DRAFT DETAILED PROJECT REPORT

TANGIER ISLAND JETTY
ACCOMACK COUNTY, VIRGINIA
SECTION 107
NAVIGATION STUDY

APPENDIX C
ENVIRONMENTAL ASSESSMENT

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

TANGIER ISLAND JETTY, ACCOMACK COUNTY, VIRGINIA SECTION 107,
NAVIGATION STUDY, DRAFT DETAILED PROJECT REPORT
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TABLE OF CONTENTS

Draft Environmental Assessment

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

DRAFT
FINDING OF NO SIGNIFICANT IMPACT
CONTINUING AUTHORITIES PROGRAM
SECTION 107 NAVIGATION STUDY
TANGIER ISLANDACCOMACK COUNTY, VIRGINIA

The US Army Corps of Engineers, Norfolk District (USACE) has investigated potential solutions to the problems resulting from wave energy entering North Channel on Tangier Island in Accomack County and continued erosion of the shoreline. If no action is take, Uppards Island will continue to erode at the channel mouth, which, if unprotected, will result in an increased need for maintenance channel dredging and continued damages to Tangier Harbor and seafood industry infrastructure associated with the harbor. A set of five design alternatives, all of which would reduce wave energy entering the navigation channel, and the no action alternative were considered.

The No Action Alternative did not meet the objectives of the project and would result in an increased need for maintenance channel dredging, and would allow continued increases in damages to the harbor and surrounding infrastructure; therefore this alternative was not chosen. However, the No Action Alternative was maintained through the entire review process as required by the Nation Environmental Policy Act. The other alternatives were not selected because they offered higher cost per unit benefit.

The Preferred Alternative consists of the construction of a single stone jetty at the western limit of North Channel. This straight, stone structure will key into the southern shoreline of Uppards Island and extends southward into the navigation channel. The length, crest elevation, and crest width of the structure are 494ft (151 m), 3.3 ft (1 m, MTL) and 13 ft (4 m), respectively. A small area, 0.07 acres terrestrial land, 0.09 acres inter-tidal habitat, 0.6 acres subaquatic, and open shallow water habitat, will be affected by the placement of the stone. An additional acre may be required during the construction phase.

USACE assessed the potential impact of the Preferred Alternative and the No Action Alternative to the human environment. No significant, adverse, impacts were identified for either the Preferred Alternative or the No Action Alternative. If the Preferred Alternative is constructed, some adverse impacts to air quality, noise, water quality, and aquatic fauna within the project area may occur; however most of these impacts are predicted to be minor and temporary in nature. Environmental conditions within the project area are expected to quickly return to preconstruction levels once the project has been built. Only one long-term impact resulting from construction of the Preferred Alternative was identified. Less than one acre of subaquatic, soft bottom habitat would be permanently converted to a rocky habitat. It is expected that although some species that rely on soft sandy bottom habitat would be displaced; significant amounts of that habitat type would be available adjacent to the project area and these species would relocate.

USACE also determined that the Preferred Alternative would also result in some environmental benefits by providing a habitat type that is not readily available in the area. Other positive benefits to the flora and fauna within the project area would include to protection of existing wetlands from erosion and improvements to water quality.

Due to the lack of significant impacts, an Environmental Impact Statement will not be required

_____ _____

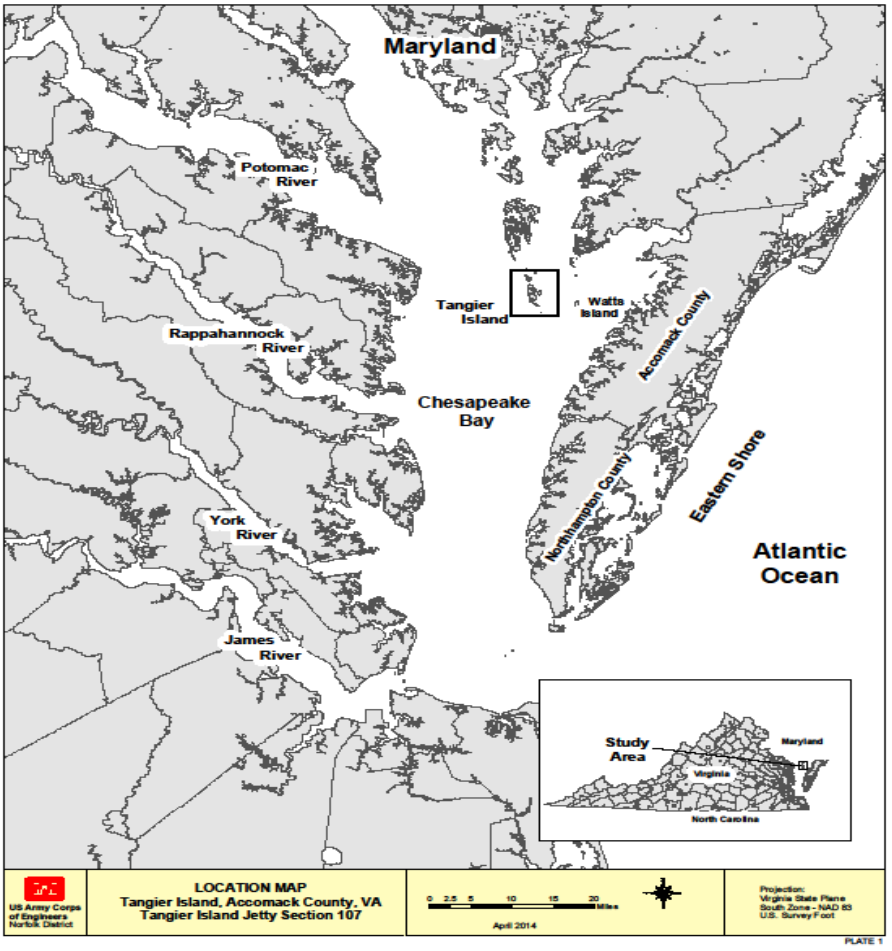
Jason E. Kelly Date
Colonel, U.S. Army
Commander

1.0 THE PROPOSED ACTION

1.1 Description

The proposed project is located on the Tangier Island complex, which is located in the Chesapeake Bay approximately 65 miles north of Norfolk, Virginia and lies entirely within the political boundaries of Accomack County on Virginia's Eastern Shore (Figure 1). Tangier is a complex of four separate islands, including Tangier, Goose, Port Isobel and the Uppards Island. These islands represent the remnants of a peninsula that extended from the Maryland Eastern Shore down into Virginia waters. This landform has been almost entirely lost as a result of sea level changes that occurred since the end of the last Ice Age. The remaining islands have continued to erode, subside, and decline in area as sea level continues to rise. Significant land losses have occurred along the western half of the island complex over the past 130 years. Erosion has also been observed on the eastern shore, but these impacts were not as severe as those on the western side.

