA-Segment 1 Thimble Shoals Channel Meeting Area 2 (1,300 feet)	56	61	3,072,847	10	13,693,000	13,693,000	2,000,744	17	5,073,591	27
PA-Segment 1 Sewells Point to Lamberts Bend	55	60	12,147,318	11	57,012,805	4,347,854	42,346,689	78	54,494,008	89
PA-Segment 1 Anchorage F - 3,620 feet	51	56	2,522,500	19	27,984,077	3,053,401	6,858,836	14	9,381,336	33
PA-Segment 2 Newport News Channel	55	60	4,906,284	4	29,272,754	2,114,772	6,676,305	16	11,582,589	19
Total			**56,793,508**	**143**	**326,346,166**	**30,743,297**	**97,405,226**	**397**	**154,198,734**	**539**

NAA/FWOP=No Action Alternative, Future Without Project; PA=Preferred Alternative

2.3 PROJECT SCHEDULE AND DREDGING FREQUENCIES

Construction is anticipated to begin in approximately 2023 but is contingent on funding availability. Construction (all channels and Anchorage F) of the Norfolk Harbor and Channels Deepening Project will take approximately 3.5 to 4 years to complete. Maintenance dredging is anticipated to occur on the approximate schedule below and is contingent on funding availability:

- Atlantic Ocean Channel: approximately every three to four years; after the deepening, this may accelerate to every two to three years.
- Thimble Shoals Channel: approximately every two to three years
- Norfolk Harbor Channel: approximately every 12-15 months
- Newport News Channel: approximately every three to four years
- Anchorage F: approximately every five years

Maintenance dredging may occur on an accelerated schedule based on shoaling conditions in the channel resulting from storm events or a delayed schedule depending on funding availability. Maintenance dredging will take approximately three to six months to complete and will be contingent on the type and size of the dredge used. Construction may occur at any time of the year, however, to the maximum practical extent possible, construction will not occur during September 1 - November 15 to reduce potential impacts to sea turtles. In general, construction operations will average approximately 18-hours per day any time of the day or night. The approximately six hours per day of construction operations may include equipment maintenance and personnel shifts.

2.4 RECENT CONSULTATION HISTORY AND CURRENT CONSULTATION

The USACE formally consulted with the NMFS in 2012, for multiple navigational channel and hurricane protection project sites within the Chesapeake Bay and Atlantic Ocean watershed, in order to determine the effects to federally listed threatened and endangered species. During consultation, individual consultation were requested for the projects. During the consultation period in 2012, NMFS requested the USACE consider a “batched” Biological Opinion for efficiency due to the volume of consultations resulting from the Atlantic sturgeon listing. The USACE agreed to be issued its own incidental take statement, and each included project would be able to re-initiate Section 7 consultation independently of the other projects when scope changes or project specific conditions warranted reinitiation of consultation. Section 2.0 of the 2012 NMFS Biological Opinion states that reinitiation of Section 7 consultation for an individual project covered in the batched opinion is allowable for affects that are limited to one action (e.g. a change in dredge type, dredge volume or disposal area).

The consultation and NMFS’s resulting Biological Opinion (NMFS 2012) included the Action Area for the Norfolk Harbor, maintenance to Congressionally-authorized depths, as well as disposal of dredged material at CIDMMA and CIEE. The USACE projects covered by NMFS’ findings were: maintenance dredging of the entire Norfolk Harbor and Channels, the Cape Henry Channel, York River Entrance Channel, York River Spit Channel, Thimble Shoals Channel, Atlantic Ocean Channel; and dredged material placement at DNODS, NODS, Virginia Beach Hurricane Protection Project, Sandbridge Beach Nourishment Project, CIDMMA, Craney Island Eastern Expansion, Wolf Trap Alternative Placement Site, and others. Therefore, its findings are inclusive of effects beyond the Action Area of this project. The NMFS issued its Biological Opinion on October 16, 2012, and it stated that its findings are valid for a period of 50 years (NMFS 2012). A more detailed account of previous consultation history between the USACE and the NMFS is described in the NMFS (2012) batched Biological Opinion.

For this Biological Assessment and consultation with species under the jurisdiction of the NMFS, we are only reinitiating consultation for the portion of the Norfolk Harbor and Channels from the Atlantic Ocean Channel to the Lamberts Bend (including the Newport News Channel), and Anchorage F and associated dredged material placement/disposal sites (including operations and maintenance of the CIDMMA) and this will not affect the other consultations described in the NMFS (2012) Biological Opinion.

2.5 ACTION AREA

Per 50 CFR 402.02, the Action Area is defined 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 consists of the areas transited by dredging vessels/equipment, areas of navigation channel dredged as well as Anchorage F, and dredged material management/disposal sites. The Action Area includes the area of anticipated circulation patterns shifts and potential water quality impacts. The geographic extent of water quality impacts is dependent upon factors such as the type of dredging equipment, the dredging depth, and environmental conditions such as wind and currents (USACE 1983). The Action Area includes the range of noise impacts as they relate to individual listed species. A maximum buffer distance of five miles was used to account for any sound-related impacts associated with the project.

2.6 FEDERALLY LISTED SPECIES WITH THE POTENTIAL TO OCCUR IN THE ACTION AREA

Animals and plants listed as endangered or threatened are protected under the Endangered Species Act of 1973, as amended (ESA). According to the ESA, an "endangered species" is defined as any plant or animal species in danger of extinction throughout all or a substantial portion of its range. A "threatened species" is any species likely to become an endangered species in the foreseeable future throughout all or a substantial part of its range. "Proposed Species" are animal or plant species proposed in the Federal Register to be listed under Section 4 of the ESA. "Candidate species" are species for which the USFWS and NMFS have sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA.

This section provides a summary of the federally listed species under the jurisdiction of the NMFS that are known or have the potential to occur in the Action Area. The following references were consulted for compilation of the threatened and endangered species that have the potential to occur in the Action Area that is provided in Table 2:

- Marine mammal survey data collected in portions of the Action Area (Aschietto et al. 2017-2015);
- Virginia Aquarium Stranding Response Program's Vessel Interaction datasets for sea turtles and marine mammals (Virginia Aquarium Foundation/Virginia Aquarium Stranding Response Program 2017a-2017b);
- Virginia Sea Turtle and Marine Mammal Stranding Network Reports (Swingle et al. 2017-2010; Barco and Swingle 2014);
- Information, Planning and Consultation System (IPaC) search conducted within the Action Area (U.S. Fish and Wildlife Service (USFWS) 2017);
- Virginia Fish and Wildlife Information Service (VaFWIS) database (VDGIF 2016b);
- Virginia Natural Heritage Database Search (Virginia Department of Conservation and Recreation (DCR) 2016);

- National Oceanographic and Atmospheric Administration, National Marine Fisheries Service (NMFS) (2012) batched Biological Opinion that includes the Norfolk Harbor; and the
- Large Whale Strike Database (Jensen and Silber 2003).

Figures 5 depicts the recorded locations of stranded, listed whales reported in the Action Area based on the Virginia Sea Turtle and Marine Mammal Stranding Network Reports (Swingle et al. 2017-2010) and the Virginia Aquarium Stranding Response Program's Vessel Interaction datasets for sea turtles and marine mammals (Virginia Aquarium Foundation/Virginia Aquarium Stranding Response Program 2017a-2017b).

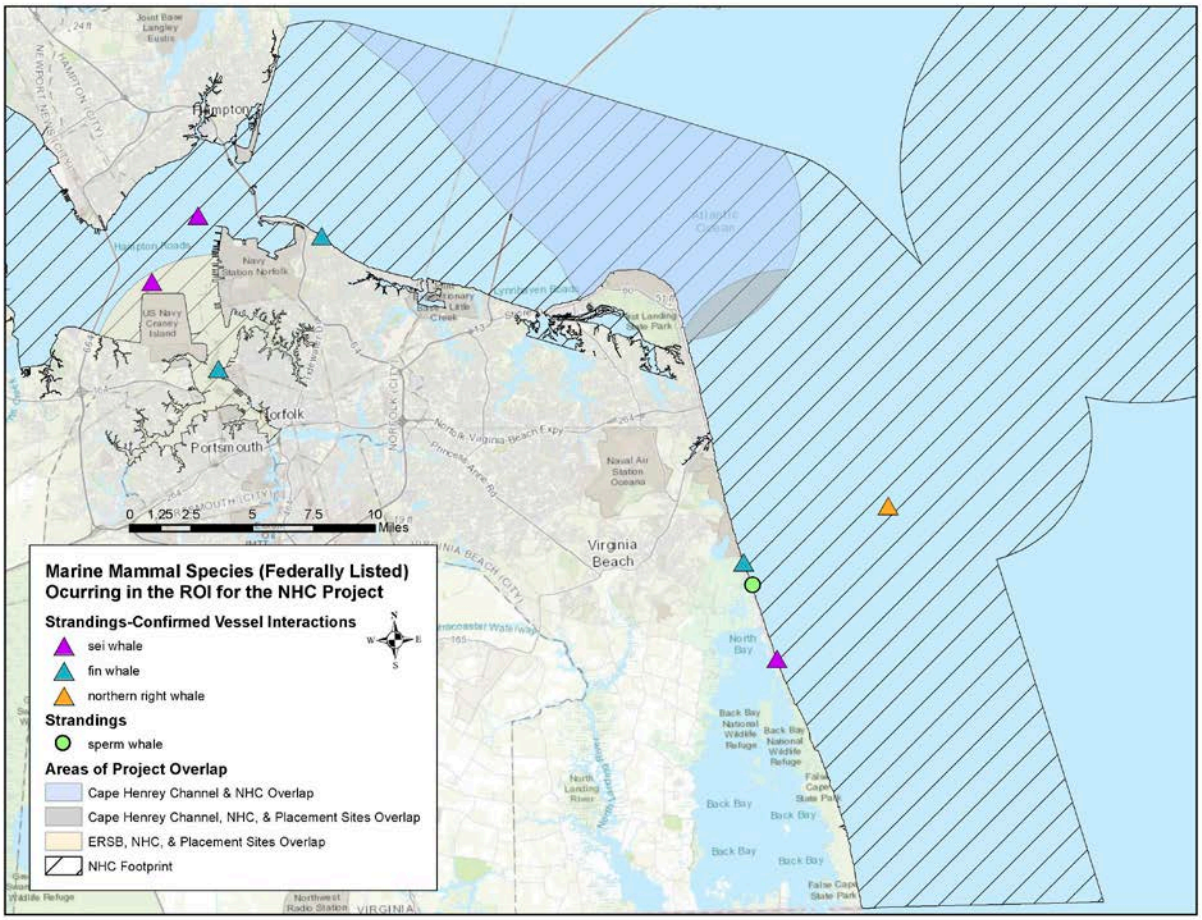

Figure 5. Listed whale strandings reported to occur in the Action Area (Swingle et al. 2017-2010; Virginia Aquarium Foundation/Virginia Aquarium Stranding Response Program 2017a-2017b).

The Aschietto et al. 2016-2015 survey data documented the recurrent presence of the fin whale in the northeastern portions of the Action Area near the Thimble Shoal and the Atlantic Ocean Channel.

Figure 6 - Figure 9 depict the recorded locations of stranded listed sea turtles reported in the Action Area based on the Virginia Sea Turtle and Marine Mammal Stranding Network Reports (Swingle et al. 2017-2010).

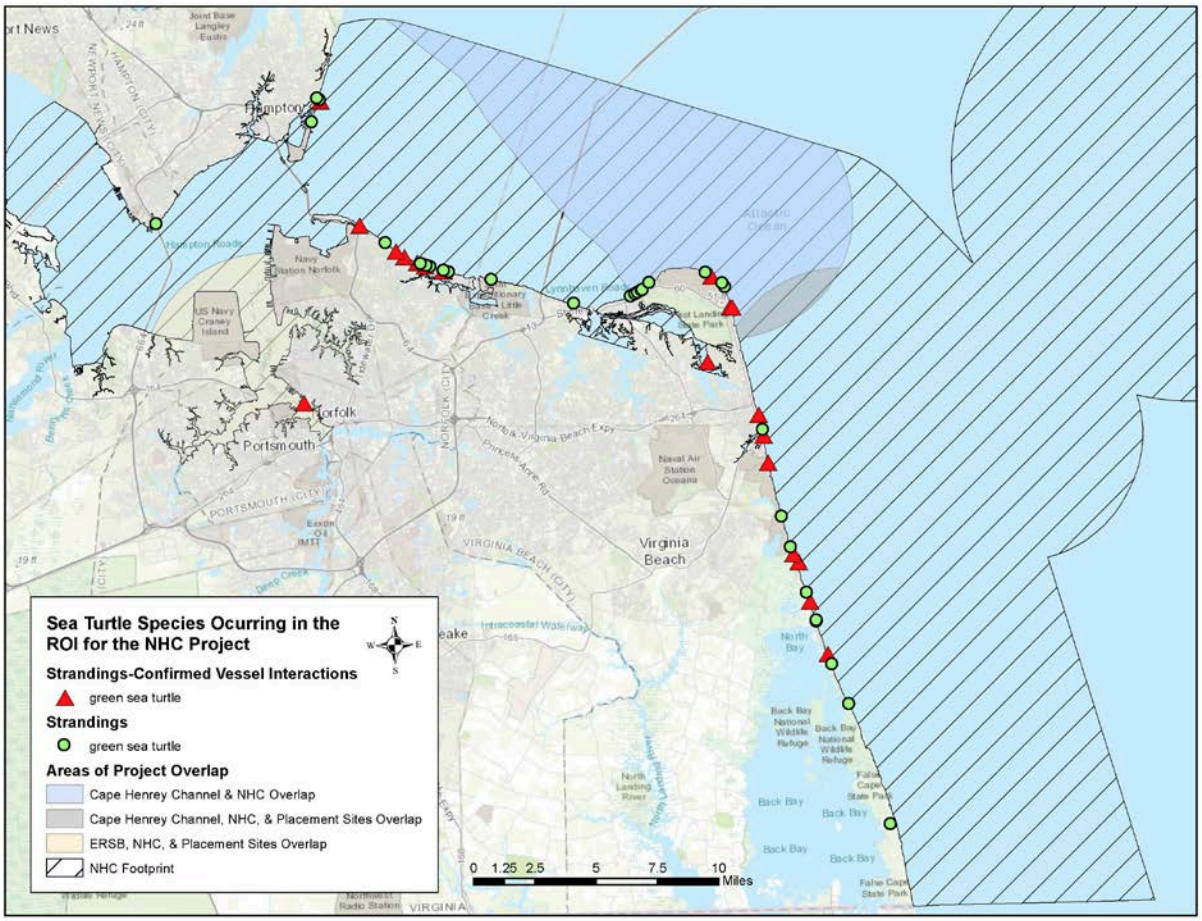

Figure 6. Green sea turtle strandings in the Action Area (Swingle et al. 2017-2010; Virginia Aquarium Foundation/Virginia Aquarium Stranding Response Program 2017a-2017b).

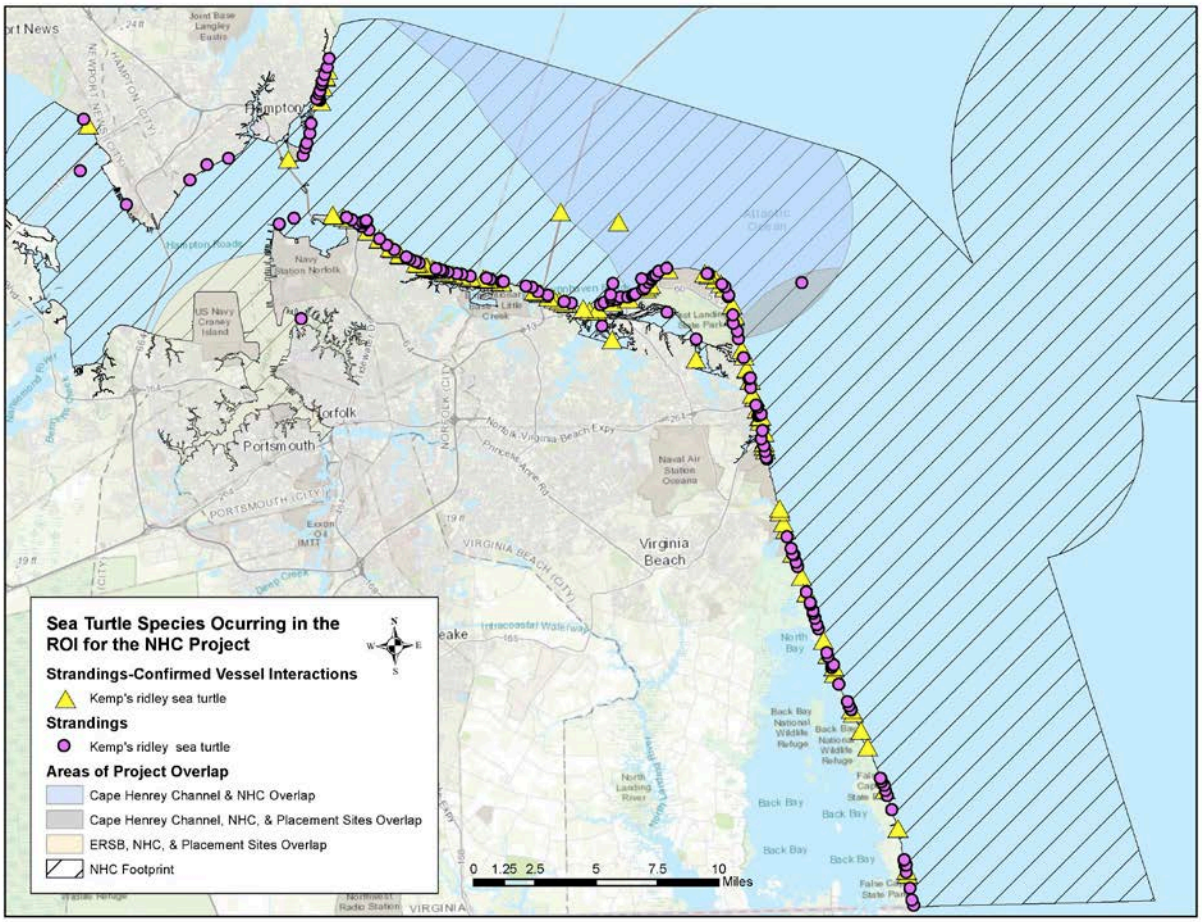

Figure 7. Kemp's ridley sea turtle strandings in the Action Area (Swingle et al. 2017-2010; Virginia Aquarium Foundation/Virginia Aquarium Stranding Response Program 2017a-2017b).