Figure 1: VICINITY MAP OF THE TANGIER ISLAND JETTYACCOMACK COUNTY, VIRGINIA, SECTION 107, NAVIGATION STUDY



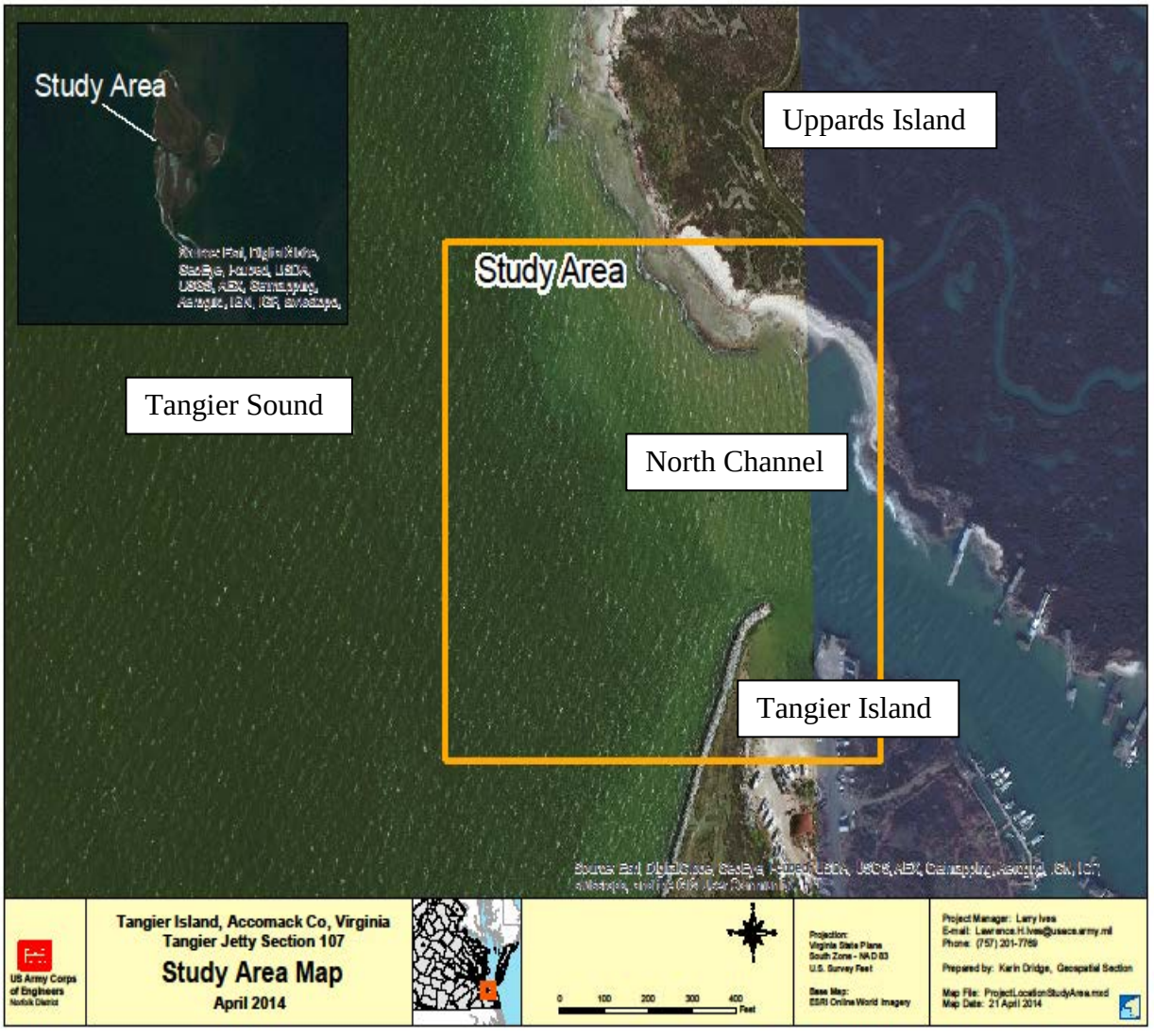
The largest island that still has uplands, Tangier Island, is approximately 5 miles long and 1-1/2 miles wide. It is composed primarily of low marshland and tidal flats, with

the exception of three sand ridges, where the town of Tangier is located. The Town of Tangier is the last island town in Virginia waters of the Chesapeake Bay.

The Uppards Island is located immediately north of Tangier Island. A navigation channel separates the two islands. Uppards Island consists entirely of estuarine wetlands and shoreline.

The project area is located on the western shore of Tangier and Uppards Islands, where the North channel empties into Tangier Sound (Figure 2).

Figure 2: THE PROJECT AREA OF THE TANGIER ISLAND JETTYACCOMACK COUNTY, VIRGINIA, SECTION 107, NAVIGATION STUDY



The proposed project consists of the construction of a single, stone jetty. The structure would anchor into the southwestern tip of Uppards Island, extending south into the water approximately 494 feet from its point of origin.

The proposed project would protect the western portion of the navigation channel, the harbor for the town of Tangier, and its associated seafood industry infrastructure. This infrastructure includes crab shedding operations and seafood facilities, docking and moorage facilities, and the working boats of Tangier watermen.

The navigation channel and associated harbor are essential to the economy and support of community of Tangier. The harbor is the primary site where the island's watermen dock and launch their vessels. Many recreational boaters and visitors to the island dock their vessels at Tangier Harbor. The people on the island depend on the Tangier Channel for majority of the channel's goods and services including food, medical equipment, and carrier services navigate through the Tangier Sound to the island via boat. Because of this, the harbors within the Tangier Channel are considered subsistence harbors, as defined in 33 U.S. Code, Section 2242. Additionally, an extensive network of facilities dedicated to the soft-shell crab industry line a portion of the channel and harbor area. These facilities provide for substantial income to the islands' watermen, who make the bulk of their income from the blue crab fishery.

The study site is located primarily on the southwestern shore of Uppards and in the mouth of North Channel. There are three nearby Federal projects. The nearest existing federal project is a continuous shoreline revetment (often referred to as a "seawall") along the southwestern side of Tangier Island (see Figure 2) that was built to protect the small airport and western side of the island. This seawall was constructed in 1990 and extends 5,700 feet. It has proven to be quite stable over the years, as major storms such as Hurricane Isobel and Sandy did not negatively impact the seawall. The second project, the Tangier Channel to the Chesapeake Bay (or North Channel), provides a channel 7 feet deep at mean low water (m.l.w.) and 60 feet wide from the anchorage basin at the Town of Tangier, northwesterly through Tangier Creek to the Chesapeake Bay, a total length of approximately 3,820 feet, and was authorized under the River and Harbors Act of 1960. The anchorage basin is 7 feet deep (m.l.w.) and 400 feet square. The third USACE project, the Tangier Channel to Tangier Sound, is located adjacent to the immediate study area and was authorized under the River and Harbors Act of 1919. It provides a channel that approaches the island from the east and is 8 feet deep at m.l.w. and 100 feet wide and 1,300 feet long in Tangier Sound, thence 8 feet deep (m.l.w.) and 60 feet wide and 4,800 feet long to the anchorage basin bay (the west) and Tangier Sound (the east). The navigation projects provide both commercial and recreational boating access to the harbor facilities at Tangier Island.

1.2 Purpose and Need

The purpose of this study is to evaluate the problems at the navigational channel located on the western shore of Tangier Island and to identify the most cost-effective plan for navigational improvements. The study also considered solutions that would reduce or eliminate erosion of the shoreline and sediment inflow to the existing Federal navigation channel. The findings are based on an evaluation of the most cost-effective plan and a determination of the potential solutions' compliance with current policies and budgetary

priorities.

The feasibility study described in this report was conducted under authority of Section 107 of the River and Harbor Act of 1960 [Public Law (PL) 86-645], as amended, and is part of the U.S. Army Corps of Engineers (USACE) Continuing Authority Program (CAP). Projects implemented under Section 107 of the CAP are formulated for small commercial navigation in accordance with current policies and procedures.

The project was initially authorized in 1994 as part of the USACE CAP Section 107 and a reconnaissance report was completed and approved in March 1995. The 1995 reconnaissance report developed a solution to the direct wave attack problems. However with a benefit to cost ratio (BCR) of 0.5, the proposed jetty plan was not economically feasible. Notwithstanding the BCR, Congress authorized project design and construction in the Water Resources Development Act (WRDA) of 1996 (PL 104-303), stating, "Congress finds that in view of the historic preservation benefits resulting from the project authorized by this section, the overall benefits of the project exceed the costs of the project". The WRDA 2007 House Report H.R. 1495-4, Section 3162 amended Section 577(a) of WRDA 1996 and authorized design and construction costs at $3.6M.

In 2009, initial funding was received to develop a Project Management Plan (PMP) and to prepare, negotiate and execute a Project Partnership Agreement (PPA) to begin the Design and Implementation (DI) Phase. Upon further review of the study, Headquarters U.S. Army Corps of Engineers (HQUSACE) felt that additional investigation would be required before NAO move into the DI Phase.

HQUSACE provided additional implementation guidance in a 31 MAR 2011 memorandum, requesting that the Norfolk District complete a Section 107 Fact sheet to be submitted for review by the North Atlantic Division (NAD) and the Office of the Assistant Secretary of the Army for Civil Works (ASA(CW)). The guidance also recommended that the Norfolk District complete a Detailed Feasibility Study in the event the ASA(CW) concurs with the Section 107 fact sheet. In December of 2011, Norfolk District submitted a Section 107 fact sheet to NAD and requested approval. In a 25 June 2012 memorandum, the ASA(CW) concurred with the Section 107 fact sheet. NAD approved the fact sheet in a memorandum dated 26 SEP 2012. ASA(CW) and NAD concurrence allowed NAO to proceed with negotiating and executing a Feasibility Cost Sharing Agreement (FCSA) with the Commonwealth of Virginia on 29 September 2012 and the start of a Detailed Feasibility Study.

In 2014, the USACE Engineer Research and Development Center began a study of the investigating the use of jetties in North Channel. The studysued numerical and wave modeling to create a series of five jetty designs that would reduce wave energy from entiring Tangier Harbor. An economic analysis was completed on the series of designs and one alternative, provided a BCR of greater than 1.0. This alternative met all requirements

to proceed as a CAP Section 107 project.

1.3 Public Concerns and Planning Objectives

The western shore of the Tangier Island complex has experienced severe erosion (defined as > 3 feet/yr, at Tangier it is often greater than 10 feet/yr), which has resulted in the conversion of land to shallow open water habitat. This loss of land mass has, in recent years, exposed the opening of the western navigation channel to the strong fetch across the Chesapeake Bay. The erosion has resulting in a number of problems for the citizens of Tangier Island. Navigation through the channel has become more difficult due to shoaling of sediment that has eroded from the channel banks into the water column. This shoaling not only can make navigation more difficult, it will also increase the amount of dredging needed to maintain the channel.

The erosion of the western shore has also exposed seafood processing infrastructure, including facilities, piers, mooring slips, and fishing vessels located in the harbor area, to more powerful wave energy and increased forces during storm events. The orientation of the western navigation channel with respect to the Chesapeake Bay makes it vulnerable to storms from the southwest. Every year, business owners sustain structural damage to their property as a result of wave energy. The people of Tangier depend primarily upon seafood harvesting and processing for their income, so any losses to this capability is especially detrimental. Given that erosion will continue without intervention, it is expected that the navigation channel and harbor will experience higher and higher levels of wave energy and storm-related damages over time.

The objectives of the study include the following.

- Reduce damage to commercial fishing and recreational boats;
- Reduce operating costs for existing and prospective commercial fishing boat operators and owners;
- Reduce necessity for commercial fishing and recreational boat owners to relocate boats during storm events;
- Reduce damage to adjacent shore structures;
- Preserve and enhance the Federal, state, and local investments in existing navigation improvements;
- In accordance with the limits of institutional participation, all plan components must meet NED objectives; and
- Preserve and maintain the environmental and historic character of the study area, including directly related plans formulated for implementation by the USACE.

1.4 Public Involvement

Coordination of the EA will occur after the associated Detailed Project Report is approved by USACE North Atlantic Division for public release. The Draft EA will be provided to the non-federal sponsor, the Commonwealth of Virginia, and those federal, state, and local agencies that have regulatory authority within the study area. Data has been

obtained through previous studies conducted by the Virginia Institute of Marine Science (VIMS), U.S. Army Engineer Research and Development Center (ERDC), Coastal and Hydraulics Laboratory (CHL) and the University of Maryland in the study area. Coordination with representatives from the U.S. Fish and Wildlife Service (USFWS) has occurred. The Coordination Act Report and the Planning Aid Report provided by the USFWS regarding the proposed project are included in this appendix. The Draft Detailed Project Report and EA will be made available to the interested public and appropriate Federal, state, and local agencies. Initial coordination has already been done with NOAA regarding EFH and USFWS regarding possible T&E species near the proposed project site.

2.0 WITHOUT PROJECT CONDITION

The future without project condition is defined as the land use and related conditions likely to occur under existing improvements, laws, and policies. This condition provides the basis for the evaluation of potential measures the will be considered to address the navigation problems described previously in this report.

In the absence of a Federal project, it is likely that current conditions will continue into the foreseeable future and may even deteriorate further as the uninterrupted wave action along the North Channel continues. A recent scientific study by the USACE (Schulte et al., 2015) assessed these future impacts and is expected that the island will have to be abandoned in at most 50 years without significant intervention. The wave energy would continue to damage vessels moored in the harbor and the harbor facilities. As land continues to erode from the northern shoreline at the mouth of the North Channel, it is predicted that the wave energy entering the North Channel would increase over time; resulting in increased damage to vessels and harbor facilities. Additionally, long-term erosion rates experienced at Tangier Island are expected to increase due to sea level rise, which would further increase impacts experienced by the community (Schulte et al., 2015).

If the erosion on the western shore of the navigation channel is not halted, the channel, harbor and associated boating and seafood industry facilities are in danger from increased wave energy and the resulting damages could make it prohibitive to operate working boats out of the harbor. This would damage, if not end, the local seafood industry on the island, forcing islanders to abandon the island and relocate to the mainland.

Currently, there are no other projects or programs, sponsored by USACE or other agencies, being planned for Tangier Island to address the impacts of erosion on the shoreline or wave energy on the harbor and its infrastructure. A small rehabilitation project that will address the corrosion of the metal on the docks within Tangier Harbor will be funded by the Virginia Port Authority. Although the time frame of this project has not yet been determined.

The future without project economic analysis identified the damages currently incurred in the project area and projected how these damages would be increased due to the erosion of the shoreline. The current damages and increased costs relevant to the project under consideration include: structural damages to harbor facilities, damages to boats, and costs of avoiding damages due to wave attack. More detailed information regarding these damages can be found in Appendix B of the supporting documentation to this report.

3.0 FORMULATION AND EVALUATION OF ALTERNATIVE PLANS

Navigation improvement is a declared USACE mission and business line. This mission involves the provision of safe, reliable, and efficient waterborne transportation systems (channels, harbors, and waterways) for movement of commerce, national security needs, and recreation. Five measures were considered for this study: (1) revetment, (2) revetment with a jetty, (3) offshore breakwaters, (4) geotextile tubes, and (5) relocation of harbor facilities. These measures are discussed and evaluated in the following paragraphs.

3.1 Revetments

A revetment is a shore stabilization structure that consists of an erosion- resistant facing that is built to protect a scarp, embankment, or other shoreline features against erosion. It is built on a slope, so it is not considered a vertical structure. The major components of a revetment are the armor layer, filter layer, and toe. The armor layer provides the basic protection against wave action; while the filter layer supports the armor, providing passage for water through the structure, and prevents the underlying soil from being washed through the armor. The toe prevents displacement of the seaward edge of the revetment. Wave modeling, completed by VIMS, demonstrated that this measure would provide limited protection from wave energy when used alone; therefore, this measure would not meet the objectives and needs of the study and was eliminated from further considationconsidered.

3.2. Jetties

A jetty is a stone or concrete structure that projects into a body of water. Jetties are used to influence local currents or tides and to protect coastal structures from storms and erosion. A jetty would provide protection against wave energy as well as prevent displacement of the seaward edge of the revetment. Since a jetty alternative satisfies many of the study objectives and needs and is technically feasible, this measure is considered further in this study.

3.3 Breakwaters

Breakwaters are also shore stabilization structures, which may be built singly or in series spaced along the shoreline. For this study, a floating breakwater positioned along the western shore of the Uppards Island, extending into Chesapeake Bay, was considered for this study. Investigation of this measure demonstrated significant reasons why this measure

would not be the best solution for this project. It was determined that the cost associated with maintaining a floating breakwater would be prohibitively high. In addition, large storm events would likely damage the floating breakwaters. For these reasons, this alternative did not receive further consideration.

3.4 Geotextile Tubes

Geotextile tubes are large bags made of sewn geosynthetic sheets that are filled with a slurried material, usually sand or finer-grained sediment. The tubes are placed along the shoreline as a deterrent to erosion caused by low energy wave activity. Upon investigation of this measure, it was determined that the wave energy experienced in the study area was too high to support the use of geotextile tubes. If implemented, this measure would not meet the objectives and needs of the study area over the project life, and was eliminated from further consideration.

3.5 Relocation of Harbor Facilities

This measure, the relocation of the harbor facilities, would involve the transfer of all harbor functions and services to another location with established harbor facilities or to a site where new facilities would be constructed. This measure was investigated during this study, including moving harbor structures further upstream within the Federal Navigation Channel. This measure would eliminate the problem of increased wave action and associated damage to harbor facilities and moored boats. There were a number of drawbacks to this plan. First, there are no nearby facilities that could be used to dock the vessels currently using the Tangier harbor facilities. Also it would be prohibitively expensive to move or construct a new harbor with all associated infrastructure, including power and water utilities, to another location. Finally, the negative, environmental impacts involved in creating a new harbor and associated facilities would likely be significant. For these reasons, this alternative is not considered further in this report.

4.0 COMPARISON AND SELECTION OF PLANS

Only those alternative plans that are practical in terms of the engineering, economic, environmental, and social impacts were developed. As a result, only plans that involved the construction of a jetty were carried forward for further consideration. Five alternatives with varying locations, heights and measurements were investigated, plus the No Action Alternative. A summary of each alternative is given in this report, but more detailed engineering information for each alternative, can be found in the Modeling Study for Tangier Island Jetties, Tangier Island, VA, dated March 2015, prepared by the Engineering Research Development Center (ERDC), Coastal Hydraulics Laboratory (CHL). This document can be found in Appendix A.

4.1 Detailed Alternative Plans Description

4.1.1 <u>Alternative 1</u>. Alternative 1 (Alt 1) is a one-piece straight structure that is tied

into the southern shoreline of Uppards Island along the northern opening of the North Channel into the Chesapeake Bay (Figure 5). The length, crest elevation, and crest width of the Alt 1 structure are 494 ft (151 m), 3.3 ft (1 m, MTL) and 13 ft (4 m), respectively.

4.1.2 Alternative 2. Alternative 2 (Alt 2) has a two-piece dogleg structure. The first leg of the structure will be anchored into the same area of the Uppards Island as Alt 1 and will run perpendicular to the shore. The jetty will then dog-leg to the west, running parallel to the navigation channel. The total length, crest elevation, and crest width of the structure are 757 ft (231 m), 3.3 ft (1 m, MTL) and 13 ft (4 m), respectively.