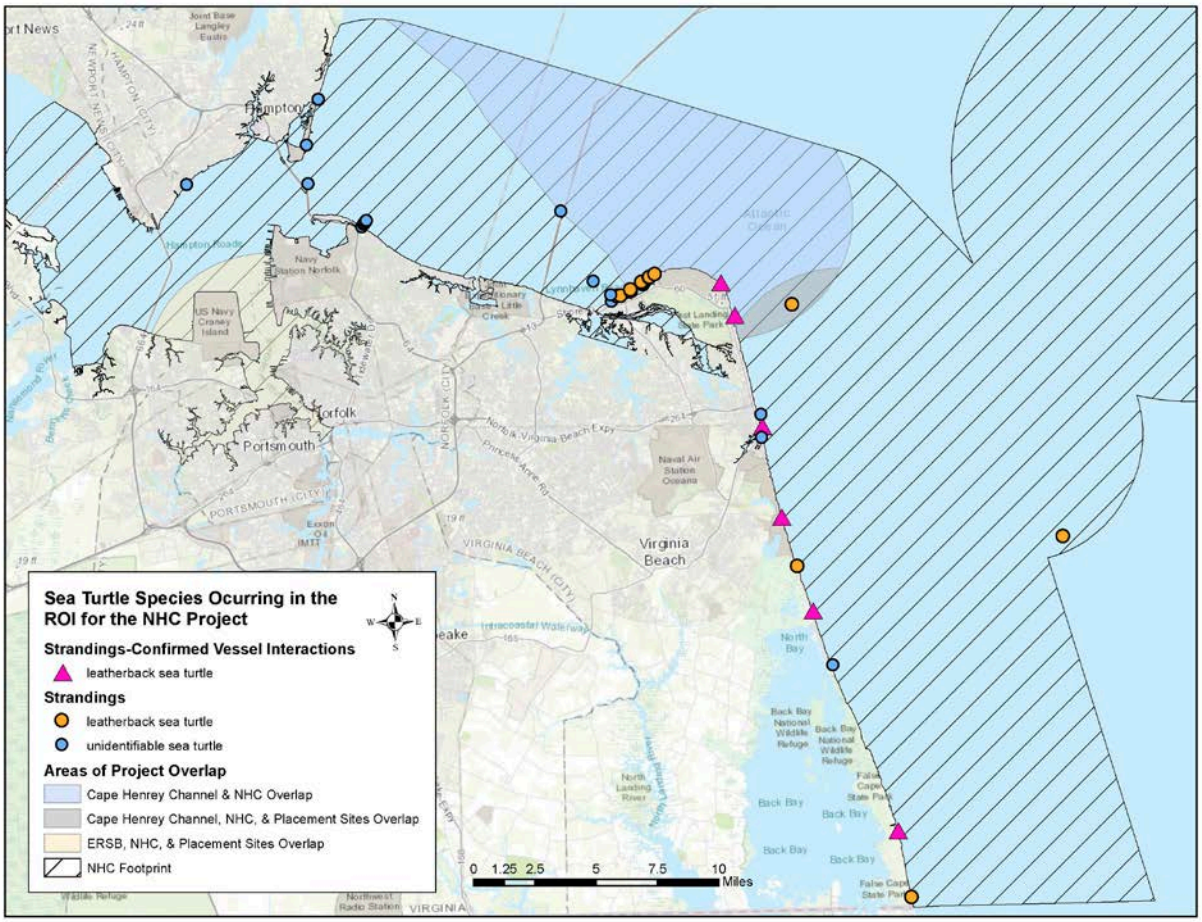

Figure 8. Leatherback sea turtle strandings in the Action Area (Swingle et al. 2017-2010; Virginia Aquarium Foundation/Virginia Aquarium Stranding Response Program 2017a-2017b).

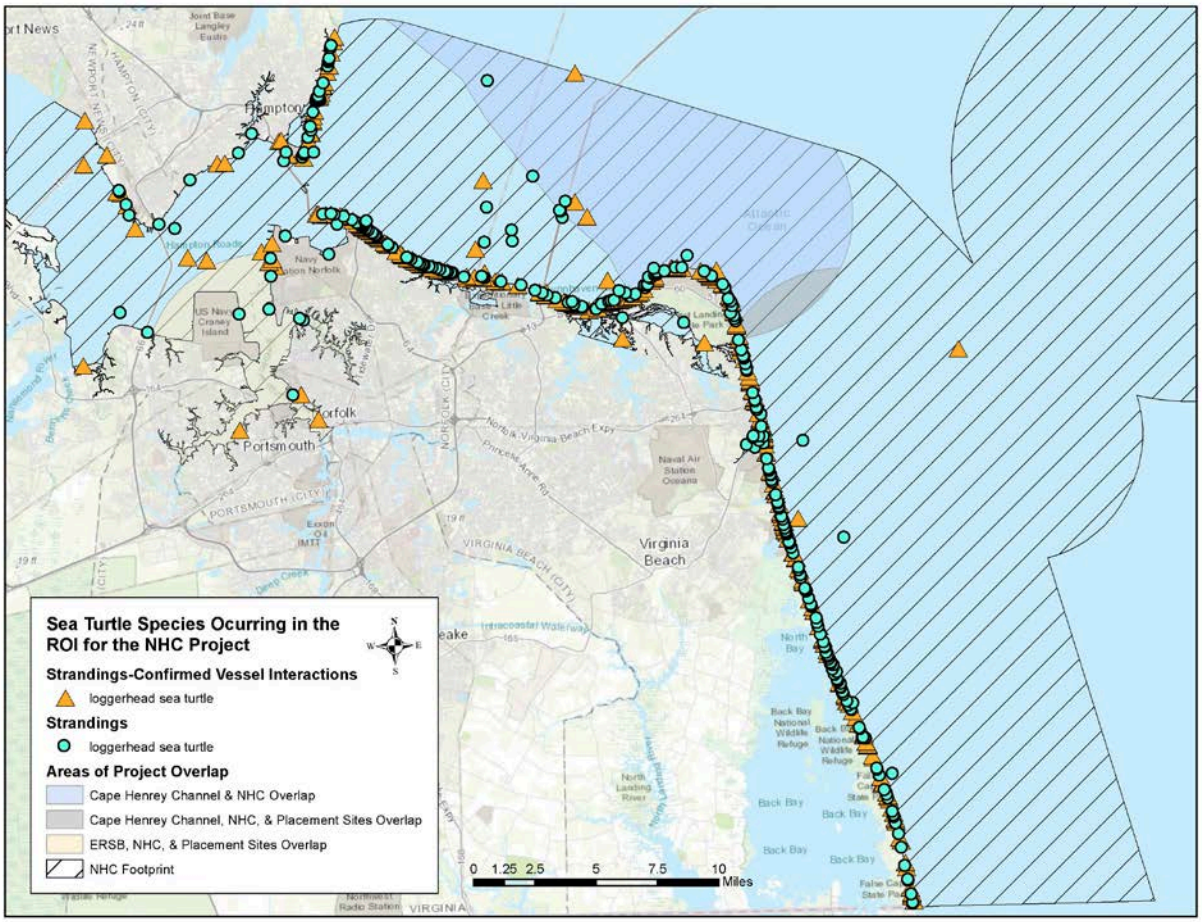

Figure 9. Loggerhead sea turtle strandings in the Action Area (Swingle et al. 2017-2010; Virginia Aquarium Foundation/Virginia Aquarium Stranding Response Program 2017a-2017b).

Relevant consultation correspondence is provided in Appendix A. The batched Biological Opinion submitted from the NMFS to the USACE in 2012 that includes the Norfolk Harbor and Channels Project was used as a reference guide to identify federally listed species known or with the potential to occur in the Action Area and to provide a frame of reference for potential impacts to listed species under the jurisdictional authority of the NMFS. There are no candidate species known or with the potential to occur in the Action Area. A small segment of the Action Area located in the westernmost reaches of the Newport News Channel and immediate surrounding areas (in the James River) is located in the Atlantic Sturgeon Critical Habitat that was designated in 2017; this is further described in Section 2.7, Critical Habitat in the Action Area.

There is no documented occurrence of the shortnose sturgeon *(Acipenser brevirostrum)* in the Action Area (NMFS 2017b), therefore, this species is not anticipated to occur in the Action Area and there would be “no affect” to this species and this species is dismissed from further analysis. Based on our review of the survey and Virginia stranding data, there is no documented occurrence of the blue whale (*Balaenoptera musculus)* in the Action Area or in coastal waters of Virginia. Also, blue whales have a predominantly offshore distribution. Therefore, we determined this species would not likely occur in the Action Area and therefore, there would be “no affect” to the blue whale and this species is dismissed from further analysis.

There is only one limited occurrence of a stranded sperm whale (*Physeter macrocephalus)* in the Action Area and because of the preferred offshore distribution of this species we would not anticipate the sperm whale to typically occur in the Action Area; therefore, there would be "no affect" to the sperm whale and this species is dismissed from further analysis. There is no documented occurrence of the hawksbill sea turtle (*Eretmochelys imbricata*) in the Action Area and there is no preferred habitat for this species in the Action Area; therefore, there would be "no affect" to the hawksbill sea turtle and this species is dismissed from further analysis. There are no candidate species anticipated to occur in the Action Area.

Table 2. Federally listed species under the jurisdiction of the National Oceanographic and Atmospheric Administration, National Marine Fisheries Service known or with the potential to occur in the Action Area (Aschietto et al. 2017-2015; Swingle et al. 2017-2010; Virginia Aquarium Foundation/Virginia Aquarium Stranding Response Program 2017a-2017b; USFWS 2017; VDGIF 2016b; DCR 2016; Barco and Swingle 2014; NMFS 2012; Jensen and Silber 2003).

Taxonomic Category/Common Name	Scientific Name	Status	Critical Habitat
Fish			
Atlantic sturgeon (all DPSs)	*Acipenser oxyrinchus*	T, E	Y
Mammals			
Fin whale	*Balaenoptera physalus*	E	N
North Atlantic right whale	*Eubalaena glacialis*	E	Y*
Sei whale	*Balaenoptera borealis*	E	N
Reptiles			
Green sea turtle (North Atlantic DPS)	*Chelonia mydas*	T	Y*
Kemp's ridley sea turtle	*Lepidochelys kempii*	E	N
Leatherback sea turtle	*Dermochelys coriacea*	E	Y*
Loggerhead sea turtle (Northwest Atlantic DPS)	*Caretta caretta*	T	Y*

DPS = Distinct Population Segment; T = Threatened; E = Endangered; Y = Yes; N = No; ^Species status is reported as it pertains to the DPS/Action Area; *Critical Habitat not located in Action Area

Fish:

Atlantic Sturgeon*.* Atlantic sturgeon that are spawned in U.S. rivers, or are captive progeny of Atlantic sturgeon that were spawned in U.S. rivers, are listed under the ESA as five Distinct Population Segments (DPSs). They are: the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs. The range of the five overlaps and extends from Canada through Cape Canaveral, Florida. They can be found in major rivers, estuaries, bays and coastal waters along the eastern seaboard of the U.S. The Chesapeake Bay is known to be used by all five DPSs. The Gulf of Maine DPS was federally listed as threatened and the rest were listed as endangered on February 6, 2012 (NOAA 2016a).

Atlantic sturgeon are an anadromous bony fish that are distinguishable from other fish by five rows of bony scutes along the length of their body, a protrusible mouth, and heterocercal tail. They are slow growing and late maturing, and have been recorded to reach up to 16 feet in length and 60 years of age. They are bottom feeders that suck food into a ventrally located

protruding mouth. The diet of adult and subadult includes mollusks, gastropods, amphipods, annelids, decapods, isopods, and fish. (NMFS 2012).
No Atlantic sturgeon spawning occurs in the Action Area (NMFS 2017a). However, adult Atlantic sturgeon migrate through the northern limits of the Action Area in the spring, summer, and fall as they move to the James River to spawn in the fall and spring (NMFS 2017a). Juveniles and subadults could be present in or near the Action Area year-round, but are less likely to be present in the winter months when individuals would be at overwintering areas, which are not known to occur in the Action Area. (NMFS 2017a; NMFS 2012). Atlantic sturgeon have the potential to forage on benthic fauna in the Action Area.

The USACE, Norfolk District has documented the presence of the Atlantic sturgeon within the lower Chesapeake Bay. During sea turtle relocation trawling conducted in fall of 2003 in conjunction with the 50-foot deepening of the inbound element of the Thimble Shoal Channel, 14 Atlantic sturgeon were captured by the trawler and released live in and around the channel; no incidental takes of Atlantic sturgeon by hopper dredge were observed during this period. Additionally, the incidental take of two Atlantic sturgeon were documented in York Spit Channel during April of 2011 while conducting maintenance dredging operations with a hopper dredge. The York Spit Channel is not within the Action Area for this project. The noted incidental takes and relocations of the Atlantic sturgeon in the lower Chesapeake Bay are associated with hopper dredging operations that are known to pose a risk of entrainment.

Historically, this species had range-wide declines due to overfishing and the caviar market. Currently, the most significant threat for all five DPSs is by-catch in fisheries. Other significant threats are vessel strikes, poor water quality, water availability, dams, and dredging. Records show that 11 Atlantic sturgeon were struck by vessels between 2005 and 2007 in the James River, which is northwest of the Action Area (NMFS 2012).

2.7 CRITICAL HABITAT IN THE ACTION AREA

Critical habitat is designated per 50 CFR parts 17 or 226 and defines those habitats that are essential for the conservation of a federally threatened or endangered species and that may require special management and protection. Critical habitat is defined as: (1) the areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the ESA, on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protections; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of Section 4 of the ESA, upon a determination by the Secretary that such areas are essential for the conservation of the species.

In 2017, NMFS designated Critical Habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon. Critical habitat in throughout the James River, Virginia is provided in Figure 10.

The following physical features for Atlantic sturgeon essential to the conservation of the species and that may require special management considerations or protection, which support the identified conservation objectives, per the Atlantic Sturgeon Critical Habitat Final Rule (50 CFR 226) are the following:

> "(1) Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 ppt range) for settlement of fertilized eggs and refuge, growth, and development of early life stages;
> (2) Transitional salinity zones inclusive of waters with a gradual downstream gradient of 0.5- up to 30 ppt and soft substrate (e.g., sand, mud) between the river mouths and spawning sites for juvenile foraging and physiological development;
> (3) Water of appropriate depth and absent physical barriers to passage (e.g., locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouths and spawning sites necessary to support:
> (i) Unimpeded movement of adults to and from spawning sites;
> (ii) Seasonal and physiologically-dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and
> (iii) Staging, resting, or holding of subadults or spawning condition adults.
> Water depths in main river channels must also be deep enough (at least 1.2 m) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river.
> (4) Water quality conditions, especially in the bottom meter of the water column, between the river mouths and spawning sites with temperature and oxygen values that support:
> (i) Spawning;
> (ii) Annual and inter-annual adult, subadult, larval, and juvenile survival; and
> (iii) Larval, juvenile, and subadult growth, development, and recruitment. Appropriate temperature and oxygen values will vary interdependently, and depending on salinity in a particular habitat. For example, 6.0 mg/L DO or greater likely supports juvenile rearing habitat, whereas DO less than 5.0 mg/L for longer than 30 days is less likely to support rearing when water temperature is greater than 25 °C. In temperatures greater than 26 °C, DO greater than 4.3 mg/L is needed to protect survival and growth. Temperatures of 13 to 26 °C likely to support spawning habitat."

A small segment of the Action Area located in the westernmost reaches of the Newport News Channel and immediate surrounding areas (in the James River) is located in the Atlantic Sturgeon Critical Habitat. This is the only critical habitat that is located within the Action Area. This portion of the critical habitat provides potential foraging habitat for adults and subadults and provides for unimpeded movement of adults to and from spawning sites located in upstream areas outside of the Action Area.