4.1.3 Alternative 3. Alternative 3 (Alt 3) consists of the same two-piece dogleg north structure as Alt 2, with the addition of a straight spur anchored into the southern shore of the navigation channel and the existing seawall, pointing to north. Total length, crest elevation, and crest width of Alt 3 north structure are 757 ft (231 m), 3.3 ft (1 m, MTL) and 13 ft (4 m), respectively. The south spur is 131 ft (40 m) long with its crest height and width the same as those of the north structure.

4.1.4 Alternative 4. Alternative 4 (Alt 4) has a similar design as Alt 3, a two-piece dogleg north structure and a straight spur. In this design, the southern spur will point towards the northwest. Total length, crest elevation, and crest width of Alt 4 north structure are 757 ft (231 m), 3.3 ft (1 m, MTL) and 13 ft (4 m), respectively. The south spur is 131ft (40 m) long with its crest height and width the same as those of the north structure.

4.1.5 Alternative 5. Alternative 5 (Alt 5) consists of two stone jetties. The first is a straight stone structure that would key into the southern shoreline of Uppards Island and extend southward into the navigation channel; while the second, smaller structure would connect to the existing sea wall and extend northwest towards the navigation channel. The length, crest elevation, and crest width of the larger structure are 494 ft (151 m), 3.3 ft (1 m, MTL) and 13 ft (4 m), respectively. The south spur is 131 ft (40 m) long with its crest height and width the same as those of the north structure.

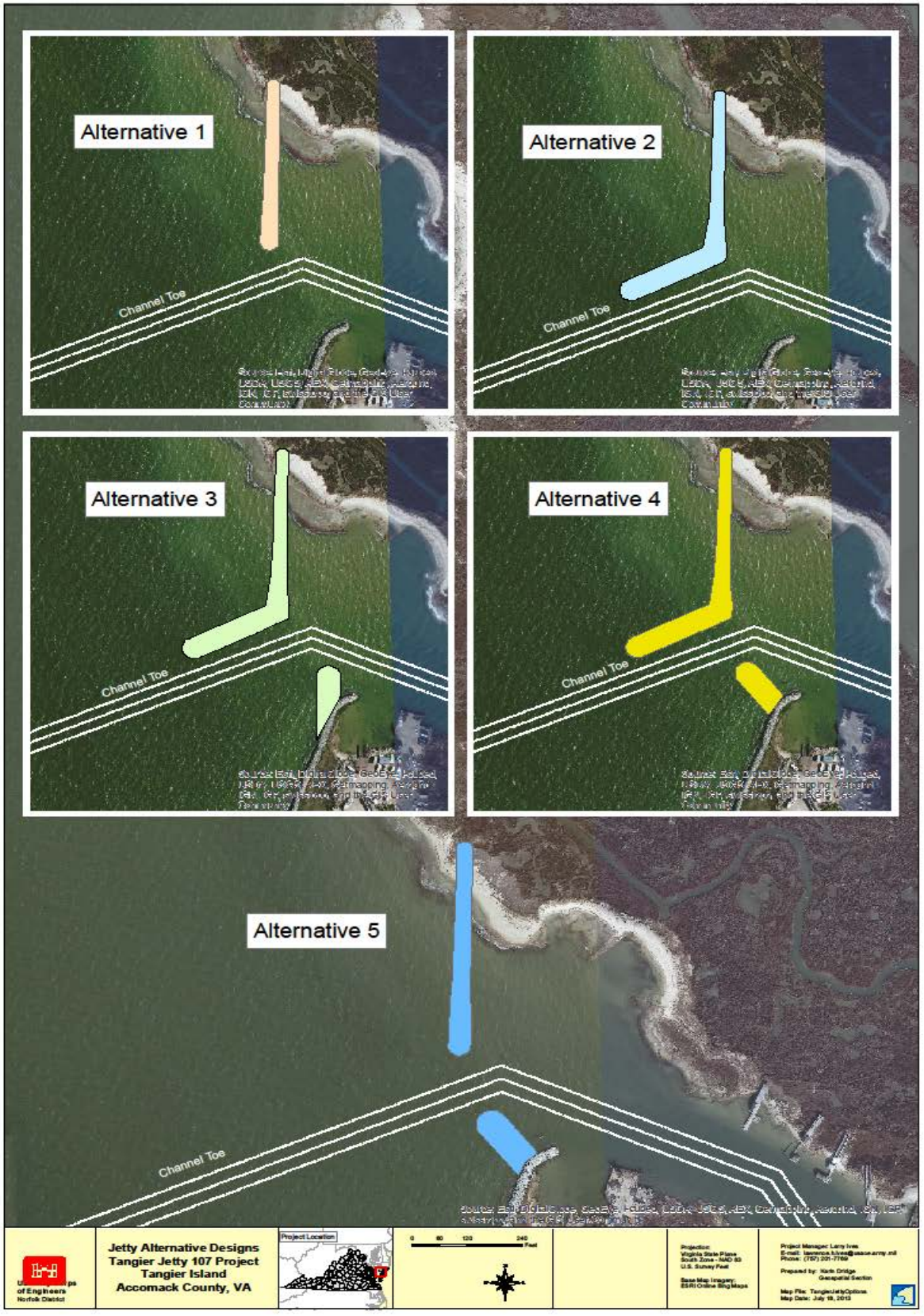
4.2 No Action Plan

The No Action Alternative (NAA) consists of no protective action taking place on or around Tangier or Uppards Islands to protect the west opening of the navigation channel, anchorage basin or seafood processing facilities near the harbor. In order to predict what the Uppards Island would look like at the end of the 50-year period of analysis if no action was taken, the impact of erosion and other geological forces were modeled. The study concluded that “most of Uppards Island is predicted to be inundated by 2063, which would significantly reduce the protection it provides to the Town of Tangier. Tangier Island itself is becoming increasingly inundated and split into three distinct sections by the expected widening of several large tidal creeks that traverse the island lengthwise with continued loss of land expected to occur at all margins of the island except where the stone revetment continues to protect much of Tangier Island's western shore” (Schulte et al., 2015). The

impacts of past erosion and sea level rise were mapped in order to determine historic rates of land loss (Figure 4). With no action, Tangier Island and the Uppards Island near the navigation channel will continue to experience significant erosion. The navigation channel, harbor, seafood processing facilities and harbor infrastructure will experience stronger wave action and associated damages as additional land erodes from the western shore of Tangier and the Uppards Islands. The NAA is predicted to result in these areas becoming unusable for the purposes they currently serve. As there is no better site to relocate the anchorage basin on Tangier Island to, the NAA might result in abandoning the town of Tangier, as the local watermen have no local alternative site.

Although the NAA would not meet the goals or objectives of the project and is not considered acceptable, it will be used as a basis of comparison for all other plans of improvement. As required by the NEPA, this alternative will be carried through the analysis.

Figure 3: DESIGNS OF ALTERNATIVES 1 THROUGH 5



4.3 Special Considerations

There was formerly a small population of federally threatened northeastern beach tiger beetles (*Cicindela dorsalis dorsalis*) found on Uppards Island (Knisley 2004). At the time (2004) this population consisted of six juveniles and two adult tiger beetles found on two different, small patches of supratidal beach habitat. One of these beaches (holding the population of two adults) was formerly located immediately east of the proposed northern jetty anchored to Uppards, but more recent photography and habitat assessment indicates this habitat has been lost in the 10 year interim between the Knisley study and the present. The beetles can no longer survive in the local area due to loss of the last patch of suitable habitat, likely due to impacts of Hurrican Sandy and rising water levels. This beach-dependent species requires open beach habitat which is now lost due to impacts of erosion and climate change.

4.4 Alternative Comparison

A study investigated the effectiveness of all design alternatives, except for the No Action Alternative, at various wind directions and wind speeds was completed by ERDC in 2015 (Appendix A). Ranking of alternatives based on a single number was not recommended by the study, but the authors recognized that this type of ranking would be useful for preliminary analysis. The ranking was based on the wave reduction factors calculated at the low water level for each alternative averaged over nine wind directions for the channel centerline, north shoreline, and south shoreline, respectively. By averaging the results for the centerline and north and south shoreline, a single number was calculated and used as a preliminary ranking of each alternative (Table 1). Each alternative demonstrated some ability to reduce wave energy, with Alt 4 producing the highest representative wave reduction. Since each of the five designs demonstrated wave reduction properties, all of the alternatives, in addition to the NAA, were included in a cost/benefits analysis.

Table 1: REPRESENTATIVE WAVE REDUCTION RATINGS FOR ALT 1 THROUGH 5.