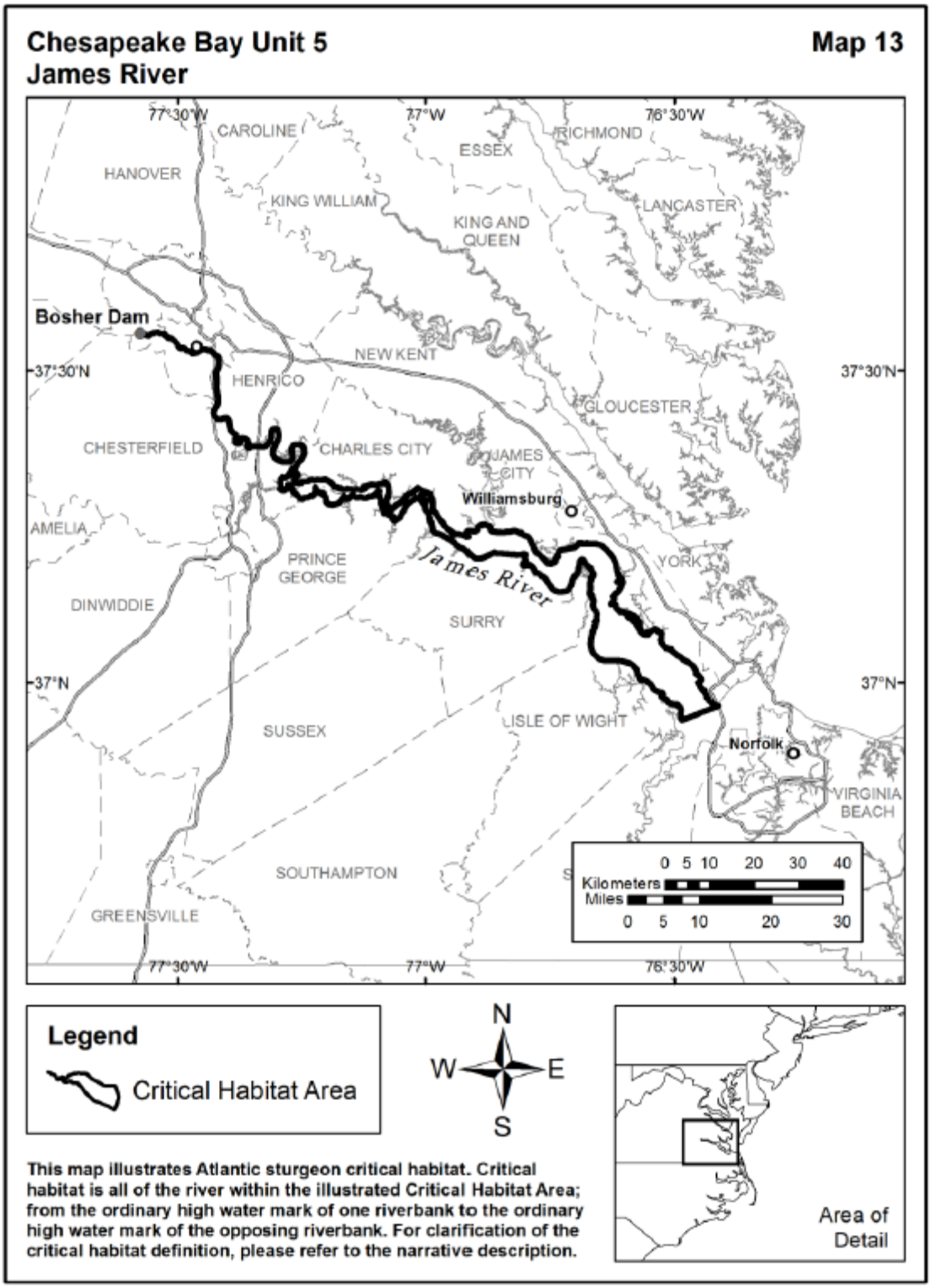

Figure 10. The heavy bold line shows the designated Critical Habitat for Atlantic sturgeon within the James River, Virginia. (NOAA 2016).

Mammals:

Fin Whale. The fin whale was listed in endangered in 1970. Fin whales are characterized by their sleek, streamlined body with black or dark brownish-gray coloration on the top and sides with a white underbelly. Fin whales are second in size only to the blue whale and can reach a maximum length of 85 feet and can weigh up to 160,000 pounds (NOAA 2013). Females are typically longer than males and can be as much as 10% longer. Fin whales occasionally hybridize with blue whales (NOAA 2013). Fin whales typically occur in social groupings that consist of two to seven fin whales (NOAA 2013). In the North Atlantic, fin whales sometimes congregate to feed with other whales and dolphins (Jefferson et al. 2008 in NOAA 2013). They forage on krill, small schooling fish, and squid except in the winter when they are fasting. The only reported predator of the fin whale is the killer whale.

Fin whales are distributed in a wide range of latitudes and longitudes typically in deep, offshore waters worldwide (NOAA 2013). There are two subspecies of fin whale (*B. physalus* that occurs in the North Atlantic and *B. physalus quoyi* that occurs in the Southern Ocean) (NOAA 2013). Also, most scientists believe there is another unnamed subspecies that occurs in the North Pacific. Fin whales in the U.S. are divided into the Hawaiian Stock, the Californian/Oregon/Washington Stock, the Alaska (Northwest Pacific) Stock, and the Western North Atlantic Stock (NOAA 2013). The Hawaiian Stock is estimated at 174 whales while the Californian/Oregon/Washington Stock is estimated at 2,541 whales (NOAA 2013). The Alaska (Northeast Pacific Stock) is estimated at 5,700 whales and the Western North Atlantic Stock is estimated at 1,678 whales (NOAA 2013). Commercial whaling greatly depleted the fin whale but was ended in most locations by 1987. Fin whales are still hunted in Greenland subject to the catch limits of the IWC. Poaching and also resumed commercial whaling are potential threats to this species (NOAA 2013). Other threats include ship strikes, entanglement in fishing gear, low prey abundance from overfishing, habitat degradation, and noise disturbance (NOAA 2013). Based on a database that consisted of all reported whale ship strikes through 2002, fin whales were struck more than any other whale species with 75 strikes reported (Jensen and Silber 2003).

Fin whales have the potential to migrate through and forage in the Action Area. Potential prey items that occur in the Action Area include fish and squid.

North Atlantic Right Whale. The north Atlantic right whale (right whale) was listed as endangered in 1970. Right whales are characterized by a stocky body, black coloration, no dorsal fin, and patches of rough skin on the head. Right whales are large baleen whales that reach a length of approximately 50 feet and weigh up to 79 tons (NOAA 2016e). Right whales are distributed in the Atlantic Ocean typically between 20° and 60° latitude (NOAA 2016e). Movements within and among North Atlantic states is extensive and is thought to be an important migratory corridor. Northern right whales are known to congregate seasonally in the coastal waters of the southeastern U.S. and have been sighted in the Action Area/adjacent area within the 2007 – 2011 time period (NOAA 2016f). Most of the North Atlantic population winter and have calving areas in coastal waters off of the southeastern U.S. while the feeding and nursery grounds are located in New England water and north to the Bay of Fundy and Scotian Shelf (NOAA 2016f). Known high use areas that are considered valuable habitat for the right whales includes coastal Florida and Georgia, the Great South Channel, Massachusetts Bay and Cape Cod Bay, the Bay of Fundy, and the Scotian Shelf.

Right whales typically forage in the spring to fall on zooplankton but sometimes forage in the winter. Critical habitat was designated in the North Atlantic in 1994 and in 2016. No critical habitat occurs in the Action Area.

The western North Atlantic population is thought to consist of approximately 400-450 whales, and though the population increased on average, 2.8% per year from 1990 to 2010, a recent study determined that since 2010, there has been a steady decline in the population (Pace et al. 2017; NOAA 2016e). The eastern North Atlantic population is nearly extinct although it is uncertain as to whether this is a reducing population or just members of the western North Atlantic population.

Threats to the right whale include the following:

- ship collisions;
- entanglement in fishing gear;
- habitat degradation;
- exposure to contaminants;
- climate and ecosystem change;
- disturbance from whale-watching operations;
- noise; and
- natural predation from large sharks and killer whales.

Human-induced mortality from 2009 – 2013 averaged at a reported 4.3 per year for the western North Atlantic Stock and was the result of incidental fishery entanglement take (3.4/year) and ship strikes (0.9/year) (NOAA 2016f). Jensen and Silber (2003) reported 38 ship strikes worldwide to the Atlantic right whales in a database compiled that consisted of all reported ship strikes through 2002.

North Atlantic right whales have the potential to migrate through and forage on zooplankton in the Action Area.

Sei Whale. The sei whale was listed as endangered in 1970. Sei whales are characterized by a dark bluish-gray body that is pale underneath with a dorsal fin that is located approximately two-thirds of the way down the back. They have a single ridge on their rostrum which distinguishes them from other whale species (NOAA 2016h). Sei whales can reach up to 60 feet and weigh 100,000 pounds (NOAA 2016h). The whale is listed as endangered throughout its range and has a worldwide cosmopolitan distribution throughout subtropical, temperature, and subpolar waters although they prefer temperate waters in mid-latitudes; they are found in the Atlantic, Indian, and Pacific Oceans. Sei whales in the U.S. are divided into the Hawaiian Stock, Eastern North Pacific Stock, Nova Scotia Stock, and Western North Atlantic Stock (NOAA 2016h). The estimated worldwide population is approximately 80,000 whales with the Hawaiian Stock containing approximately 40 – 80 whales and the eastern north Pacific stock containing approximately 35 – 55 whales (NOAA 2016h). There are no other stock assessments available in the U.S. The full distribution and migratory patterns of this species are largely unknown. Populations are thought to migrate to the lower latitudes in the winter and the higher latitudes during the summer. They are typically found in oceanic areas far from coastlines. A sei whale stranding occurred in the Elizabeth River in 2014, however, this is the only known reported occurrence of a sei whale in the Action Area or adjacent areas. Sei whales would be considered an extremely rare occurrence in the Action Area or adjacent areas.

Sei whales were largely depleted during the 19th and 20th century from commercial hunting and whaling with a loss of an estimated 300,000 whales (NOAA 2016h). Other contributing threats to the sei whale population include potential impacts from ship strikes and entanglement in fishing gear (NOAA 2016). Jensen and Silber (2003) reported three ship strikes worldwide to the sei whales in a database compiled that consisted of all reported ship strikes through 2002. The sei whale population in the Southern Ocean is still largely depleted while the whales are more abundant in the North Atlantic and North Pacific (NOAA 2016h). The sei whale forages on plankton, small fish, and cephalopods. Sei whales are often spotted in small groups of approximately two to five whales. They are the fastest swimming cetaceans reaching speeds of 34.5 miles per hour (NOAA 2016h).

Sei whales have the potential to migrate through and forage on plankton, small fish, and squid in the Action Area.

Sea Turtles:

Five sea turtle species are found in the U.S. Atlantic Ocean: green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles. Sea turtles often migrate long distances from nesting beaches to their foraging grounds. The waters of the Greater Atlantic Region serve as important foraging and developmental areas for sea turtles when water temperatures are warm enough. As water temperatures warm in the spring, sea turtles begin to migrate northward, typically arriving in Virginia waters as early as April/May and on the more northern foraging grounds in New England in June. This trend is reversed in the fall as water temperatures cool with most sea turtles leaving New England by fall (NOAA 2016a). Based on the sea turtle nesting database compiled of the long-term monitoring records from the Virginia Department of Game and Inland Fisheries and the Virginia Aquarium Stranding Response Program, no sea turtle nesting occurs in the Action Area.

Green Sea Turtle. The green sea turtle was listed as endangered in Florida, and threatened elsewhere in the U.S., in July 1978. However, on April 6, 2016, NMFS superseded this with a Federal Register announcement of 11 worldwide DPSs for this species, the North Atlantic DPS being inclusive of this region. The range of this DPS extends from the boundary of South and Central America, north along the coast to include Panama, Costa Rica, Nicaragua, Honduras, Belize, Mexico, and the U.S. East Coast. The range extends due east across the Atlantic Ocean to include a portion of the west coast of Africa. It was re-listed as a threatened species.

Green turtles are the largest of all the hard-shelled sea turtles, but have a comparatively small head. Its carapace is smooth with shades of black, gray, green, brown, and yellow. Adults can grow to four feet in length (carapace length) and weigh up to 440 pounds. Juveniles are omnivorous feeding on both benthic invertebrates as well as algae and sea grasses. Adults are largely herbivorous, feeding on algae and sea grasses. They occur seasonally in Mid-Atlantic waters such as the Chesapeake Bay and the Long Island Sound, which serve as foraging and developmental habitat. The principal feeding areas for the species are the west coast of Florida, the Florida Keys, and the Yucatan Peninsula (NMFS 2012).

According to NMFS, nesting has increased considerably since the 1970s. By far the most important nesting grounds for the Western Atlantic population remains in Costa Rica. In the U.S., nesting mostly occurs in Florida, although it has recently been recorded in North Carolina, at Bald Head Island and the Cape Hatteras National Seashore (NMFS 2012). In 2005, there was also a green sea turtle nest reported in Virginia Beach, Virginia which was the first time a green sea turtle nest has ever been documented in beaches near the Action Area. Nesting

data indicate long-term increases at all major nesting sites (50 CFR 224). Its critical habitat in the U.S. is confined to Puerto Rico (NMFS 2012).

There is no nesting habitat located in the Action Area; therefore, no nesting occurs in the Action Area. Juveniles and adult green sea turtles have the potential to forage and migrate through in the Action Area. Only one green sea turtle take has been recorded by USACE during dredging operations in the Atlantic Ocean and/or Chesapeake Bay channels from 1994-2017, but no green sea turtle incidental take has ever been observed in the Action Area.

Kemp's Ridley Sea Turtle. The Kemp's ridley sea turtle was listed endangered in 1970. According to NMFS, Kemps ridley is one of the least abundant of the world's sea turtles; it is mostly found in the Gulf of Mexico and the northwestern Atlantic Ocean. The majority of nesting occurs along a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico. In the U.S., nesting in limited to South Texas, where a record 195 nests were found in 2008. Nesting occurs from April through July each year, with hatchlings emerging after 45-48 days. Once they leave the nesting beach, hatchings are distributed in both Gulf of Mexico and Atlantic Ocean (NMFS 2012).

Adult Kemp's ridleys are the smallest marine turtle in the world. Their carapaces are often grayish-green, and nearly circular. Each of the front flippers has one claw while the back flippers may have one or two. Adults can reach 24-28 inches in length, and can weigh up to 100 pounds. Developmental habitats are defined by several characteristics, including coastal areas sheltered from high winds and waves such as embayments and estuaries, and nearshore temperate waters shallower than 50 m. Kemp's ridleys eat a variety of crab species, with mollusks, shrimp, and fish consumed less frequently. (NMFS 2012).

The threats to the species are similar to those of the loggerhead. Interactions with fisheries may be particularly high for Kemp's ridleys. In addition, they may be more susceptible to oceanographic-related events such as cold-stunning. From 2006-2010, an average annual rate of 115 Kemp's ridleys were found cold-stunned on Cape Cod. Populations reached their lowest recorded point in 1985, when fewer than 300 nesting females were identified. Populations began to recover in the 1990s; and by 2006, there were an estimated 7,000-8,000 Kemp's ridley turtles (NMFS 2012). In 2014, there were a total of 10,986 nests recorded in Mexico, so there is cautious optimism; but not high enough numbers to declassify the species as of yet (NMFS and USFWS 2015).

There is no nesting habitat located in the Action Area; therefore, no nesting occurs in the Action Area. Kemp's ridley sea turtles are the second most abundant species in the Chesapeake Bay (Virginia Institute of Marine Science (VIMS) 2018). Within the Chesapeake Bay, juveniles are mostly predominant (VIMS 2018). Juveniles and adult Kemp's ridley sea turtles have the potential to forage and migrate through in the Action Area. Within the Action Area they have the potential to forage on crabs, molluscs, and other crustaceans (VIMS 2018).

Leatherback sea turtle. The leatherback sea turtle was listed as endangered in 1970. They are the largest living turtle species in the world, attaining lengths of up to 6.5 feet, and weighing up to 2,000 pounds. They are also the most migratory and wide-ranging of any sea turtle, ranging from the Atlantic, Pacific, and Indian Oceans, and the Mediterranean Sea. They migrate routinely between the northern temperate and tropical waters. Leatherbacks from the western North Atlantic beaches have been documented as using the entire North Atlantic Ocean. They are known as a pelagic (offshore) species that feeds on jellyfish and tunicates; however, they are also known to use the coastal waters of the continental shelf. They are often

sited in temperature ranges similar to those preferred by the loggerhead (7°C to 27°C), however, they also appear to have greater tolerance of cooler water temperatures (NMFS 2012). In the Caribbean, Atlantic and Gulf of Mexico, leatherback populations are generally increasing. In the continental U.S., the Atlantic coast of Florida is one of the main nesting areas.

There is no nesting habitat located in the Action Area; therefore, no nesting occurs in the Action Area. Leatherback sea turtles have the potential to forage and migrate through in the Action Area. Leatherbacks preferred food is jellyfish and squid and therefore, the Action Area provides potential foraging habitat for this species.

No leatherback turtle incidental takes have been reported from dredging of the Norfolk Harbor and Channels since monitoring began in 1994. Critical habitat in the U.S. is limited to the Virgin Islands.

Loggerhead Sea Turtle. The loggerhead sea turtle was listed as threatened in July 1978. The loggerhead is the most abundant species of sea turtle in U.S. waters. The Northwest Atlantic DPS loggerhead is found in temperate and subtropical waters, from Florida to Cape Cod. Aerial surveys of continental shelf waters north of Cape Hatteras showed that loggerheads were most commonly sighted in waters with bottom depths ranging from 22 to 49 meters. However, in more recent survey data and satellite tracking data support that they occur in waters from beach to beyond continental shelf, in a range of habitats including offshore waters, continental shelves, bays, estuaries, and lagoons. They have been observed in waters with surface temperatures of 7°C to 30°C, but water temps of greater than 11°C are most favorable. They occur year-round in the ocean waters of North Carolina, South Carolina, Georgia, and Florida (NMFS 2012).

Loggerheads have powerful jaws that enable them to feed on hard-shelled prey, such as whelks and conch. Their carapaces are slightly heart-shaped and reddish-brown in adults and subadults, while the undersides are generally a pale yellowish color. The neck and flippers are usually dull brown to reddish brown on top and medium to pale yellow on the sides and bottom. Adults can reach lengths of three feet and weigh up to 250 pounds. (NOAA 2016g).

As coastal water temps warm in the spring, loggerheads begin to migrate to inshore waters of the Southeastern U.S., and also move up the U.S. Atlantic coast. They arrive in Virginia foraging areas as early as April and May. The majority of the nesting occurs on beaches of the southeastern U.S. Within its range, nesting season occurs late April to early September and hatching season late June through early November. Juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface. Subadults and adults are primarily coastal dwelling and typically prey on benthic invertebrates such as mollusks and decapods crustaceans in hard bottom habitats. The loggerhead is a long-lived species with an average life span of 57 years (NMFS 2012).

Threats to species include by-catch in fisheries, interactions with vessels and dredges, oil spills, and other marine pollution in the water; and habitat loss, nesting predation or disturbance that affects eggs, hatchlings, and nesting females on land. Based on a five-year status review of the species, which discussed a variety of threats to loggerheads including climate change, NMFS and FWS determined that they should not be delisted or reclassified. A NMFS model in 2009 had suggested that the populations are most likely declining, although overall nesting population remains widespread, and the trend for nesting population appears to be stabilizing (NMFS 2012).

Critical habitat designated for this species includes the coastlines of Texas, Louisiana, Florida, and North Carolina, and areas well offshore of Mississippi, Alabama in the Gulf of Mexico, and well offshore of Georgia, South Carolina, and Virginia, in the Atlantic Ocean. Therefore, no critical habitat exists within the Action Area.

Loggerhead sea turtles are the most abundant sea turtle in the Chesapeake Bay (VIMS 2018b). In the Action Area, we would anticipate that mainly juveniles would occur (VIMS 2018b). However, both adults and juveniles have the potential to migrate through and forage in the Action Area. Loggerheads have the potential to forage on blue crabs, horseshoe crabs, and fishes in the Action Area (VIMS 2018b).

2.8 ALTERNATE MONITORING METHODS FOR UNEXPLODED ORDINANCE/MUNITIONS OF EXPLOSIVE CONCERN SCREENING

Impacts to sea turtle and sturgeon species are typically monitored and documented through the use of NOAA Fisheries approved observers onboard the hopper dredge. Approved observers are required to be present on the hopper dredge during the period of April 1 through November 30 or when water temperatures reach eleven degrees Celsius; whichever occurs first. The observer protocols are specified in the Biological Opinion. Typically, the observers inspect dragheads and inflow cages after each load on the hopper dredges effectively providing one-hundred percent observation coverage of inflow. The observers typically inspect dragheads for impinged turtles or turtle pieces. Additionally all material captured by the inflow cages is inspected and biological material is identified and documented. The inflow cages have a maximum four inch by four inch square openings. This conventional monitoring protocol is not effective or practicable when hopper dredging operations use Unexploded Ordinance/Munitions of Explosive Concern (UXO/MEC) special screening.

The UXO/MEC special screening are installed on dragheads to prevent or minimize the entrainment of UXO/MEC materials that may be present in the navigation channel or borrow area. Unexploded Ordinance/Munitions of Explosive Concern have been recovered during hopper dredging operations in Atlantic Ocean Channel, Thimble Shoals Channel, Cape Henry Channel, and the Thimble Shoals Surround Borrow Area. The presence of UXO/MEC presents a safety hazard to both the vessel and human personnel onboard the vessel. The current specification for UXO/MEC screening on hopper dredge requires UXO/MEC special screening with screen openings no larger than 1.25 inch by 6-inch openings to prevent the passage of any material greater than 1.25 inch diameter. Based on screening requirements, the use of UXO/MEC special screening is likely to prevent the entrainment and the traditional observation of potential incidental takes of sea turtle or sturgeon species. To account for incidental take of sea turtles species or Atlantic sturgeon that may not be observed through traditional observation and screening methods, NOAA Fisheries has implemented a proxy incidental take when UXO/MEC screens are installed. Proxy incidental takes apply when UXO/MEC special screening is installed and attributes an incidental take to the hopper dredging project based on unit effort (i.e. cubic yards dredged). The current rate of proxy incidental take is one sea turtle incidental take for every 300,000 cubic yards of material dredged. The current rate of proxy incidental take is one Atlantic sturgeon incidental take for every two million cubic yards of material dredged. The proxy incidental take “system” has been utilized since the issuance of the October 16, 2012 Biological Opinion. NOAA-Fisheries-approved observers have been utilized for the inspection of the dragheads and UXO/MEC screening for impinged sea turtles and Atlantic sturgeon or their parts. Observation monitoring and data indicates that at a minimum some incidental takes are still being observed through impingement of sea turtle

species or their parts on the UXO/MEC screening. No observed impingement of Atlantic sturgeon on UXO/MEC screening has been observed or documented by USACE, Norfolk District projects to date.

2.9 EFFECTS DETERMINATION

2.9.1 ATLANTIC STURGEON (ALL LISTED DISTINCT POPULATION SEGMENTS)

Based on data collected by the USACE, both subadult and adult Atlantic sturgeon have the potential to become entrained in dredging equipment. When entrainment occurs, it will typically result in mortality to the Atlantic sturgeon. Entrainment is defined as the direct uptake of aquatic organisms by the suction field generated at the suction intake or the uptake of aquatic organisms by mechanical dredging. The size and suction power of the dredge, the condition of the substrate being dredged, and the method of operations of the dredge all relate to the potential of the dredge to entrain Atlantic sturgeon (Reine and Clarke 1998).

The method of dredging contributes to the risk of entrainment. Hydraulic cuttterhead dredges are not likely to pose a significant threat to adult or subadult Atlantic sturgeon occurring in marine or estuarine waters where young or juvenile sturgeon are absent. The dredge suction intake is generally shielded by the cutterhead itself which is designed to loosen sediments and feed the material inward towards the suction intake. Additionally, the slow forward advancement of the hydraulic pipeline dredge plant relative to hopper dredging operations further reduces the likelihood of interactions with Atlantic sturgeon. Adult and subadult Atlantic sturgeon likely have the ability and swimming stamina to avoid interactions and possible entrainment. Likewise, mechanical dredging is not believed to pose a significant threat to adult or subadult Atlantic sturgeon occurring in marine or estuarine waters where young or juvenile sturgeon are absent.

Entrainment of Atlantic sturgeon during hydraulic pipeline dredging and mechanical dredging operations in federal navigation channels appears to be relatively rare. During the period of 1990 to 2012, the USACE has documented a total of 35 incidental takes of sturgeon species (all sturgeon species) on monitored projects for all types of dredge plant (mechanical, hydraulic pipeline, and hopper dredge). The majority of the takes resulted from hopper dredging; six of the 35 documented observed takes were sturgeon species incidentally taken with pipeline dredge plants and five of the 35 sturgeon takes were by mechanical dredge plants.

The USACE-Norfolk District and Baltimore District dredging projects described in the NMFS (2012) Biological Opinion were monitored in the Chesapeake Bay from 1994 to 2012. During this period, observers noted an approximate entrainment rate of one Atlantic sturgeon per nine million cubic yards of dredged material in the Action Area described in the NMFS (2012) Biological Opinion. No additional observed entrainment was reported from 2013 to 2017. Based on the 1994-2012 entrainment rate and the maximum amount of dredged material volume anticipated for the 50 year period of the Preferred Alternative, we would anticipate entrainment of approximately 18 Atlantic Sturgeon. However, in the NMFS (2012) Biological Opinion, a more conservative rate of one Atlantic sturgeon entrained for approximately every two million cubic yards dredged (with a hopper dredge) was assumed because they took into account entrainment rates outside of the Action Area. Using the more conservative calculation in the NMFS (2012) Biological Opinion, this would result in an estimated maximum entrainment rate of approximately 78 Atlantic sturgeon over the 50 period with implementation for the

Preferred Alternative. In summary, we would anticipate that there could be some entrainment with implementation of the Preferred Alternative that would result in adverse effects to the Atlantic sturgeon.

The resulting turbidity plume that would result temporarily from dredging and dredged material placement operations may temporarily cause sturgeons to leave the disturbance area and may prevent them from temporarily foraging in this area. Also, dredging and dredged material placement actions would temporarily reduce prey availability causing them to move to another foraging area. Reductions in Dissolved Oxygen pose a potential threat to Atlantic sturgeon that can be particularly exacerbated during periods of high temperature. Deep draft dredging actions have the potential to modify circulation patterns and Dissolved Oxygen levels. Modeling conducted to assess potential hydrodynamic effects and water quality affects associated with the channel deepening and widening show only insignificant effects to salinity and Dissolved Oxygen and also indicate that following dredging operations, there may be a slight increase in Dissolved Oxygen levels in the Lafayette River from increased flushing (Liu et al. 2017; Wang et al. 2017; Zhang et al. 2017). Overall, it is anticipated that any potential disturbance or water quality impacts overall would be insignificant to the Atlantic sturgeon.

Atlantic sturgeon interactions with vessels has been documented to occur in the James River (Balazik et al. 2012). The Balazik et al. (2012) study was conducted in the freshwater portion of the James River from 2007-2010 from 31 carcasses of adult Atlantic sturgeon. Twenty-six of the carcasses had scars from propellers and five were too decomposed to determine the cause of death. Nearly all of the carcasses were recovered (84%) from a narrow reach that was modified to enhance shipping efficiency. Balazik et al. (2012) indicated that the vessel interactions were likely caused by deep draft vessels because of the benthic nature of Atlantic sturgeon based on the telemetry study.

Due to the open-water environment of the Port of Hampton Roads, the likelihood of sturgeon dredging vessel/equipment strikes is possible but is not anticipated to be a significant threat due to the limited amount of time the dredging vessels will be operating (for the anticipated dredging durations please refer to Table 1), the anticipated low speed of the dredging vessels (10 knots and less), the ability of subadult and adult sturgeon to move away from dredging impacts, and the limited draft of the dredging vessels. The distance between the bottom hull of the dredging vessels and any potential support vessels and the river bottom would be greater than 10 feet; therefore, risks of bottom-dwelling Atlantic sturgeon hull strikes with dredging or support vessels would be highly unlikely and therefore, discountable.

No vessel fueling will occur in the Action Area so chances of fuel leaks would be limited. However, if a fuel or oil leak did occur the boat is equipped with spill response equipment and the fuel would remain on the water surface outside of the normal benthic habitat of the Atlantic sturgeon. Therefore, any potential chances of fuel spill impacts to the Atlantic sturgeon would be highly unlikely and insignificant.

Relocation trawling will be required if two sea turtles are entrained in one 24-hour period, or four sea turtles are entrained in a two month period, or in other circumstances where entrainment indicates that the density of sea turtles in the action area is high and would result in entrainment at a higher rate than anticipated. The trawling entails conducting approximately 30 minute tows of a trawling net behind a motorized boat. Towing may occur for up to 12 hours per day. Sea turtle relocation trawling has the potential to result in the capture of Atlantic sturgeon, however, all sturgeon would be immediately placed back into the water. To date, no injury or mortality of captured Atlantic sturgeon from trawling events has occurred; however, there is a

slight chance that trawling could potentially result in mortality or injury to captured Atlantic sturgeon. Being captured by the trawling net would result in a disturbance effect where normal behaviors such as foraging or migration could be temporarily impacted. Therefore, trawling has the potential to result in adverse effects to Atlantic sturgeon. Any captured turtles are the released at a distance of approximately three miles off the coast of Virginia.

The impact to Atlantic sturgeon from dredging equipment and the associated noise has not been well documented. However, existing studies demonstrate no impact to behavior, spawning, feeding, or movement of any Atlantic sturgeon within the vicinity of active dredging operations (Moser and Ross 1995). Moser and Ross (1995) concluded that Atlantic sturgeon showed no difference in habitat preference or behavior between the dredged and undisturbed areas during dredging operations. The conclusions are consistent with USACE studies conducted on the James River with active dredging operations. The findings of this study showed no change in behavior or movement as a result of an active dredge operating within close proximity to radio-tracked Atlantic sturgeon (unpublished USACE 2009).

Maintenance of the CIDMMA shoreline and breakwaters may result in a temporary disturbance effect to Atlantic sturgeon from the increase in turbidity and Total Suspended Solids but it would not significantly impact any foraging or migratory behaviors. Therefore potential adverse impacts to Atlantic Sturgeon from CIDMMA maintenance would be temporary and insignificant.

Another potential threat to this species is injury or incidental take resulting from MEC/UXO detonation or contact with contaminants leaching from MEC/UXO that occur in the Action Area. Detonation of an MEC/UXO could result in morality or temporary to permanent physical injuries to Atlantic sturgeon. Also, leaching of contaminants could also result in mortality, injury, or bioaccumulation of contaminants in the tissue of Atlantic sturgeons. This could potentially result in an adverse effect to the Atlantic sturgeon. However, this is largely mitigated through use of MEC/UXO screens that will be used during dredging operations.

With implementation of the Preferred Alternative, the increased dredging footprint, dredging volumes and dredging durations would increase impacts to sturgeon as compared to existing conditions or future conditions without implementation of the project. Overall, additional temporary loss of benthic prey would occur from the increased dredging footprint and also entrainment risks would increase due to the increased dredging durations and amount of areas dredged. Because of the increased dredging durations, the potential risk for strikes with dredging vessels could increase, however, this risk is already considered discountable because of the slow moving speed of the dredging vessels and the limited draft of the dredging vessels. Because of the benthic habitat preference of the sturgeon and the limited draft of the dredging vessels the potential for collisions is limited. However, potential collisions risks with deep draft vessels transiting the harbor would generally decrease when comparing future with versus future without implementation of the Preferred Alternative because overall vessel calls would be less with implementation of the Preferred Alternative. Therefore, overall we would anticipate a slight increase in impacts but the impacts due to potential collision risks would be insignificant.

Potential cumulative threats to Atlantic sturgeon include ship strikes from commercial and recreational vessels as well as hopper dredging impacts and exposure to contaminants such as oil spills. Another potential cumulative impact to consider is impacts that occur from fishery entanglement. Virginia Port growth is anticipated to increase throughout the next 50 years and a new port facility is planned, which may increase the number of vessels transiting the Norfolk Harbor and Channels. Also, additional development including construction of the Third

Crossing, the Interstate-64 Widening and High Rise Bridge Replacement, and expansion of the Chesapeake Bay Bridge Tunnel is planned in the future.

Therefore, implementation of the Preferred Alternative may affect and is likely to adversely affect the Atlantic sturgeon. However, we would not anticipate that implementation of the Preferred Alternative would jeopardize the continued existence of the species.

2.9.2 ATLANTIC STURGEON CRITICAL HABITAT

Dredging actions would result in the removal of the sediment layer containing benthic invertebrates and therefore, temporary loss of benthic prey within the dredging footprint would occur. Also, the immediate areas adjacent to the channel and the open-water dredged material placement areas would be subject to the turbidity plume resulting in some potential siltation and burial of sessile invertebrate prey in the area adjacent to the dredging footprint. Therefore, there would be adverse effects to Atlantic Sturgeon Critical Habitat because of the negative and temporary impacts to soft mud bottom Atlantic sturgeon foraging habitat.

Detonation of MEC/UXO could potentially result in movement and loss of benthic prey in soft bottom sediments used for Atlantic sturgeon foraging. It could also potentially result in the release of contaminants from leaching MEC/UXO in the sediment. While this could potentially result in adverse impacts to Atlantic Sturgeon Critical Habitat, this is unlikely as MEC/UXO screens will be deployed during dredging operations which largely mitigate the potential impact.

Deep draft dredging actions have the potential to modify circulation patterns and Dissolved Oxygen levels. Modeling conducted to assess potential hydrodynamic effects and water quality affects associated with the channel deepening and widening show only insignificant effects to salinity and Dissolved Oxygen and also indicate that following dredging operations, there may be a slight increase in Dissolved Oxygen levels in the Lafayette River from increased flushing (Liu et al. 2017; Wang et al. 2017; Zhang et al. 2017). Therefore, it is anticipated that any potential disturbance or water quality impacts overall would be insignificant to Atlantic Sturgeon Critical Habitat.