Alternative	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Average Wave Reduction (%)	11.6	25.8	46.4	49.1	34.0

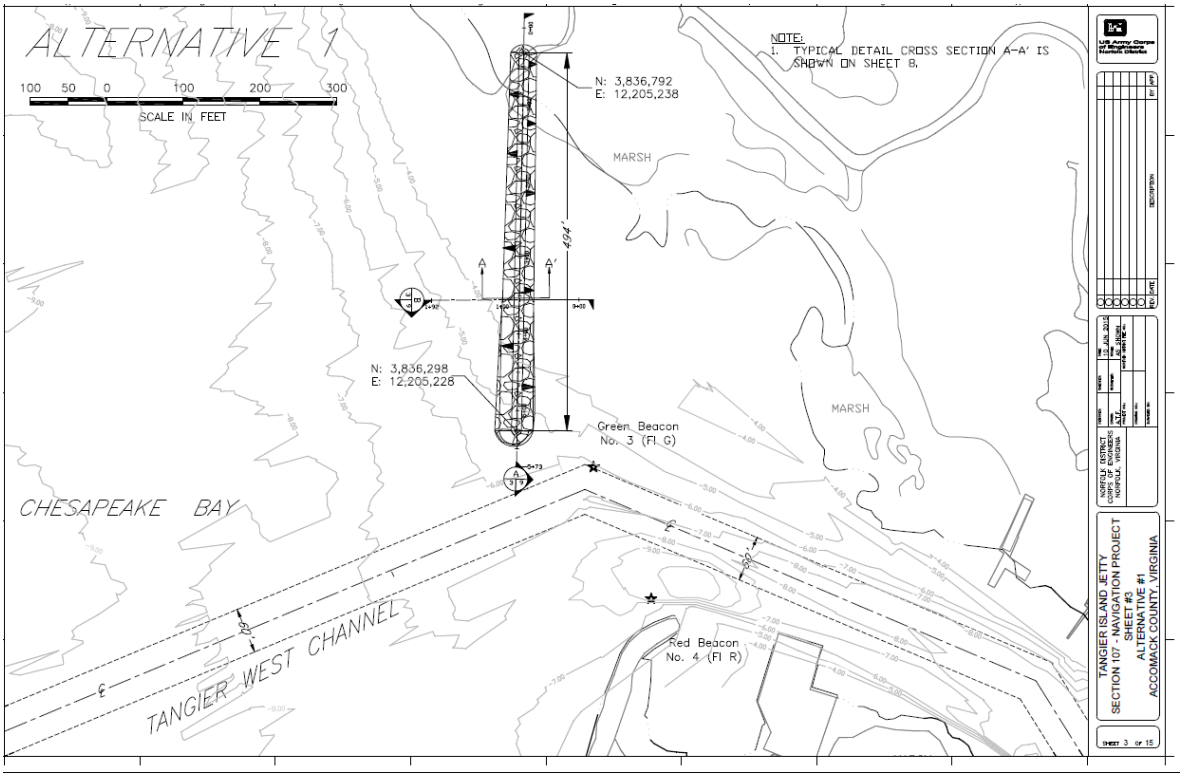
4.5 Selected Alternative

The selected alternative is Alternative 1, which consists of a single stone jetty that would key into the southern shoreline of Uppards Island and extend southward into the

navigation channel. The length, crest elevation, and crest width of the structure are 494 ft (151 m), 3.3 ft (1 m, MTL) and 13 ft (4 m), respectively. The only construction materials that will be used to build the jetty are clean stone and geotextile.

The amount of land that would be affected by the construction of the project includes 0.068 acres terrestrial land, 0.085 acres of inter-tidal habitat, and 0.62 acres of subaquatic bay bottom. The total impact area, which includes needed construction areas, will be approximately 2 acres, though the majority of this area of impact will be temporary impacts. Once construction equipment is removed, these areas should return to normal.

Figure 4: DESIGN DRAWING OF THE SELECTED ALTERNATIVE (ALT 1)



5 AFFECTED ENVIRONMENT

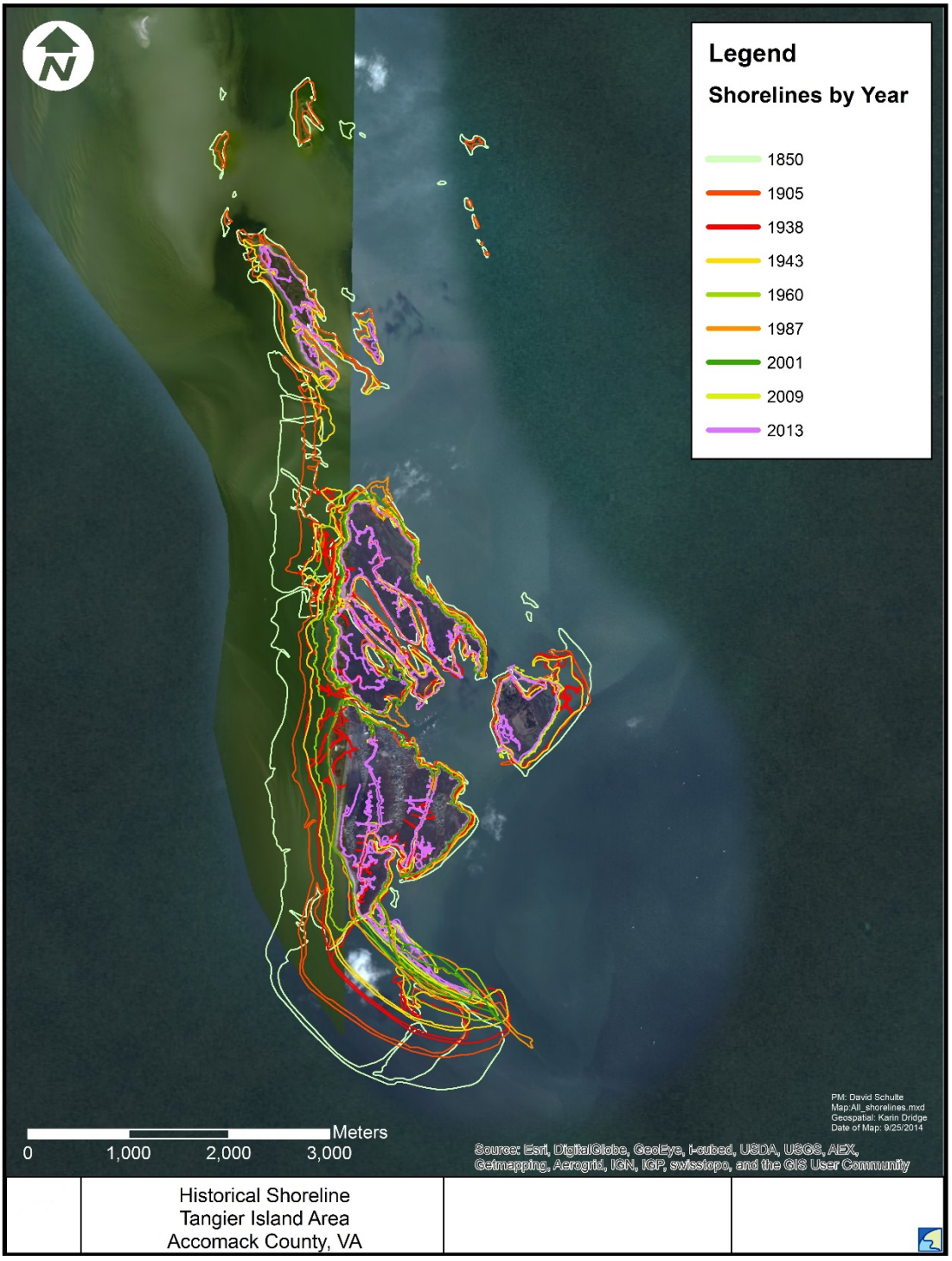
5.1 Location

Tangier is a complex of five separate islands, including Tangier, Goose, Fox,Watts and the Uppards Island. Watts Island, which lies approximately 4.5 miles to the southeast of Tangier, is the southernmost island of this chain. These islands represent the remnants of a peninsula that extended from the Maryland Eastern Shore down into Virginia waters. This landform has been almost entirely lost as a result of sea level changes that occurred since the end of the last Ice Age. The remaining islands have continued to erode, subside, and decline in area as sea level continues to rise. Significant land losses have occurred along the western half of the island complex over the past 130 years. Erosion has also been

observed on the eastern shore of the island, but these impacts were not as severe as those on the western side. Figure 5 depicts land loss that has occurred on Uppards Island due to erosion.

The project site is located on the western shore of Tangier and Uppards Island, which are approximately 12.5 nautical miles from the western shore of the Chesapeake Bay (Northumberland County) and just south of the Virginia-Maryland border. Currently, these islands are separated by two navigation channels that are maintained by the USACE, but early in the 20th century, they were connected. A combination of erosion, subsidence and sea level rise has reduced them to their current configuration and both islands continue to decline in size.