Therefore, implementation of the Preferred Alternative may affect and is likely to adversely affect Atlantic Sturgeon Critical Habitat. We would not anticipate any permanent destruction or adverse modification of Atlantic Sturgeon Critical Habitat.

2.9.3 FIN WHALE, NORTH ATLANTIC RIGHT WHALE, AND SEI WHALE

Based on the survey data collected by Aschiettio et al. (2017-2015), finbacks and humpbacks are whale species reported recently to occur in the Action Area. In Virginia, only the West Indies DPS of the humpback whale is present and this DPS is no longer federally listed. Per the Aschietto et al. (2017-2015) survey data, humpbacks are the only abundant listed species in the Action Area while finbacks are reported to occur repeatedly in the Action Area but in relatively low abundance.

Because of the predominant offshore habitat preferences of the north Atlantic right whale and the sei whale, the presence of them in the Action Area would be considered a rare and temporary occurrence and the potential for interaction with dredging vessels and equipment would be possible but unlikely.

Based on our review of the stranding data from 2003-2017, there were three finback whales, one northern right whale, and three sei whales that were reported stranded in the Action Area from vessel interactions (Virginia Aquarium Foundation/Virginia Aquarium Stranding Response Program 2017b).

The speed of vessels is a factor thought to affect the potential risk for whales and vessel interactions. The NMFS (2017) reports that overall, most ship strikes of large whale species occurred when ships were traveling at speeds of 10 knots or greater and that collisions are more likely to occur with ships traveling at speeds of 14 knots or greater. Based on NMFS (2017), the average vessel speed that resulted in injury or mortality to large whales was 18.6 knots. There is a 10 knot speed restriction at the entrance to the harbor that is in force during the northern right whale migration season (November 1-April 30). There is also a 10 knot speed restriction in a portion of the inner Norfolk Harbor during all times of year. However, speed restrictions are not in place in the other portions of the Action Area. Also, whale strikes have also been recorded to occur at speeds of only two knots (Jensen and Silber 2003); therefore, even with the vessel speed restriction, the risk of a whale strike is likely reduced but not eliminated. In general, at higher speeds, vessel operators may have less opportunity to detect and avoid interactions with whales (Whale and Dolphin Conservation Society 2006). Likewise, whales may also have less opportunity to detect and avoid interactions as well. Vessel interactions could result in injury or mortality to the whale. Also, the vessel interactions could result in a disturbance effect where there would be a disruption to whale behavior and could potentially cause a whale movement out of the area.

The size of vessels, type of whale species, and age and gender of the whale may be contributing risk factors for whale interactions with vessels (NMFS 2017; Laist et al. 2001). Vessel interactions with whales has been reported to occur for a variety of vessel types including cargo ships, ferries, cruise liners, navy ships, recreational vessels, fishing boats, whale-watch vessels, research vessel, and non-motorized vessels (Whale and Dolphin Conservation Society 2006; Jensen and Silber 2003). Laist et al. (2001) also reported that all sizes and types of vessels can hit whales but indicated that the most serious injuries and mortalities were caused by ships that are 80 meters in length or longer. The number of vessel calls of the largest TEU ships is not anticipated to increase in the future with versus the future without the project. However, the number of vessel calls of some of the smaller sized ships in the deep draft fleet (e.g. Panamax-size ships) may decrease when comparing the future with project versus the future without project. This is because of the increased efficiency of cargo loading in the future with project condition. Therefore, with implementation of the future with the Preferred Alternative we would not anticipate an increased whale strike rate from a shift in vessel size; this is not an anticipated impact. Laist et al. (2001) reported that fin whales are the species most likely to be hit by vessels and that right whales, humpback whales, sperm whales, and gray whales are commonly hit. This may be related to the whales foraging behavior or potentially the time spent at the surface. It could also be related to the swimming speed of the whale in relation to the speed of the vessel. The whales behavior may be a contributing strike risk factor as well because whales that are foraging, socializing, or mating may be distracted enough to not notice an oncoming vessel (Whale and Dolphin Conservation Society 2006). Another potential contributing factor that could affect whale and vessel interactions is the age and gender of the whale; the Whale and Dolphin Conservation Society (2006) reported that juveniles and mothers may be greatest risk for collision.

We would anticipate a potentially higher risk of vessel interactions with listed whales in the future either with or without implementation of the Preferred Alternative as compared to current conditions because the predicted number of vessel calls is anticipated to increase. In

comparison of the future with and without implementation of the Preferred Alternative, we would anticipate the potential for fewer vessel strikes with the Preferred Alternative because of the anticipated reduced vessel calls as compared to the future without project conditions. Because it is uncertain from the whale and vessel interaction stranding where strikes have occurred, it is difficult to estimate potential future increases in vessel interactions that could potentially occur. Because vessel speeds are not anticipated to increase with implementation of the Preferred Alternative we would not anticipate that the strike risk hazard to increase from increased vessel speed but rather just the sheer potential of impact from the increased future number of vessel calls compared to existing conditions.

The risk of injury to listed whales from collisions with dredge-related vessels is considered discountable considering the species mobility and slow speed of the dredge vessels (10 knots or less) and associated barges and scow. Also, trained personnel that know how to recognize the presence of threatened and endangered whale and sea turtle species will be onboard at all times to help ensure that vessel interactions are avoided. No whale strikes with dredge-related vessels has ever been reported to occur in the Action Area.

Within a noisy harbor area such as the Norfolk Harbor, ongoing exposure to underwater noise may cause causing a masking effect such that the noise of an oncoming vessel may not be detected (Whale and Dolphin Conservation Society 2006). Whales may often habituate to the noisy harbor and simply not respond to an oncoming vessel as they are so adapted to the sound of vessels (Whale and Dolphin Conservation Society 2006). In addition, the noise of the dredging vessel/equipment and also the vessels in the harbor itself has an adverse effect to listed whales in the Action Area and may interfere with their ability to communicate and forage for prey in addition to the vessel strike risks. According to Todd et al. (2014), there are few studies on the effects of dredging on marine mammals due to dredging activities in isolation. In terms of direct effects, vessel collisions are possible, but improbable because dredges operate either in a stationary position or at low speeds. Todd et al. (2014) note that while dredging noise levels vary greatly and depend partly on the method and the material being dredged, limited data seem to indicate that dredging is unlikely to cause physiological damage to marine mammal auditory systems. They note that it is more likely to lead to temporary masking and behavioral disturbances. In addition, effects of turbidity are often localized with minimal direct impact on marine mammals (Todd et al. 2014). Todd et al. (2014) note that indirect effects are more complex, and less understood. In general, literature has suggested that dredging can cause reductions in biomass and varying levels of prey availability, depending on the surrounding conditions. However, it is also noted that marine mammals can likely compensate for small-scale changes in prey by switching prey species or moving to other foraging areas (Todd et al. 2014).

We would anticipate a potentially higher risk of noise related impacts to listed whales in the future either with or without implementation of the Preferred Alternative as compared to existing conditions because the predicted number of vessel calls is anticipated to increase. In comparison of the future with and without implementation of the Preferred Alternative, we would anticipate the potential for noise related impacts to be less with the Preferred Alternative because of the reduced vessel calls as compared to the future without project conditions. We would not anticipate noise impacts from implementation of the Preferred Alternative to result in any substantive harassment to listed whales from noise-related impacts. Any potential noise impacts to listed whales species would be anticipated to be insignificant.

In summary, we would not anticipate any substantial increase to noise threats/and/or dredging vessel strike threats from implementation of the Preferred Alternative. If whales were in the

Action Area during dredging/dredged material placement operations it is anticipated they would move away from noise, disturbance, and turbidity impacts. All impacts would be temporary. The implementation of the Preferred Alternative would only be considered to have a temporary, insignificant impact on any whales that could be transiting the project area.

Maintenance of the CIDMMA shoreline and breakwaters may result in a temporary disturbance effect to whales in the Action Area. It may cause an insignificant impact resulting from an increase in turbidity and Total Suspended Solids but it would not substantively affect any foraging or migratory behaviors. Therefore potential adverse impacts to whales from CIDMMA maintenance would be temporary and insignificant.

Another potential threat to these species is injury or incidental take resulting from MEC/UXO detonation or contact with contaminants leaching from MEC/UXO that occur in the Action Area. However, the USACE deploys MEC/UXO screening devices on dredges where there is risk of MEC/UXO detonation which largely mitigates potential impacts. Also, because of the predominant offshore distribution of the potential listed whale species in the Action Area the chance of a whale interaction with MEC/UXO is highly unlikely and therefore would be considered to be discountable.

Potential cumulative threats to whales include ship strikes and noise impacts from commercial and recreational vessels that occur throughout the entire range of the whales and exposure to contaminants such as oil spills. Another potential cumulative impact to consider is impacts that occur from fishery entanglement. Virginia Port growth is anticipated to increase throughout the next 50 years and a new port facility is planned, which is anticipated to increase the number of vessels transiting the Norfolk Harbor and Channels. Also, additional development including construction of the Third Crossing, the Interstate-64 Widening and High Rise Bridge Replacement, and expansion of the Chesapeake Bay Bridge Tunnel is planned in the future. Additional development could increase the risks of whale impacts from noise impacts and ship strikes. However, implementation of the Preferred Alternative is not anticipated to substantially contribute to those increased impacts to whales.

Therefore, the implementation of the Preferred Alternative may affect, but is not likely to adversely affect any of the listed whale species that have the potential to occur in the Action Area.

2.9.4 GREEN SEA TURTLE, KEMP'S RIDLEY SEA TURTLE, LEATHERBACK SEA TURTLE, AND LOGGERHEAD SEA TURTLE

Sea turtles are likely to be in the Action Area from April through mid-November with the greatest amount of sea turtles present from June through October (NMFS 2012). We would anticipate the greatest quantity of turtles to consist of juvenile loggerhead turtles, however, adult loggerheads, juvenile Kemp's ridley, adult and juvenile leatherback, and adult green sea turtles would be anticipated to also occur in the Action Area.

Because of their large size, we would not anticipate entrainment in dredging equipment to be a threat to leatherback turtles. However, loggerhead, Kemp's ridley, and green sea turtles would be vulnerable to entrainment in hopper dredging operations that could occur in the Atlantic Ocean Channel and the Thimble Shoal Channel and the Norfolk Harbor Channel - Sewells Point to Lamberts Bend. These turtles could become entrained in hopper dredges as the draghead moves along the bottom of the channel. Mortality can occur if the sea turtle gets

sucked into the dredge draghead and then pumped through the intake pipe and crushed when they go through the pump and into the hopper. Most likely, entrainment occurs for those sea turtles that are on the bottom of the channel because it is thought that they only become entrained when the draghead is operating on the channel bottom (NMFS 2012). Sea turtle entrainment can also occur if there is suction in the draghead created by current flow when the draghead is being moved or if the dredge is operating on an uneven surface. Also, turtle exclusion devices will be used on the hopper dredges, however, these likely become less or ineffective when working on an uneven channel bottom. Loggerheads are also known to bury themselves in the mud (this behavior is called brumation). This makes them especially vulnerable to entrainment in hopper dredges and this was documented by a substantial entrainment event that occurred in Port Canaveral Ship Channel in Florida (NMFS 2012). In general, chelonid turtles utilize deep, less productive channels as resting areas as they provide an escape from predators (NMFS 2012.)

The NMFS Biological Opinion (2012) lists the sea turtle takes reported in USACE, Norfolk District Dredging Operations from 1992 - 2012. Incidental turtle entrainment data collected from 1994 – 2017 is provided in Appendix B. During the 1994 - 2012 time period, there were 17 reported sea turtle takes that resulted from hopper dredging operations. These takes occurred solely in the Thimble Shoal Channel. Of the takes reported in the Action Area during this time period, most of the takes (14) consisted of loggerhead sea turtles; there was also one reported take of a Kemp's ridley sea turtle and there were two sea turtle takes where the species could not be determined. During the reporting time period, observer coverage was not 100% so turtle mortality may have been underestimated; also it is possible that not all sea turtles that are killed by the dredge are observed (NMFS 2012). For example, a dredge could crush a sea turtle causing injuries or mortality (NMFS 2012). Although we do not have direct evidence of this in the Action Area, this is a potential threat.

It is difficult to predict the number of sea turtle and dredge interactions anticipated to occur from a dredging operation. For example, the same dredging operation equipment in the same channel stretch can result in varying levels of sea turtle impacts year to year. In locations where high numbers of sea turtles are present (Chesapeake Bay) and where dredges are operational in areas with depths known to be used by turtles for foraging and/or resting, the overall number of turtles entrained compared with the number of turtles present is low (NMFS 2012). This is attributed in part to proper operation of sea turtle deflector equipment minimizing entrainment interactions with sea turtles, the condition of the channel during dredging activities (i.e. production dredging versus clean-up dredging activities), and/or because turtles will avoid the disturbance impacts of the dredge by moving away from the dredge and turbidity plume. The NMFS (2012) noted that the interactions between dredging equipment and sea turtles can be associated with the volume of material dredged. The volume of dredged material is correlated to the amount of dredging time with a larger volume of material and time associated with a greater number of sea turtle interactions. Interactions are also thought to be related to the amount of food in the area and bottom type being dredged. The NMFS (2012) calculated the amount of turtle takes associated with quantities of dredged material during the 1992 – 2012 timeframe and found that one sea turtle is entrained for every 300,000 cubic yards removed (18,442,566 cubic yards removed April – November divided by 64 sea turtles) for projects conducted by the USACE, Norfolk District since monitoring began in 1994. When taking into account the more recently collected turtle entrainment data (2013 – 2017 data) with the 1994 – 2012 entrainment data the older data provides the more conservative entrainment rate estimate. Therefore, for our estimated, predicted turtle entrainment rates with implementation of the Preferred Alternative, we utilized the entrainment calculation provided in the NMFS (2012) Biological Opinion. While this estimate relies on a series of assumptions, it

incorporates the best available information from past dredging events in the Action Area and surrounding areas and all of the projects included had observer coverage. Out of the 64 entrained sea turtles evaluated by the NMFS (2012), 60 could be identified to species and these were mainly loggerheads (54); there were also five Kemp's ridleys and one green sea turtle documented. Therefore, based on this information, NMFS (2012) assumed for every 300,000 cubic yards of material dredged, 90% will be loggerheads, 8% will be Kemp's ridleys, and 2% will be green sea turtles. This same methodology can be applied to our project. Using this methodology, the following estimated sea turtle takes are estimated to occur over the 50 year lifecycle of the project: 463 loggerhead, 42 Kemp's ridley, and 11 green sea turtles. Therefore, because of potential entrainment impacts, there would be adverse effects to loggerhead, Kemp's ridley, and green sea turtles.

There is no Submerged Aquatic Vegetation in the Action Area, therefore, adult green sea turtles will not be foraging in the Action Area; however, juveniles could potentially be foraging on benthic invertebrates in the Action Area. Sessile and slow moving benthic fauna would be removed and potentially buried by dredging operations in the dredging footprint and in surrounding areas affected by the turbidity plume. Benthic resources that serve as prey items for sea turtles could also be entrained by dredging operations. For the listed species anticipated to occur in the Action Area, loggerheads and Kemp's ridley sea turtles are most likely to be foraging in the Action Area on benthic species that could include crabs and mollusks. Therefore, the dredging actions, may temporarily reduce prey populations used by juvenile green, loggerheads and Kemp's ridley sea turtles. However, there are other foraging areas within the immediate vicinity of the Action Area that could be used for foraging and this is not anticipated to cause substantial foraging impacts. Leatherbacks, which prefer to forage on soft-bodied invertebrates such as jellyfish, could also be potentially foraging in the Action Area and could be temporarily disrupted by dredging and dredged material placement activities. However, any foraging related impacts to sea turtles would be considered to be insignificant.

As described in the Mitigation and Best Management Practices Section below, sea turtle relocation trawling will be done to minimize the number of sea turtles captured and killed during dredging operations. This is thought to be an effective method to minimize sea turtle interactions with dredging equipment when there is a high abundance of sea turtles in the area (NMFS 2012). Relocation trawling will be required if two sea turtles are entrained in one 24-hour period or when four sea turtles are entrained in a two month period or in situations where there is an unusual high abundance of sea turtles that could results in higher than anticipated entrainment rates. Relocation trawling may cause some stress to the sea turtles and the effects of this stress are not fully understood. Only one potential mortality of a sea turtle has ever been recorded from relocation trawling conducted by the Norfolk District (NMFS 2012). It was a Kemp's ridley turtle that had a blunt force trauma to the head that likely resulted from relocation trawling. Therefore, sea turtle relocation trawling would have the potential to cause adverse effects to green, Kemp's ridley, and loggerhead sea turtles.

Maintenance of the CIDMMA shoreline and breakwaters may result in a temporary disturbance effect to sea turtles in the Action Area. It may cause an insignificant impact resulting from an increase in turbidity and Total Suspended Solids but it would not substantively affect any foraging or migratory behaviors. Therefore potential adverse impacts to sea turtles from CIDMMA maintenance would be temporary and insignificant.

Another potential threat to these species is injury or incidental take resulting from MEC/UXO detonation or contact with contaminants leaching from MEC/UXO that occur in the Action Area.

Detonation could result in mortality or temporary to permanent injuries to sea turtles. Exposure to contaminants could also result in mortality or injury and bioaccumulation of contaminants in sea turtle tissues. This could result in a potentially adverse effect to any of the listed sea turtles with the potential to occur in the Action Area. However, use of the MEC/UXO screening devices will mitigate this to the extent practical.

The risk of injury to sea turtles from collisions with dredge-related vessels is considered discountable considering the species mobility and slow speed of the dredge vessels (10 knots or less) and associated barges and scow. Also, trained personnel that know how to recognize the presence of threatened and endangered whale and sea turtle species that will be onboard at all times to help ensure that vessel interactions are avoided. No sea turtle vessel collisions with dredge-related vessels has ever been reported to occur in the Action Area from dredging operations. With implementation of the project, the number of deep draft vessel calls is anticipated to decrease in the future with project as compared to the future without project conditions. This could potentially reduce the number of collisions of sea turtles with deep draft vessels in the future.

Potential cumulative threats to sea turtles include ship strikes from commercial and recreational vessels and exposure to contaminants such as oil spills. Another potential cumulative impact to consider is impacts that occur from fishery entanglement. Virginia Port growth is anticipated to increase throughout the next 50 years and a new port facility is planned, which may increase the number of vessels transiting the Norfolk Harbor and Channels. Also, additional development including construction of the Third Crossing, the Interstate-64 Widening and High Rise Bridge Replacement, and expansion of the Chesapeake Bay Bridge Tunnel is planned in the future. Additional development could increase the risks of sea turtle impacts from disturbance, noise impacts and ship strikes.

Therefore, implementation of the Preferred Alternative may affect and is likely to adversely affect the green sea turtle, the Kemp's ridley sea turtle, the leatherback sea turtle, and the loggerhead sea turtle.

2.10 BEST MANAGEMENT PRACTICES/MITIGATION MEASURES AND CONSERVATION MEASURES FOR LISTED SPECIES

2.10.1 BEST MANAGEMENT PRACTICES/MITIGATION MEASURES

Below are the mitigation measures planned with implementation of the Preferred Alternative for protection of listed sturgeon, whales, and sea turtles.

- The NMFS will be contacted three days prior to the commencement of any dredging operations to ensure all appropriate reporting forms will be used.
- To minimize entrainment during dredging operations Turtle Excluder Devices will be used on dragheads for hopper dredges. Turtle Exclusion Devises create a sand wave in front of the draghead and will "roll" a resting sea turtle on the bottom off to the side and out of the path of the draghead.
- National Marine Fisheries Service-approved observers will be present on all hopper dredges and perform 100% inspection of inflow and/or inspection of dragheads and turtle excluder devices when MEC/UXO screens are utilized.
- All dredge operators will be trained on measures of dredge operation that will minimize the take of sea turtles. All personnel performing dredging operations will be notified of the potential presence of sea turtles and the need to avoid collisions with sea turtles. All

personnel are responsible for observing water-related activities for the presence of these species. All personnel shall be notified that there are civil and criminal penalties for harming, harassing, or killing listed or other protected species.

- If a sea turtle is observed within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle. Operation of any mechanical construction equipment shall cease immediately if a sea turtle is observed within a 50-ft radius of the equipment. Activities may not resume until the sea turtle has departed the project area of its own volition.
- Any collision with and/or injury to a sea turtle shall be reported within 24 hours to the NMFS's Protected Resources Division.
- The USACE will ensure all appropriate measures are taken to protect any sea turtles or listed sturgeon that survive hopper dredging entrainment.
- Sea turtle relocation trawling will be initiated following the take of two sea turtles in a 24-hour period or four turtles within a two month period.
- MEC/UXO screening devices shall be used on dredging equipment in locations with a high potential risk of MEC/UXO detonation as defined by the USACE.

2.10.2 CONSERVATION MEASURE

To the maximum extent practicable and dependent on mission requirements, a time-of-year restriction for hopper dredging in the lower Chesapeake Bay will be followed from September 1 through November 15 to avoid impacting sea turtles during the fall migration period when there is a high density of sea turtles in the lower bay preparing for migration south.

3.0 SPECIES SUMMARY CONCLUSION TABLE.

Table 3 provides the summary species conclusion table.

Table 3. Summary Species Conclusion Table.

Species / Resource Name	Endangered Species Act Section 7 Determination	Notes / Documentation
Atlantic sturgeon	May Affect, Likely to Adversely Affect	Entrainment from hopper dredging may result in injury and mortality. Collisions with dredging vessels would be unlikely and discountable. Dredging would result in a temporary loss and impact to prey species. Dredging may result in a disturbance effect where sturgeon leave the Action Area from the increased levels of Total Suspended Solids, turbidity, and noise. Sea turtle relocation trawling could result in sturgeon captures causing a temporary stress effect.

Species / Resource Name	Endangered Species Act Section 7 Determination	Notes / Documentation
Atlantic sturgeon Designated Critical habitat	May Affect, Likely to Adversely Affect	Dredging would result in temporary loss and impact to benthic prey species. Dredging would temporarily result in increased levels of Total Suspended Solids and turbidity in the water column.
Fin whale, north Atlantic right whale, and sei whale	May Affect, Not Likely to Adversely Affect	Collisions with dredging vessels would be unlikely. Dredging may impact prey species and cause whales to leave the Action Area from the dredging turbidity plume and noise disturbances. Effects would be insignificant and discountable.
Green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle	May Affect, Likely to Adversely Affect	Entrainment in hopper dredging may result in injury and incidental take. Dredging may impact prey species and cause sea turtles to leave the Action Area from the dredging turbidity plume. No nesting locations are in the Action Area. Relocation trawling could result in injury, incidental take, or a temporary stress effect.

4.0 REFERENCES

Aschettino, J. M., Engelhaupt, D., Engelhaupt, A., Richlen, M. 2017. Final mid-Atlantic humpback whale monitoring, Virginia Beach, Virginia: 2016/17 Annual Progress Report. Submitted by HDR, Virginia Beach, Virginia to Naval Facilities Engineering Command Atlantic.

Aschettino, J. M., Engelhaupt, D., Engelhaupt, A., Richlen, M. 2016. Mid-Atlantic humpback whale monitoring, Virginia Beach, Virginia: 2015/16 Annual Progress Report. Submitted by HDR, Virginia Beach, Virginia to Naval Facilities Engineering Command Atlantic.

Aschettino, J. M., Engelhaupt, D., Engelhaupt, A. 2015. Final mid-Atlantic humpback whale monitoring, Virginia Beach, Virginia: 2015/16 Annual Progress Report. Submitted by HDR, Virginia Beach, Virginia to Naval Facilities Engineering Command Atlantic.

Balazik, M.T., Reine, K.J., Spells, A.J., Frederickson, C.A., Fine, M.L., Garman, G.C., McIninch, S.P. 2012. The potential for vessel interactions with adult Atlantic Sturgeon in the James River, Virginia. North American Journal of Fisheries Management. 32:6, 1062-1069.

Barco, S.B., Swingle, M. 2014. Marine mammal species likely to be encountered in the coastal waters of Virginia from analysis of stranding data. Prepared for the Virginia Department of

Mines, Minerals, and Energy. Retrieved from http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjL87763bWAhUIWCYKHf3qALgQFggoMAA&url=http%3A%2F%2Fwind.jmu.edu%2Foffshore%2Fvowda%2Fdocuments%2FVAQF_Scientific_Report_2014-07a_Marine%2520Mammals%2520.pdf&usg=AOvVaw0f_VXjD6D4y2L11nAmM0qN.

Byrne, R.J. 1993. Report of the Virginia Institute of Marine Science on Beneficial Uses of Dredged Materials in Hampton Roads, Virginia. To the Governor and the General Assembly of Virginia. House Document No. 16, Richmond, Virginia.

Jensen, A.S., Silber, G.K. 2003. Large Whale Ship Strike Database. U.S. Department of Commerce, NOAA Technical Memorandum. NMFS-OPR- , 37 pp.

Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S., Podesta, M. 2001. Collisions between ships and whales. Marine Mammal Science 17, 1: 35-75.

Liu, Z., Wang H., Ye, F. 2017. Incorporating Sea Level Change Scenarios into Norfolk Harbor Channels Deepening and Elizabeth River Southern Branch, Navigation Improvements Study, Final Report. Virginia Institute of Marine Science, Special Report No. 457 In Applied Marine Science and Ocean Engineering. doi:10.21220/V5BX49.

Moser, M.L., Ross, S.W. 1995. Habitat use and Movements of Shortnose and Atlantic Sturgeons in the Lower Cape Fear River, North Carolina. Transactions of the American Fisheries Society 124:225-234.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2017. Large whale ship strikes relative to vessel speed. Retrieved from http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwiH1KzEptrWAhUHPiYKHeOyDdEQFggoMAA&url=http%3A%2F%2Fwww.nmfs.noaa.gov%2Fpr%2Fpdfs%2Fshipstrike%2Fss_speed.pdf&usg=AOvVaw0l1snfU-n2uhAO7bzH3EDS.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2017a. GARFO Master ESA Species Table: Atlantic Sturgeon. Retrieved from https://www.greateratlantic.fisheries.noaa.gov/protected/section7/listing/garfo_master_esa_species_table_-_atlantic_sturgeon_121917.pdf.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2017b. GARFO Master ESA Species Table: Atlantic Sturgeon. Retrieved from

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2016a. Atlantic Sturgeon Recovery Program. Retrieved from http://www.greateratlantic.fisheries.noaa.gov/protected/atlsturgeon/index.html.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2016c. Humpback Whale (*Megaptera novaeangliae*). 2016 (May). Retrieved from http://www.nmfs.noaa.gov/pr/species/mammals/whales/humpback-whale.html.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2016d. Loggerhead Turtle (*Caretta caretta*). Retrieved from http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.html.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2016e. North Atlantic Right Whales (*Eubalaena glacialis*). 2016. Retrieved from http://www.nmfs.noaa.gov/pr/species/mammals/whales/north-atlantic-right-whale.html.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2016f. North Atlantic Right Whale (*Eubalaena glacialis*) Western Atlantic Stock. 2016 (May). Retrieved from http://www.nmfs.noaa.gov/pr/sars/species.htm#largewhales.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2016g. Sea Turtle Program Managing, conserving, and rebuilding populations of sea turtles in the Greater Atlantic waters. Retrieved from http://www.greateratlantic.fisheries.noaa.gov/Protected/seaturtles/.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2016h. Sei Whale (*Balaenoptera borealis*). 2016. Retrieved from: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/seiwhale.htm.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2016i. Shortnose Sturgeon (*Acipenser brevirostrum*). Retrieved from http://www.fisheries.noaa.gov/pr/species/fish/shortnose-sturgeon.html.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2016j. Sperm Whale (*Physeter macrocephalus*). Retrieved from http://www.fisheries.noaa.gov/pr/species/mammals/whales/sperm-whale.html.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2014. Minke Whale (*Balaenoptera acutorostrata*). Retrieved from http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/minkewhale.htm.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2013. Fin Whale (*Balaenoptera physalus*). Retrieved from: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/finwhale.htm.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2012. Endangered Species Act Biological Opinion: Maintenance of Chesapeake Bay Entrance Channels and use of sand borrow areas for beach nourishment. Dated 16 November 2012.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 1998. Final Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). Retrieved from http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=8&ved=0ahUKEwiiyqXZw_HOAhXI5SYKHbaQBcUQFghBMAc&url=http%3A%2F%2Fwww.nmfs.noaa.gov%2Fpr%2Fpdfs%2Frecovery%2Fsturgeon_shortnose.pdf&usg=AFQjCNEWRZl6lcm2tkbZdvavxzMbvPYDAA&sig2=j5FXDsDXngzIxWyn7unnOQ&bvm=bv.131783435,d.eWE.

Pace, R., Corkeron, P., & D. Kraus, Scott. (2017). State–space mark–recapture estimates reveal a recent decline in abundance of North Atlantic right whales. Ecology and Evolution. 7. . 10.1002/ece3.3406.

Reine, K., and Clarke, D. 1998. Entrainment by hydraulic dredges–A review of potential impacts. Technical Note DOER-E1. U.S. Army Engineer Research and Development Center, Vicksburg, MS.

Swingle, W.M., Barco, S.G., Costidis, A.M., Bates, E.B., Mallette, S.D., Phillips, K.M., Rose, S.A., Williams, K.M. 2017. Virginia Sea Turtle and Marine Mammal Stranding Network 2016 Grant Report: VAQF Scientific Report (Vol 2017 No. 1). Retrieved from: http://www.deq.virginia.gov/Portals/0/DEQ/CoastalZoneManagement/FundsInitiativesProjects/task49-15.pdf?ver=2017-05-16-074848-097.

Swingle, W.M., Barco, S.G., Bates, E.B., Lockhart, G.G., Phillips, K.M., Rodrique, K.R., Rose, S.A., Williams, K.M. 2016. Virginia Sea Turtle and Marine Mammal Stranding Network 2015 Grant Report: VAQF Scientific Report (Volume 2016 No. 01). Retrieved from: http://www.deq.virginia.gov/Portals/0/DEQ/CoastalZoneManagement/FundsInitiativesProjects/task49-14.pdf.

Swingle, W.M., Lynott, M.C., Bates, E.B., Lockhart, G.G., Phillips, K.M., Rodrique, K.R., Rose, S.A., Williams, K.M. 2015. Virginia Sea Turtle and Marine Mammal Stranding Network 2014 Grant Report: VAQF Scientific Report (Volume 2015 No. 01). Retrieved from: http://www.deq.virginia.gov/Portals/0/DEQ/CoastalZoneManagement/FundsInitiativesProjects/task49-13.pdf.

Swingle, W.M., Lynott, M.C., Bates, E.B., D'Eri, L.R., Lockhart, G.G., Phillips, K.M., Thomas, M.D. 2014. Virginia Sea Turtle and Marine Mammal Stranding Network 2013 Grant Report: VAQF Scientific Report (Volume 2014 No. 02). Retrieved from: http://www.deq.virginia.gov/Portals/0/DEQ/CoastalZoneManagement/FundsInitiativesProjects/task49-12.pdf.

Swingle, W.M., Trapani, C.M., D'Eri, L.R., Lynott, M.C. 2013. Marine Mammal and Sea Turtle Stranding Response 2012 Grant Report: VAQF Scientific Report (Volume 2013 No. 01). Retrieved from: https://www.virginiaaquarium.com/conserve/Documents/2012-Stranding-Network-Report.pdf.

Swingle, W.M., Trapani, C.M., D'Eri, L.R., Lynott, M.C. 2012. Marine Mammal and Sea Turtle Stranding Response 2011 Grant Report: VAQF Scientific Report (Volume 2012 No. 02). Retrieved from: http://www.deq.virginia.gov/Portals/0/DEQ/CoastalZoneManagement/FundsInitiativesProjects/task49-10.pdf.

Swingle, W.M., Trapani, C.M., Cook, M.L. 2011. Marine Mammal and Sea Turtle Stranding Response 2010 Grant Report: VAQF Scientific Report (Volume 2011 No. 01). Retrieved from: http://www.deq.virginia.gov/Portals/0/DEQ/CoastalZoneManagement/task49-09.pdf.

Swingle, W.M., Trapani, C.M., Cook, M.L. 2010. Marine Mammal and Sea Turtle Stranding Response 2009 Grant Report: VAQF Scientific Report (Volume 2010 No. 01). Retrieved from: http://www.deq.virginia.gov/Portals/0/DEQ/CoastalZoneManagement/task49-08.pdf.

Todd, Victoria L.G., I.B. Todd, J.C. Gardiner, E.C. N. Morrin, N.A. MacPherson, N.A. DiMarzio, and F. Thomsen. 2014. A Review of Impacts of Marine Dredging Activities on Marine Mammals. ICES Journal of Marine Science. Retrieved from http://www.osc.co.uk/wp-content/uploads/2015/01/Todd_2015_DredgingReview.pdf.

U.S. Army Corps of Engineers. 1983. Dredging and Dredged Material Disposal. Engineer Manual 1110-2-5025, Office, Chief of Engineers, Washington, DC.

U. S. Department of the Navy. 2009. Final Environmental Impact Statement for the Proposed Dredging of Norfolk Harbor Channel, Norfolk and Portsmouth, Virginia. July. Lead Agency: U. S. Department of the Navy, Commander Navy Region Mid-Atlantic, with the assistance of the U.S. Army Corps of Engineers.

U.S. Fish and Wildlife Service. 2017. Information for Planning and Conservation Database. Retrieved from http://www.fws.gov/northeast/virginiafield/endangered/projectreviews_step2.html.

U.S. Fish and Wildlife Service. 2015. Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) 5-year review: Summary and Evaluation. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C00O.
Virginia Aquarium Foundation/Virginia Aquarium Stranding Response Program. 2017a. Vessel Interaction Sea Turtles VAQS 2008-2016 [Data file].

Virginia Aquarium Foundation/Virginia Aquarium Stranding Response Program. 2017b. Vessel Interactions Marine Mammals VAQS 2003-2017 [Data file].

Virginia Department of Conservation and Recreation (DCR). 2016. Virginia Natural Heritage Data Explorer. https://vanhde.org/.