Figure 5: LAND LOSS DUE TO EROSION AND CLIMATE CHANGE OF THE TANGIER ISLAND COMPLEX



5.2 Climate

The region that includes Tangier and Pocomoke Sounds experiences a climate that is classified as modified continental with mild winters and warm and humid summers. The average annual temperature is approximately 58 degrees Fahrenheit (°F) with 103 °F and –5 °F representing the highest and lowest temperatures of record, respectively. The average annual precipitation is approximately 42.5 inches and is evenly distributed throughout the

year. The prevailing winds are from the south to southwest at an average annual velocity of 10 miles per hour. The area is vulnerable to hurricanes, and 13 major hurricanes have been recorded between 1901 and 2010. These hurricanes can cause significant damage to property and have contributed to shoreline erosion. Northeast storms that occur during the fall and winter, called "Nor'easters," are capable of reaching hurricane level intensity and can also cause significant erosion and destruction of property (USACE, 1996). Superstorm "Sandy" of 2012 caused some loss of natural habitat on Tangier Island; however, human impacts were minimal and included minor flooding of several residences along with other structural damage.

5.3 Physiography, Relief, and Drainage

The Chesapeake Bay occupies a drowned river valley excavated by the Susquehanna River and its tributaries during the late Pleistocene. Melting glacial ice caused an increase in sea level approximately 10,000 years ago, resulting in the formation of the Chesapeake Bay. The water depth within Chesapeake Bay is relatively shallow and rarely exceeds 40 feet deep, averaging about 20 feet in depth. Local water depths at the project site are shallow, varying from intertidal to -4 ft MLW. Salinity varies considerably within the Chesapeake Bay, decreasing with distance from the Atlantic Ocean. The salinity of waters in the study area varies from between 14 to 20 parts per thousand, depending on season and precipitation. The western shore, where the project is located, is impacted by a fetch approximately 14 miles in length, which can provide for substantial waves, particularly during storm events.

Tangier Island and the string of islands to the north have diminished in size, extent, and relief over the years as a direct result of sea level rise and erosion forces (Figure 5). Uppards and Goose Islands were once inhabited from 1778 through the early 20th century (Cultural Resources, Inc., 2003). These islands were abandoned due to sea level rise, which rendered the ridges that homes were built on too low to provide adequate protection from tidal action and storm surges. Prior to 2010, two such areas, which included the remnants of the former town of New Canaan and a small cemetery, could be found on Uppards Island. By 2010, these features had eroded into the Bay, with Superstorm Sandy exposing a number of graves. The last few surviving trees located at the north end of Uppards Island have also fallen into the Bay and/or died due to sea level rise impacts. Today, these remaining ridges are only a few feet above sea level. Both Uppards and Goose Islands today consist entirely of low lying marshes cut by numerous inlets.fdf

A similar pattern of development and erosion can be seen on Tangier Island. Before 1900, there were seven ridges that were high enough to support permanent human habitation. By 1930, there were six, and today there are only three. If sea level rise continues at present rates, the town of Tangier is likely to become uninhabitable in the relatively near future. Present rates of sea level rise in the Chesapeake Bay are about three quarters of a foot (0.75') every 50 years and this rate is accelerating.

5.4 Geology and Soils

Soils on Tangier, Uppards, and Goose Islands consist mostly of Chincoteague Silt Loam and Magotha Fine Sandy Loam, both categorized as not being highly suitable for farming or highly erodible; however, constant flooding and wave action are eroding the islands at an alarming rate. During the period from 1938 to 2001, the western shoreline of Uppards Island has eroded at a rate of up to 16 feet/year in some areas and erosion rates since then appear to be similar. An erosion rate of 3 feet/year is considered severe. Where beaches have been created along the shores of Tangier, Uppards and Goose Islands, the soils consist primarily of medium grain sand. At the project site, the sediments consist primarily of medium to fine-grain sands.

5.5 Wild and Scenic Rivers

Due to the offshore location of the proposed project in the main stem of the Chesapeake Bay, there are no wild or scenic rivers in the vicinity of the study area.

5.6 Subsurface Stability

Tangier and Uppards Islands are eroding and subsiding as sea level rises. The present shorelines of these islands consist of low eroding marshes that are very irregular. The irregularity is due to a series of headlands and embayments that have developed as the islands erode. Subsurface sediments are exposed in many embayments of the two islands due to erosion. These subsurface sediments are primarily ancient peats deposited by many centuries of marsh vegetation growth cycles. Peat boulders, which have been ripped out of the subsurface of the islands, can be observed along the western shore of any of the islands addressed in this Draft EA. Evidence of former islands can be observed in the underlying sediments present in what is now a channel between Uppards and Goose Islands. These layers consist of compacted substrates, primarily peat. Islands can also be identified though historical documents, including navigation charts, of the local area dating back to the mid 1800s.

5.7 Tides

The tides experienced at the study area are semi-diurnal, with a tidal cycle consisting of two distinct high tides and two low tides each lunar day. Consecutive high and low tides are of similar height but vary in height slowly over a monthly cycle. Pocomoke Sound has a mean tidal range of 2.3 feet (U.S. Department of Commerce, 1989). Tangier Sound has a mean high tide of 1.7 feet above mean sea level (MSL) and a mean low tide of 0.14 feet below MSL, resulting in a mean tidal range of 1.84 feet.

5.8 Water Quality

The water quality in the study area is generally considered good. Intermittently, salinity, nutrient levels, dissolved oxygen (DO), and total suspended solids (TSS) have varied enough to cause negative impacts to marine life, especially the benthos, typically during major storm events. Phosphorous input is generally derived from agricultural practices, which are considered non-point sources of pollution and can be difficult to

control. Levels of phosphorous tend to peak in the summer. Total nitrogen levels tend to be rather high in the study area, especially in the summer. The agricultural practices on the Eastern Shore, in particular fertilizer application and waste from livestock, cause the nitrogen levels found in the study area. However, these levels are very close to the SAV habitat criteria of 0.15 milligrams per liter (mg/l). Phosphate concentration was measured in the study area and found to be 0.002 mg/l, well below the SAV habitat criteria acceptable maximum of 0.02 mg/l established by the CBP (Koch, 2003).

DO levels are typically high enough to avoid hypoxia, which are DO concentrations lower than 1.0 mg/l which can kill aquatic organisms. There is a deeper channel to the northeast of Tangier Island near the study area where DO levels have been measured at < 2.0 mg/l DO, which is low enough to stress marine life. This lowered oxygen level typically occurs in the channel during the summer months. TSS varies greatly with season and year. During a monitoring study within the study area to determine the fitness of the site for SAV (Koch, 2003), TSS was reported as approximately 50 mg/l. This amount of TSS is significantly higher than the recommended seagrass habitat requirement of < 15 mg/l (U.S. Environmental Protection Agency [USEPA], 1992). Despite this, there are extensive seagrass beds in the local area. The TSS within the SAV beds is likely lower the 15 mg/l due to the ability of SAV to reduce TSS levels (de Boer 2007).

Currently, none of the public oyster grounds, commonly known as Baylor Grounds, near the study area have been condemned by the Virginia Department of Health for the direct harvesting of shellfish. Condemnation of grounds is typically caused by bacterial contamination originated from sewage or industrial outfalls, large septic fields, or areas with high levels of livestock waste runoff. The open waters of the study area are not ordinarily exposed to such high levels of bacteria.

Excessive nutrient inputs have caused eutrophication and periods of hypoxia, which in turn have killed or stressed living resources in many areas of the Chesapeake Bay. The algal blooms from high nutrient inputs and sediment loads also decrease water clarity, which is largely responsible for the decline of SAV, one of the most important components of the Chesapeake Bay ecosystem. Finally, fish health is periodically threatened by toxic dinoflagellates, including *Pfiesteria*, which may be related to adjacent land-use practices (U.S. Geological Survey, 2004).

5.9 Wetlands

Wetlands are important ecological resources that improve and maintain water quality, reduce flood damage, and provide habitat for a wide variety of plants and animals, including many threatened and endangered species. Rapid loss of wetlands resulting from rural and urban development has prompted the Federal government and many State governments to regulate development activities in and near wetlands to preserve their important ecological functions. Section 404 of the Clean Water Act establishes regulatory authority governing the protection of wetlands at the Federal level and allows individual

States to develop their own regulatory programs, which can be even more stringent. Virginia has developed regulatory programs that specifically address tidal wetlands. In 1974, USFWS created the National Wetlands Inventory Project (NWI) to map the location, type, and distribution of the nation's wetlands. The NWI uses the classification system of Cowardin et al. (1979) for wetland habitat type codes on its maps.

The Uppards, according to the USFWS National Wetlands Inventory survey (1995), consists entirely of different types of wetlands. As of this report, the Uppards contains approximately 320 acres of wetlands. Tangier Island itself also holds extensive wetland acreage, approximately 375 acres, which does not include the airfield or three inhabited upland ridges. All are estuarine intertidal, and many are classed as unconsolidated shore, with most of the remainder classed as emergent. Unvegetated shorelines are not recognized by the USACE, USEPA and NRCS as "wetlands" due to the lack of vegetation. Much of the total acreage consists of *Spartina patens* or *Spartina alterniflora* marshlands with saltgrass, *Distichlis spicata*, often associated with the *S. patens.* Higher areas have wetland vegetation common to slightly higher elevations, such as *Baccharis halmifolia*, the saltbush, and *Iva frutescens*, the marsh elder.