Virginia Department of Game and Inland Fisheries (VDGIF). 2016b. Virginia Fish and Wildlife Information Service. http://vafwis.org/fwis/?Menu=Home.__By+Coordinates.
Wang, R., Shen, J., Sisson, M. 2017. Incorporation of sea level change scenarios into Norfolk Harbor Channels Deepening Study & Elizabeth River Southern Branch Navigation Improvements Study. Draft Report submitted to the Moffatt and Nickol and the U.S. Army Corps of Engineers. Virginia Institute of Marine Science. Special Report No. 456 In Applied Marine Science and Ocean Engineering. doi:10.21220/V5GM8Z.

Virginia Institute of Marine Science (VIMS). 2018a. Sea Turtle Stranding Program. Kemp's Ridley Sea Turtle. Retrieved from http://www.vims.edu/research/units/legacy/sea_turtle/va_sea_turtles/kemps_ridley.php.

Virginia Institute of Marine Science (VIMS). 2018b.Sea Turtle Stranding Program. Loggerhead Sea Turtle. 2018. Retrieved from http://www.vims.edu/research/units/legacy/sea_turtle/va_sea_turtles/loggerhead.php.

Welsh, S.A., Mangold, M.F., Skjeveland, J.E. 2002. Distribution and movement of shortnose sturgeon (*Acipenser brevirostrum*) in the Chesapeake Bay. Estuaries 25, 101.

Whale and Dolphin Conservation Society. 2006. Vessel collisions and cetaceans: what happens when they don't miss the boat. Retrieved from http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwj546TqiOfWAhWBLyYKHXryACEQFggoMAA&url=http%3A%2F%2Fuk.whales.org%2Fsites%2Fdefault%2Ffiles%2Fwhales-and-ship-strikes.pdf&usg=AOvVaw1KIM-3ylliuilTv5Q7p3-p.

Zhang, J., Wang, H., Ye, F., Wang, Z. 2017. Assessment of Hydrodynamic and Water Quality Impacts for Channel Deepening in the Thimble Shoals, Norfolk Harbor, and Elizabeth River Channels, Final report on the "hydrodynamic modeling." Special Report No. 455 In Applied

Marine Science and Ocean Engineering, Virginia Institute of Marine Science. doi:10.21220/V5MF0F.

Appendix A – Coordination and Consultation Correspondence

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

August 16, 2016

Ms. Christine Vaccaro
Protected Resources Division
NOAA Fisheries, Greater Atlantic Region
55 Great Republic Drive
Gloucester, MA 01930

Dear Ms. Vaccaro:

The U.S. Army Corps of Engineers (USACE), Norfolk District, in cooperation with the Virginia Port Authority (VPA), has initiated a General Reevaluation Report (GRR) for the Norfolk Harbor and Channels deepening project. It is a deep-draft project consisting of a network of multiple channel and anchorage elements that provide two-way, full-width navigation from the Atlantic Ocean into the Port of Hampton Roads. The natural harbor in which the Port of Hampton Roads facilities are located covers a 25-square-mile area and serves the cities of Norfolk, Newport News, Portsmouth, Chesapeake, and Hampton in southeastern Virginia.

The original Norfolk Harbor Federal Navigation channel network was authorized by the 1876 River and Harbor Act, and modified by numerous River and Harbor Acts through Section 201 of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662). This channel system is currently maintained by the USACE.

The purpose of this project is to improve the operational efficiency of deep draft vessels for use of the harbor in the future. The need for this project arises from inefficiencies currently experienced by commercial vessels in Norfolk Harbor and Channels. These inefficiencies are projected to continue in the future as vessel sizes are expected to increase. The existing channel system was never dredged to the depths originally authorized by the WRDA, so we are considering various alternatives for deepening and adding anchorages and ship meeting areas.

The project consists of the Atlantic Ocean Channel, Thimble Shoal Channel and Meeting Areas, Channel to Newport News and Anchorages, and Channel from Sewells Point to Lamberts Bend and Norfolk Harbor Anchorages. The dredge material management areas are anticipated to be the following existing facilities: the Norfolk Ocean Disposal Site (NODS), the Dam Neck Ocean Disposal Site (DNODS), and the Craney Island Dredged Material Management Area (CIDMMA). A physical description of the project limits follows below, and is also shown on the attached maps.

The **Atlantic Ocean Channel**, just off the coast of Virginia, was authorized by the WRDA of 1986. The WRDA authorized the USACE to construct the AOC, which consists of a channel 11.1 miles long, 1,300 feet wide, and 57 feet deep. As part of the 50-foot inbound construction effort in 2006, the channel was deepened to provide for a depth and width of 52 feet and 1,300 feet, respectively.

The **Thimble Shoal Channel** is located in the southern part of the Chesapeake Bay, just off the shoreline of Norfolk and Virginia Beach, and east of the CIDMMA. This project was originally authorized by the River and Harbor Act of 1917. The authorized channel dimensions are 13.4 miles long, 1,000 feet wide, to a depth of 55 feet, but it is currently dredged to 1,000 feet wide and 50 feet deep.

The **Channel to Newport News and associated Newport News anchorages** is authorized to 55 feet deep by 800 feet wide, from Norfolk Harbor Channel in Hampton Roads to Newport News and the Newport News Anchorages. It is currently 50 feet deep and 800 feet wide.

The **Sewells Point to Lamberts Bend Channel** is located in the mainstem of the Elizabeth River in Norfolk. This segment of the project is approximately eight miles long and varies in width between 800 feet to 1,200 feet. This reach also consists of: Anchorage F, Sewells Point East Anchorage (includes the Naval Maneuvering Area and Approach Areas), Sewells Point West Anchorage and (Approach Area), Anchorage G, and all approach areas. The authorized project dimensions for this reach include a channel 55 feet deep and 1,200 feet wide from that depth in Hampton Roads, to a point approximately 6.0 miles upstream from the Hampton Roads Bridge-Tunnel; thence 55 feet deep and 800 feet wide to Lambert Point.

The **Norfolk Ocean Disposal Site (NODS**) was officially designated as an ocean placement site in 1993, pursuant to Section 102 (c) of the Marine Protection, Research, and Sanctuaries Act of 1972 (as amended, 33 U.S.C. 1401 *et seq*). This ocean placement site was designated by the administrator of the Environmental Protection Agency (EPA) in December of 1986. The center of the NODS is located 17 nautical miles from Virginia Beach. It is circular, with a radius of 4 nautical miles. The coordinates of its center are: 36 ° 59′ N latitude; 75° 39′ W longitude. Water depths near the center of the site vary between 65 to 80 feet.

The **Dam Neck Ocean Disposal Site (DNODS**) was first utilized as an ocean placement site in 1967. It was designated by the administrator of the EPA in March of 1988. It is located three nautical miles east of, and runs parallel to, Virginia Beach, covering about eight square nautical miles. Its boundary coordinates are:

36° 51′ 24.1″ N latitude; 75° 54′ 41.4″ W longitude
36° 51′ 24.1″ N latitude; 75° 53′ 2.9″ W longitude
36° 46′ 27.4″ N latitude; 75° 51′ 39.2″ W longitude
36° 46′ 27.4″ N latitude; 75° 54′ 19″ W longitude
36° 50′ 05″ N latitude; 75° 54′ 19″ W longitude

Water depths at DNODS vary between 31 to 49 feet deep.

The **CIDMMA** is a 2,500-acre confined disposal facility adjacent to the confluence of the James River, Elizabeth River, and Nansemond River, and in close proximity to the Chesapeake Bay and the Atlantic Ocean. It includes both a rehandling basin and upland cells for direct pumping of dredged material. It was completed in 1957 and is maintained by the USACE.

We have also included maps of the Action Area, which consists of the areas of navigation channel dredged and dredged material placement/disposal sites. The Action Area also includes all areas transited by dredging equipment. The Action Area also includes the area of anticipated circulation patterns shifts and water quality impacts. The geographic extent of water clarity impacts (Total Suspended Solids and turbidity) is estimated to not extend past 4,000 feet from the dredging site and is dependent upon factors such as the type of dredging equipment, the dredging depth, and environmental conditions such as wind and currents (USACE, 1983). The Action Area also includes the range of noise impacts as they relate to individual listed species.

We are preparing a General Reevaluation Report (GRR), which is required due to a proposal to deepen the channels and take into account any changed conditions and/or assumptions. The results may affirm the previous plan; reformulate and modify it, as appropriate; or find that no plan is currently justified. As required under the National Environmental Policy Act (NEPA) of 1969, as amended, the USACE will determine whether or not the project's environmental impacts are significant. If significant impacts to the human environment are anticipated, the USACE will prepare an Environmental Impact Statement. If not, the USACE will prepare an Environmental Assessment. At this time, no significant impacts have been identified and we anticipate preparation of an Environmental Assessment.

As you know, we obtained a batched Biological Opinion (BO) in October 2012 from NOAA Fisheries, for this and other projects. The purpose of this letter is to request updated official protected species lists pursuant to Section 7 of the Endangered Species Act (ESA), and the Marine Mammal Protection Act (MMPA), as well as to request any initial comments or direction you have in terms of re-initiation of consultation. We will conduct further coordination with you upon receipt of these lists, and after dredged cubic yardages and depths are further refined. We look forward to our meeting with you on August 22.

Thank you for your attention to this project. Please do not hesitate to contact me at (757) 201-7218 or Kathy.S.Perdue@usace.army.mil if you have any questions or need any additional information related to this GRR study. The USACE greatly values your participation and comments on the study. We look forward to working with you.

Sincerely,

Kathy Perdue

Kathy Perdue
U.S. Army Corps of Engineers, Norfolk District, Fort Norfolk
803 Front Street
Norfolk, Virginia 23510

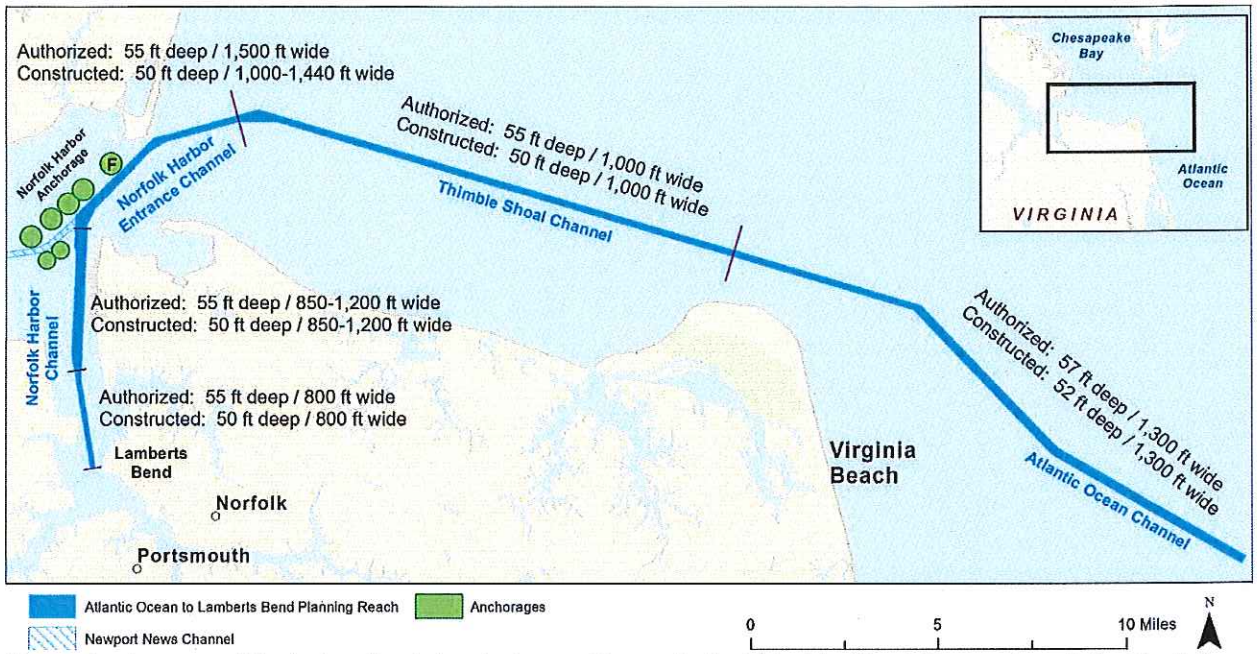

Figure 1. Segment 1 includes the Atlantic Ocean Channel, the Thimble Shoal Channel, and the Norfolk Harbor Channel. Authorized dredging depths and the existing dredging depths that have been constructed to date are depicted.

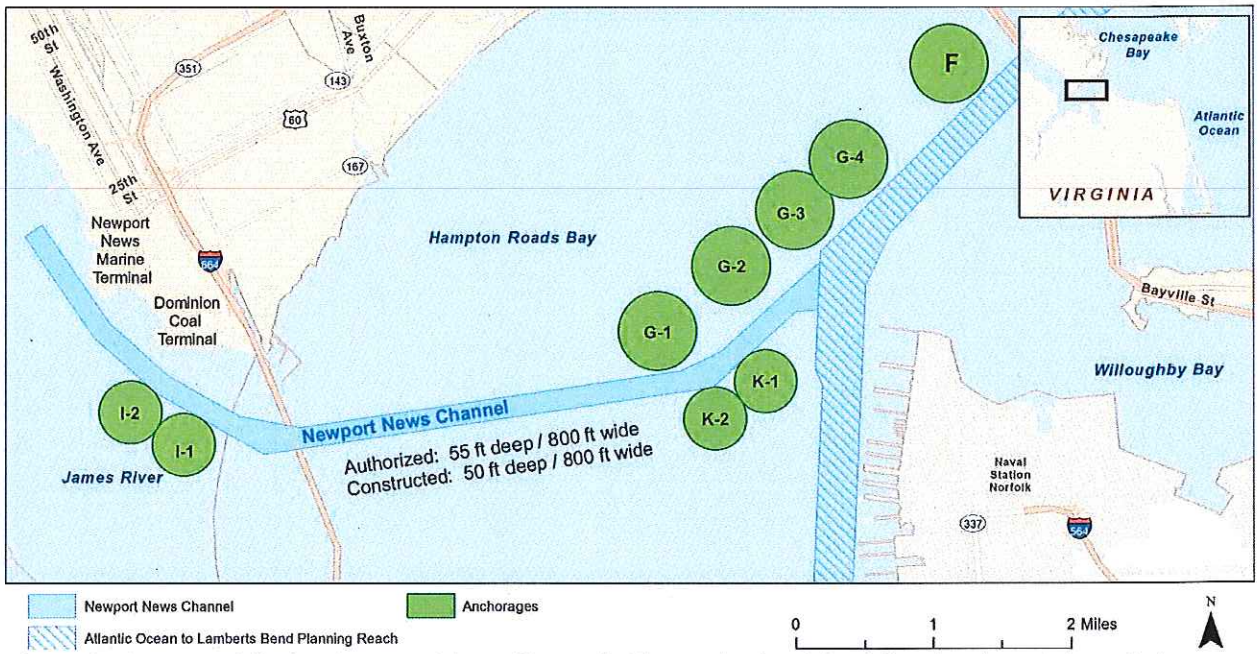

Figure 2. Segment 2 is the Newport News Channel. The authorized dredging depth and the existing dredging depth that has been constructed to date is depicted. Anchorages are also shown for reference. Deepening of Anchorage F is being considered for this project.

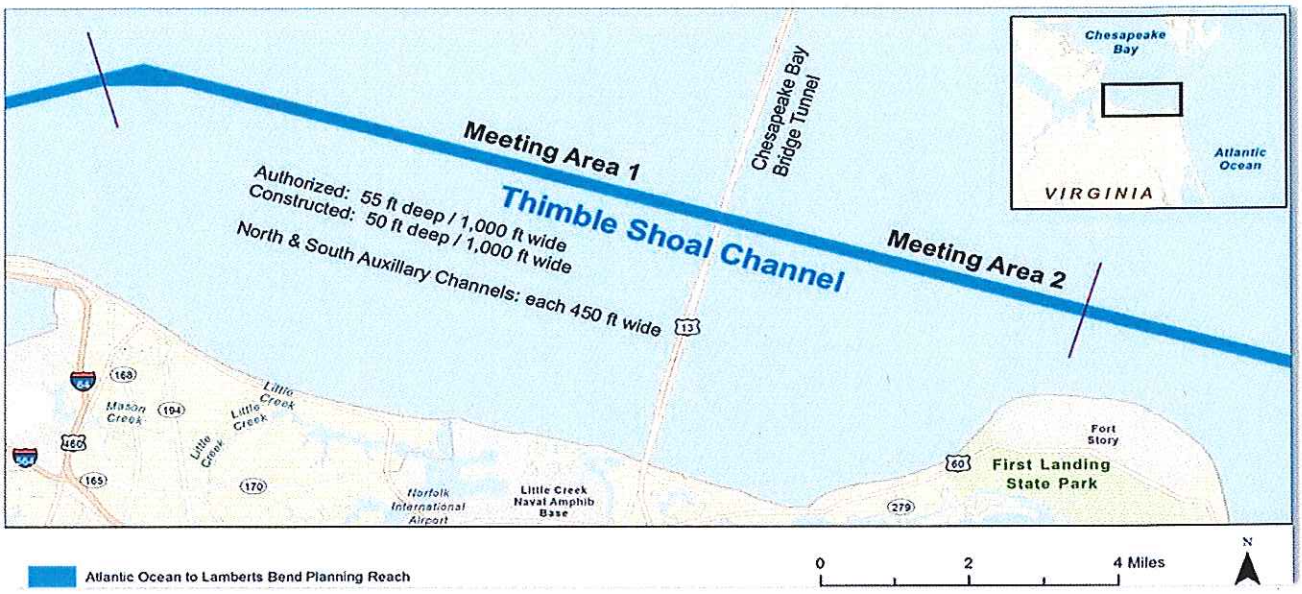

Figure 3. Channel widening locations (also referred to as Meeting Areas 1 and 2), with implementation of the maximum action alternative.

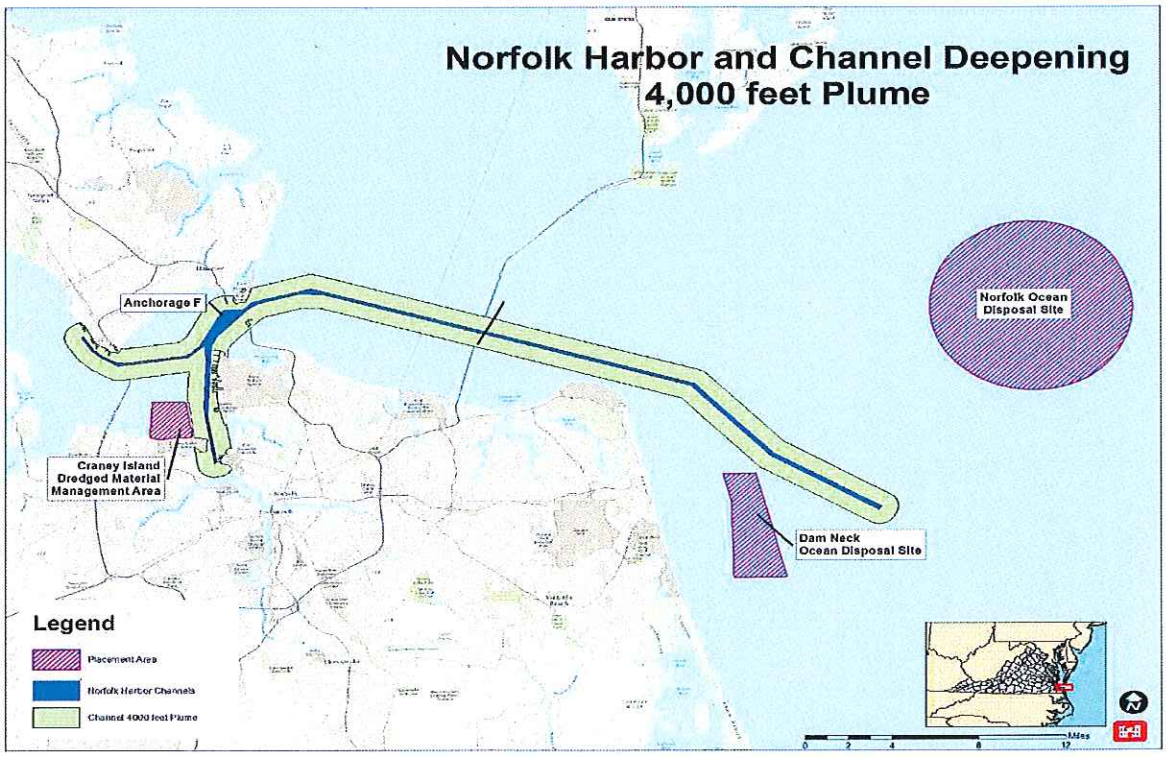

Figure 4. The Action Area for the project, including indirect plume effects from dredging, and showing the dredged material disposal sites. (NOTE: it is unknown what pathways the barges will take to transit back and forth from the channel to NODS and DNODS, so those are not depicted in the drawing. But any species impacted by transit by barge traffic between those areas should be considered too.)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

AUG 18 2016

Kathy Perdue
Department of the Army
Norfolk District, US Army Corps of Engineers
Fort Norfolk
803 Front Street
Norfolk, VA 23510-1011

Re: General Reevaluation Report for the Norfolk Harbor and Channels deepening project

Dear Ms. Perdue,

We received your letter on August 16, 2016, regarding the Norfolk Harbor and Channels deepening project, for which you request information about threatened and endangered species and critical habitat under the jurisdiction of NOAA's National Marine Fisheries Service (NMFS).

Species Presence

Sea Turtles
Several species of threatened and endangered sea turtles occur seasonally in the Chesapeake Bay and its tributaries and coastal Virginia waters, during the warmer months, typically from late April through mid-November. The Western North Atlantic Distinct Population Segment (DPS) of loggerhead sea turtles (*Caretta caretta*), as well as Kemp's ridley (*Lepidochelys kempi*), and green sea turtles (*Chelonia mydas*) are present in these waters mainly during late spring, summer and early fall when water temperatures are relatively warm.

Atlantic Sturgeon
Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) occur in estuarine and marine waters along the U.S. Atlantic coast and may be present in the vicinity of project area. The New York Bight, Chesapeake Bay, South Atlantic, and Carolina DPSs of Atlantic sturgeon are endangered; the Gulf of Maine DPS is threatened. Individuals originating from any of these DPSs could occur in the project areas. Juvenile and early life stages of Atlantic sturgeon will not be present as they are not able to tolerate the high salinity of marine and coastal waters.

Proposed Atlantic Sturgeon Critical Habitat

On June 3, 2016, NMFS issued two proposed rules to designate critical habitat for the five listed distinct population segments (DPSs) of Atlantic sturgeon found in U.S. waters (Gulf of Maine, New York Bight, and Chesapeake Bay DPSs: 81 FR 35701; Carolina and South Atlantic DPSs: 81 FR 36078). Federal agencies are required to confer with NFMS on any action that is likely to jeopardize the continued existence of any species proposed for listing or result in destruction or adverse

modification of proposed critical habitat (50 CFR §402.10). "Destruction or adverse modification" is defined as a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species (50 CFR § 402.02). The proposed rules identified the following four essential physical and biological features (PBFs) necessary for the conservation of the species. The term "physical or biological features" is defined as the features that support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species or other features.

1) Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0 to 0.5 parts per thousand range) for settlement of fertilized eggs, refuge, growth, and development of early life stages;

2) Aquatic habitat with a gradual downstream salinity gradient of 0.5 to 30 parts per thousand and soft substrate (e.g., sand, mud) downstream of spawning sites for juvenile foraging and physiological development;

3) Water of appropriate depth and absent physical barriers to passage (e.g., locks, dams, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support: (1) Unimpeded movement of adults to and from spawning sites; (2) seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and (3) staging, resting, or holding of subadults or spawning condition adults. Water depths in main river channels must also be deep enough (e.g., >1.2 m) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river; and

4) Water, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support: (1) spawning; (2) annual and interannual adult, subadult, larval, and juvenile survival; and (3) larval, juvenile, and subadult growth, development, and recruitment (e.g., 13°C to 26°C for spawning habitat and no more than 30°C for juvenile rearing habitat, and 6 mg/L dissolved oxygen for juvenile rearing habitat).

NFMS has proposed to designate Atlantic sturgeon critical habitat for the Chesapeake Bay DPS in the James River from Boshers Dam downstream for 160 river kilometers to where the main stem river discharges at its mouth into the Chesapeake Bay at Hampton Roads. The Newport News Channel overlaps with this proposed critical habitat, as does project related vessel traffic to the Elizabeth River, including trips to Craney Island Dredged Material Management Area. For additional details, please see: www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/maps/index.html.

As project plans develop, we recommend you consider the following project best management practices and avoidance / minimization measures for all of the proposed project's activities that might affect sea turtles and sturgeon.

• For activities that increase levels of suspended sediment, consider the use of silt management and / or soil erosion best practices (i.e., silt curtains and / or cofferdams).

• For any impacts to habitat or conditions that temporarily render affected water bodies unsuitable for the above-mentioned species, consider the use of timing restrictions for in-water work.

• For work that will increase vessel traffic, consider restricting the number of trips taken by each vessel and restricting the speed at which the vessel can travel.

For additional guidance on the section 7 consultation process, technical resources and species information, please visit our website:
http://www.greateratlantic.fisheries.noaa.gov/protected/section7/.

You will be responsible for determining whether the proposed action may affect listed species. If you determine that the proposed action may affect a listed species, you should submit your determination of effects, along with justification and a request for concurrence to the attention of the Section 7 Coordinator, NMFS, Greater Atlantic Regional Fisheries Office, Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930. After reviewing this information, we would then be able to conduct a consultation under section 7 of the ESA. If you have any questions regarding these comments, please contact Ms. Ainsley Smith (978-281-9291; Ainsley.Smith@noaa.gov)

Per your request, we have provided reinitation guidance. Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this consultation; (c) If a new species is listed or critical habitat designated that may be affected by the identified action; or (d) If the amount or extent of taking specified in the incidental take statement is exceeded. Trigger (d) only applies for formal consultations that include an Incidental Take Statement within a Biological Opinion. No take is exempted in informal consultation. If there is any incidental take of a listed species, reinitiation would be required immediately.

Magnuson-Stevens Fishery Conservation and Management Act
Essential fish habitat (EFH) may be present within the Elizabeth River and coastal Virginia. Further EFH consultation by the lead federal action agency may be required as part of the federal permit process. For a listing of EFH and further information, please visit our website, www.greateratlantic.fisheries.noaa.gov/habitat. If you have any questions regarding EFH, please contact David O'Brien (david.l.o'brien@noaa.gov, 804-684-7828).

Sincerely,

Mark Murray-Brown
Section 7 Coordinator
for Protected Resources

File H:\Section 7 Team\Section 7\Non-Fisheries\ACOE\Technical Assistance\2016\Norfolk and VPA
EC: NMFS Smith, O'Brien

Appendix B – Sea Turtle Entrainment Data (1994 – 2017)

Project Location	Start Year	Dredging Dates (observers required: April 1 - November 30)	Cubic Yards Removed	Corps Contract "Pay" Volumes (Does not include non-pay yardage)	Corps Contract #	total sea turtles	log	KR	green	unknown
Thimble Shoal Channel	2017	4/29/2017-6/25/2017; 8/23/2017-8/31/2017	-	863,933	W91236-16-C-0029	1	1	0	0	0
Cape Henry Channel	2015	4/2/2015-6/1/2015	-	478,566	W91236-14-C-0014	0	0	0	0	0
York Spit Channel	2015	5/23/2015	-	815,979	W91236-15-C-0033	6	6	0	0	0
Cape Henry Channel	2014	4/23/2014-9/5/2014	-	1,686,859	W91236-14-C-0014	4	3	1	0	0
Thimble Shoal Channel	2014	4/23/2014-7/31/2014	-	863,933	W91236-14-C-0014	0	0	0	0	0
VA Beach Nourishment & Hurricane Protection (Thimble Shoal Channel)	2013	6/26/2013-8/1/2013; 1/6/2013-3/3/2013	-	724,290	W91236-12-C-0042	0	0	0	0	0
VA Beach Nourishment & Hurricane Protection (Atlantic Ocean Channel)	2013	1/6/2013-3/3/2013	-	716,000	W91236-12-C-0042	0	0	0	0	0
Craney Island Eastward Expansion (Atlantic Ocean Channel)	2013	12/30/2012-3/31/2013; 4/1/2013-4/12/2013	-	1,534,123	W91236-12-C-0041	0	0	0	0	0
Cape Henry Channel	2012	1/29/2012 - 4/12/2012	-	1,190,004	W91236-11-C-0027	1	1	0	0	0
York Spit	2012	3/1/2012 - 3/8/2012; 4/3/2012 - 4/5/2012	-	145,332	W91236-10-C-0086	1	1	0	0	0
Cape Henry Channel	2011	2/9/2011-5/10/2011	2,472,000	957,996	W91236-11-C-0027	0	0	0	0	0
York Spit	2011	1/9/2011-4/24/2011	1,630,713	1,503,517	W91236-10-C-0086	0	0	0	0	0

Project Location	Year	Dredging Dates (observers required: April 1 - November 30)	Cubic Yards Removed	Corps Contract "Pay" Volumes (Does not include non-pay yardage)	Corps Contract #	total sea turtles	log	KR	green	unknown
Thimble Shoals	2011	12/19/2010 - 2/27/2011, 4/19/2011 - 4/21/2011	-	368,104	W91236-10-C-0086	-	-	-	-	-
Thimble Shoals	2009	4/4/2009-5/20/2009	473,900	370,412	W91236-09-C-0028	3	3	0	0	0
York Spit	2008	11/2008 - 1/2009	372,533	-	Gov't Dredge, "McFarland" no contract file	-	-	-	-	-
York Spit	2007	6/18/2007-7/03/2007; 7/13/2007-08/05/2007	608,000	415,626	Gov't Dredge, "McFarland" no contract file	1	0	1	0	0
Cape Henry Channel	2006	6/15/2006-7/21/2006	447,238	447,238	W91236-06-C-0048	3	3	0	0	0
Thimble Shoal Channel	2006	6/13/2006-6/30/2006; 7/10/2006-7/27/2006	300,000	419,624	Gov't Dredge, "McFarland" no contract file	1	1	0	0	0
Atlantic Ocean Channel (Deepening)	2005	12/24/2005-04/8/2006; 4/16/2006-4/19/2006	1,118,749	1,185,436	W91236-05-C-0066	0	0	0	0	0
Thimble Shoal Channel	2004	4/5/2004-4/20/2004; 4/30/2004-5/01/2004	139,200	426,588	W91236-04-C-0051	0	0	0	0	0
Thimble Shoal Channel	2004	5/29/2004-6/16/2004	-	426,588	W91236-04-C-0051	0	0	0	0	0
York Spit Channel	2004	5/23/2004-5/28/2004	-	93,665	Gov't Dredge, "McFarland" no contract file	0	0	0	0	0

Project Location	Year	Dredging Dates (observers required: April 1 - November 30)	Cubic Yards Removed	Corps Contract "Pay" Volumes (Does not include non-pay yardage)	Corps Contract #	total sea turtles	log	KR	green	unknown
York Spit Channel	2004	4/01/2004-4/06/2004	91,406	93,665	Gov't Dredge, "McFarland" no contract file	0	0	0	0	0
Virginia Beach Hurricane Protection	2003	12/26/2003-3/14/2004	844,968	-	-	-	-	-	-	-
York River Entrance Channel	2003	9/9/2003-9/11/2003; 10/17/2003-11/30/2003	343,092	268,641	DACW65-03-C-0056	0	0	0	0	0
Thimble Shoal Channel (VA Beach)	2003	8/24/2003-12/28/2003	1,828,312	1,300,223	DACW65-03-C-0054	9	7	1	0	1
Sandbridge Beach	2003	05/1/2003-5/25/2003	-	1,500,000	DACW65-02-C-0049	-	-	-	-	-
Cape Henry Channel	2002	4/12/2002-8/19/2002; 10/21/2002-11/02/2002	1,407,814	2,449,285	DACW65-01-C-0053	8	6	1	1	0
York Spit Channel	2002	8/20/2002-10/21/2002; 11/03/2002-11/05/2002	911,406	978,846	DACW65-01-C-0053	9	8	1	0	0
Cape Henry Channel	2001	09/17/2001-01/14/2002	1,641,140	1,641,140		3	2	1	0	0
VA Beach Hurrican Protection (Thimble Shoal Channel)	2001	6/26/2001-11/30/2001	4,000,000	4,000,000	DACW65-01-C-0034	6	5	0	0	1
Cape Henry Channel	2000	04/08/2000-06/02/2000	759,986	541,037	DACW65-00-C-0024	0	0	0	0	0
Thimble Shoal Channel	2000	6/22/2000-7/31/2000; 8/13/2000-9/19/2000	831,761	1,370,316	DACW65-99-C-0071	3	2	0	0	1
Thimble Shoal Channel	1999	12/16/1999-1/23/2000	388,987	1,370,316	DACW65-99-C-0071	-	-	-	-	-
Cape Henry	1998	01/05/1998-3/25/1998	740,674	1,169,639	DACW65-97-C-0108	-	-	-	-	-
Sandbridge Beach	1998	05/16/1998-7/21/1998	-	-	-	0	0	0	0	0
York River Entrance Channel	1998	8/22/1998-11/03/1998	672,536	853,743	DACW65-98-C-0045	6	6	0	0	0

Project Location	Year	Dredging Dates (observers required: April 1 - November 30)	Cubic Yards Removed	Corps Contract "Pay" Volumes (Does not include non-pay yardage)	Corps Contract #	total sea turtles	log	KR	green	unknown
York Spit Channel	1998	3/26/1998-5/31/1998	296,140	371,200	DACW65-97-C-0108	0	0	0	0	0
Cape Henry Channel	1998	02/19/1998-5/16/1998	485,885	534,362	DACW65-95-C-0043	0	0	0	0	0
York Spit Channel	1997	6/21/1997-6/28/1997	61,299	141,434	DACW65-94-C-0024	4	4	0	0	0
Thimble Shoal Channel	1996	05/07/1996-06/03/1996	529,301	282,431	DACW65-96-C-0021	1	1	0	0	0
Cape Henry Channel	1994	4/11/1994-5/12/1994; 5/27/1994-6/20/1994	552,671	739,642	DACW65-94-C-0024	5	4	0	0	1
Total Sea Turtle Takes by USACE Dredging from 1994-2017						**75**	**64**	**6**	**1**	**4**

log – Loggerhead

KR – Kemp's ridley

Unknown – unidentifiable