All of the wetlands within the project area are identified as Estuarine. This designation includes "deepwater tidal habitats and adjacent tidal wetlands that are influenced by water runoff from and often semi-enclosed by land. They are located along low-energy coastlines and they have variable salinity". There are two types of Estuarine wetlands found within the project area. These include Intertidal wetlands, defined as the area from extreme low water to extreme high water and associated splash zone and Subtidal wetlands, which are habitats that are continuously submerged substrate.

Estuarine wetlands are particularly important habitats for brackish and marine fishes and shellfish, various waterfowl, shorebirds, wading birds, and several mammals. Many commercial and game fishes use estuarine marshes and estuaries as nursery and spawning grounds. Menhaden, bluefish, flounder, sea trout, mullet, croaker, and striped bass are among the most familiar fishes that depend on estuarine wetlands. Blue crabs and other shellfish, such as oysters, clams, and shrimp, also use coastal marshes for a variety of functions at various stages in their life cycles.

5.10 Submerged Aquatic Vegetation

The term submerged aquatic vegetation (SAV) refers to both marine angiosperms (the so-called true seagrasses) and freshwater macrophytes that occupy Chesapeake Bay and its tributaries (VIMS 2014). SAV encompasses 19 taxa from ten families of vascular macrophytes and three taxa from one family of freshwater macrophytic algae, the Characeae, but excludes all other algae. SAV are considered collectively, because monitoring data for SAV is recorded as an acreage in the Bay regardless of species. The SAV community of Chesapeake Bay and its tidal tributaries includes 15 species (exclusive of the algae).

SAV plays a critical role in the Chesapeake Bay ecosystem, serving as a sediment stabilizer, important habitat for juvenile fish and crabs, food for waterfowl, and a seasonal nutrient sink that can help offset the growth of algae.

SAV populations in the Chesapeake Bay today are greatly reduced in both density and abundance compared with levels documented in the early 1960s (Kemp et al. 2005). Declines are attributed to decrease water quality (increased amounts of suspended solids and dissolved nutrients) and disturbances to SAV beds, such as by boating and fishing (Orth et al 2009). As of 2009, 228.5 acres of SAV grow in the lee of Uppards Island in a number of different locations, or beds. No SAV is located within the project area.

5.11 Fauna of the Study Area

5.11.1 Commercial Benthos. Blue crabs are the primary commercial fishery in the area today. Watermen from Saxis Island, Tangier Island, Smith Island, and other areas rely primarily on the blue crab harvest. From 1996-1998 the Chesapeake Bay-wide commercial harvest averaged 70 million pounds of live crab. A significant recreational fishery also exists, and estimates for the catch per year range widely from 11 to 40 million pounds. In recent years, catch data has indicated the fishery may be overexploited or at the threshold limit, and more active management and catch limits may soon be necessary. Current catches in the last several years in Virginia have averaged around 25 million pounds, a significant decrease from the long-term average. This remains the case today, though the population is increasing rapidly due to restrictions in place on the fishery as well as establishment of a large sanctuary for blue crabs to allow for population recovery. Fishery restrictions put in place, along with this sanctuary, are reducing the catch by approximately 15% to allow for increased stock size, and it appears these management measures are working and collapse of the blue crab fishery seems unlikely at this time. With continued attention to effective management, it is likely the population and associated catch will increase. This proved to be the case for several years, but the most recent population estimate (2014) indicates the population of female blue crabs has dropped significantly, partly due to the severe winter of 2013-14, and harvest restrictions put in place several years ago will remain in place, with the possibility of new restrictions to aid in population recovery.

Small numbers of hard clams are also found in the area, though their numbers are too small at the present time to support a large commercial fishery. Small-scale clamming operations occur; watermen from Tangier Island harvest clams from former oyster reefs, now mere footprints, in sufficient numbers to support a small but growing fishery. The great majority of hard clam meat produced in Virginia comes from the aquaculture industry, based on the Eastern Shore.

Oysters were an important part of the benthic community and were formerly one of the most important commercial and recreational fisheries in the Chesapeake Bay. Current harvest levels in Virginia waters are about 1 percent of the harvest just 40 years ago, and

this parallels the collapse of the oyster population Chesapeake Bay-wide. At its peak in the late 1800's, approximately 20 million bushels of oysters were harvested from the Chesapeake Bay and Eastern Shore (Hargis, 1999). As recently as the 1980's, the oyster fishery was the most valuable fishery in the Chesapeake Bay. Presently, however, Virginia's oyster fishery has collapsed supporting far fewer watermen and the region's oyster processing industry relies on the importation of oysters from outside state waters to support a shrinking public demand for this resource (Kirkley 1997). Recently, extensive investments into a public fishery subsidy to establish harvest grounds coupled with recent increases in disease resistance of the oysters to the two diseases which devastated populations from the late 1950's to the present, MSX and Dermo, are allowing for small but increasing fishery output in the local area. Baylor grounds (public oyster grounds) are numerous and several thousand acres of these grounds are located in Tangier Sound. None are in the immediate project area, all such grounds are located well offshore and will not be affected by the proposed project. Local watermen are likely to be able to increase local harvests of oysters and increase their income due to these subsidies and natural disease resistance development, as well as initiatives to grow oysters via aquaculture.

5.11.2 <u>Noncommercial Benthos.</u> Non-commercial benthos are also of high importance in the ecology of the Chesapeake Bay. The abundance and diversity of the benthic community is an important indicator of overall water quality and productivity. Benthic organisms are often detritivores that consume dead organic matter and recycle these nutrients when they are in turn eaten by predators higher on the aquatic food chain. Consequently, the benthic community, in particular the invertebrates, is used as an indicator to determine environmental stress levels. Currently, the environmental stress levels can be estimated using a Benthic Index of Biotic Integrity (BIBI) (Weisberg, et al., 1997). The Chesapeake Bay Water Quality Monitoring Program includes benthic monitoring throughout the Chesapeake Bay. The data has revealed that the lower Chesapeake Bay, which includes Virginia's waters, is in better overall condition than Maryland's waters, with the mid-Chesapeake Bay main stem having the poorest benthic community due to seasonal hypoxia, the "Dead Zone" of the Bay. Monitoring sites nearest the study areas show a generally good benthic community condition, though some highly degraded sites, which often occur in areas prone to hypoxic conditions, were found. The data, when compared with water quality data, shows that the benthic community is greatly influenced by the water quality. Most of the degraded sites have a BIBI greater than 2, which indicates these sites would recover quickly to meet Chesapeake Bay restoration goals if water quality were improved (Ranasinghe et al., 1999).

A monitoring station within the Pocomoke Sound has documented a fairly wide variety of benthic organisms. Benthic samples included the bivalves *Macoma mitchelli*, *Leucon americanus*, and *Acteocina canaliculata*. Several gastropod species were also documented and include *Acteon punctostriatus* and *Mulinia lateralis*. A wide variety of polychaetes were found, including *Glycera dibranchiata*, *Glycinde solitaria*, *Heteromastus filiformis*, *Mediomastus ambiseta*, *Paraprionospio pinnata*, *Spiochaetopterus costarum*,

and *Streblospio benedicti*. This data was collected in June 1999 and is fairly representative of the benthic organisms likely to be found in the study area today.

Several of the polychaetes documented are opportunistic species, which included *Glycinde solitaria* and *Paraprionospio pinnata* (Smith, 1994). The presence of these organisms may indicate a local ecosystem under stress and/or a recent anoxic or hypoxic event in the local waters. These two species are quick to colonize an area after an anoxic event. There are other factors that may also be influencing the local BIBI. Smith (1994) refers to the well-documented influence of sediment grain size on the benthic infaunal community (Bloom et al., 1972; Fresi et al., 1983; Gaston et al., 1988). Sediments with a higher percentage of sand often support benthic communities with higher BIBI numbers than those found in finer-grained, silty, or clay sediments. Possible explanations for this phenomenon include the increase in interstitial space for epifaunal and infaunal detritivores (Hyland et al., 1991). Also, due to increased permeability and porosity, coarser grained (sand) sediments typically have deeper Redox Potential Discontinuity layers than finer grained sediments due to the downward diffusion of oxygen. However, during anoxic and hypoxic events, waters above the sediments can overwhelm the high permeability associated with coarser-grained sediments. Due to the shallowness of the waters and regular mixing due to tides and currents, it is very unlikely the study area is ever subject to anoxia.

An additional influence on the benthic community in the Chesapeake Bay is predation. Common predators of the mesohaline Chesapeake Bay community in the study area include spot, Atlantic croaker, winter flounder, hogchoker, windowpane flounder, summer flounder, and blue crab (Holland et al., 1980; National Oceanic and Atmospheric Administration NOAA], 1999).

5.11.3 Nekton. The nekton of the study and surrounding areas includes primarily estuarine fish species. According to the Virginia Department of Game and Inland Fisheries online database, six anadromous fish species may occur in the area. These include the Atlantic sturgeon (*Acipenser oxyrhynchus*) a newly listed species (Threatened, 2012), a Virginia species of special concern, Alewife *(Alosa pseudoharengus),* and striped bass *(Morone saxitalis),* blueback herring *(Alosa aestivalis),* sea lamprey *(Petromyzon marinus),* and American shad *(Alosa sapidissima).*

Other fish documented to inhabit waters in and around the study area include the Atlantic croaker *(Micropogonias undulates),* spot *(Leiostomus xanthurus),* winter flounder *(Pleuronectes americanus),* windowpane flounder *(Scopthalmus aquosus),* summer flounder *(Paralicthys dentatus),* bluefish *(Pomatomus saltatrix),* scup *(Stenotomus chrysops),* black sea bass (*Centropristus striata),* king mackerel *(Scomberomorus cavalla),* Spanish mackerel *(Scomberomorus maculates),* cobia *(Rachycentron canadum),* red drum *(Sciaenops occelatus),* white perch *(Morone Americana),* silver perch *(Bairdiella chrysoura),* sand tiger shark *(Odontaspis taurus),* Atlantic sharpnose shark *(Rhizopriondon*

terraenovae), dusky shark *(Charcharinus obscurus)*, and the sandbar shark *(Charcharinus plumbeus)* (NOAA, 1999). All of these fish species represent a diverse assemblage from planktivores (alewife) to open water predators (bluefish) to benthic feeders (winter flounder). For a complete listing of all fish species found in the local area, see Table 2.

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires all Federal agencies to consult with the National Marine Fisheries Service (NMFS) on all actions, or proposed actions, permitted, funded, or undertaken by the agency that may adversely impact Essential Fish Habitat (EFH). EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (NOAA, 1999). A Federal agency must identify the species of concern and prepare an analysis of the effects of the proposed action. The agency must also give its views regarding the effects of the proposed action and propose mitigation if applicable. NMFS has suggested that the EFH analysis and determination be incorporated as part of the National Environmental Policy Act (NEPA) process rather than in a separate document such as a biological assessment, which is prepared for endangered species. An EFH habitat assessment is included in the Environmental Consequences section of this Draft EA.

5.11.4 <u>Avian Resources.</u> The Eastern Shore area of the Chesapeake Bay and nearby islands, which include the Uppards, nearby Tangier Island, and Smith Island, are known for their wealth of avian resources. Smith Island, including the Martin National Wildlife refuge, and the nearby islands and Eastern Shore provide thousands of acres of estuarine marsh, beaches, and upland areas for foraging and nesting for a wide variety of colonial waterbirds, waterfowl, and raptors. These sites also provide important resting and staging areas for migratory songbirds (USACE, 2000). The marshes in this area are relatively undisturbed by man, and the islands contain isolated hammocks of upland that provide excellent nesting areas for colonial waterbirds and waterfowl. The nearby waters also contain extensive beds of SAV, which are eaten directly or provide habitat for invertebrates consumed by many species of waterfowl. The project area provides for limited foraging habitat when sand flats are exposed at low tide, along with eroding wetlands and shallow water habitat that local bird species could utilize.

The local area of the Tangier Islands provides ideal colonial waterbird habitat, providing an ample food source and protection. (The Virginia Fish and Wildlife Information Service WebPages, 2000).
Non-wading waterbirds, terns and gulls, also utilize the marshes, dunes, and hammocks found on the islands.

The following shorebirds have also been identified on shorelines in the study area: American oystercatcher, willet, semipalmated sandpiper, spotted sandpiper, least sandpiper, western sandpiper, purple sandpiper, pectoral sandpiper, black-bellied plover, semipalmated plover, killdeer, dunlin, red knot, lesser yellowlegs, greater yellowlegs,

snipe, and sanderling. The local islands provide important breeding area for the American black duck *(Anas rubripes*), mallard *(Anas platyrhynchos*), and gadwell *(Anas strepera*).

5.11.5 Mammals. A diverse assemblage of mammals utilizes the island areas near the proposed navigation project. Wetlands support a variety of furbearers, including muskrat *(Ondatra zibethica)*, raccoon *(Procyon lotor)*, mink *(Mustela vison)*, and others. The red fox *(Vulpes vulpes fulva)*, and opossum *(Didelphis marsupialis)* can also be found foraging in shoreline habitats (USACE, 2000). A number of other mammal species may also be present and include species of mice, rats, squirrels, shrews, voles, and possibly others. The river otter *(Lontra canadensis lataxina)* may also be found foraging in tidal creeks (VDGIF, 2000).

5.11.6 Reptiles and Amphibians. An abundant variety of reptiles utilize the island habitat, but due to the estuarine nature of the Uppards, it is unlikely that any amphibians, except possibly toads, can be found. Species of reptiles that could be found in the study area include the Atlantic hawksbill, Kemp's Ridley, leatherback, loggerhead, green sea turtles, and the Northern diamondback terrapin, a semi-aquatic turtle.

5.11.7 Threatened and Endangered Species and State Species of Special Concern. Species known to or believed to inhabit or utilize the open waters of the study area listed as federally-endangered include the Atlantic hawksbill sea turtle *(Eretmochelys imbricata imbricate)*, Kemp's Ridley sea turtle *(Lepidochelys kempii)*, and the leatherback sea turtle *(Dermochelys coriacea)*. Although none of these turtles nest or overwinter in the Chesapeake Bay, it is possible these turtles may move through or forage in nearby waters (Bruenderman, S. and K. Terwilliger, 1994).

The federally threatened Northeastern beach tiger beetle (*Cincindela dorsalis dorsalis*) was found in a 2004 survey on Tangier and the Uppards. A total of eight tiger beetles were found at two sites on the southwestern shore of the Uppards, two adults being found on the small beach adjacent to the project area and six found on a beach further north on the western shore of Uppards. A survey (2004) was conducted for larval tiger beetles within the proposed project footprint and also at any potential tiger beetle larval stage habitat throughout the Uppards and Tangier Islands. No larvae were found within the proposed project footprint, and only two adults. The population on the island may be migrants from the eastern shore of Chesapeake Bay or possibly a population in decline. The beach these two adults were found on has since become mostly shallow open water habitat since 2004 and it is now highly unlikely this habitat still serves as Northeastern beach tiger beetle habitat. They are no longer considered to be inhabiting this area.

Species known to or believed to inhabit or utilize the open waters of the study area listed as federally threatened include the Atlantic sturgeon (*Acipenser oxyrinchus*)), the green sea turtle *(Chelonia mydas)*, and the loggerhead sea turtle *(Caretta caretta caretta)*. Federal and State Species of Concern include the Northern diamondback terrapin

(Malaclemys terrapin terrapin), gull-billed tern *(Sterna nilotica aranea)*, brown pelican *(Pelecanus occidentalis carolinensis)*, Caspian tern *(Sterna caspia)*, sandwich tern *(Sterna sandvicensis acuflavidus)*, Forster's tern *(Sterna forsteri)*, the least tern *(Sterna antillarum)*, and the river otter *(Lontra canadensis lataxina)*. For a listing of all threatened, endangered, and State species of concern, see Table 2.

The bottlenose dolphin, while not a threatened or endangered species, is listed as "depleted" under the Marine Mammal Protection Act. It is listed as occurring within the vicinity of the proposed project (VDGIF, 2000). A number of other listed species found in databases covering the local area were not included in the above listings due to their terrestrial or nearshore habitat preference. It is extremely unlikely they would be found in the open waters of Tangier-Pocomoke Sound.

5.12 Cultural Resources

5.12.1 Historic Context Although the recorded history of Tangier begins in the 17th century, there is some evidence that Tangier and its adjacent islands, such as Goose and Watts Islands, were visited by Indian populations possibly prior to 8000 B.C. The archaeological evidence that has been found on these islands indicates that the Indians were most likely using the islands as a source of food but not for settlement (Cultural Resources, Inc., 2003). An archaeological site on Goose Island identified in 2001 encompasses almost the entire island and spans all periods of prehistoric occupation. No determination of this site's eligibility for listing on the National Register of Historic Places has been made. The earliest record of European settlement on Tangier Island occurred in 1778 when Joseph Crockett and his family moved to the island after he purchased 450 acres on the island. Prior to this time, the island had become part of the holdings of the wealthy families of the Eastern Shore, and it was used for livestock grazing. For most of the period from 1778 to 1860, the Tangier residents were farmers who lived on the various ridges on Tangier, Uppards and Watts Islands. At that point, there was considerably more high ground than there is today.

By 1820, oystering was starting to replace farming as the predominant economic activity on the island. This trend accelerated with the arrival of the railroad in Crisfield, Maryland, and the advent of refrigerated railroad cars, which enabled oysters to be shipped to points much further away. After the Civil War, Tangier's economy flourished, partially because of the development of the steam canning process, which allowed for nationwide shipment of oysters. The island's population grew, and the lots on the high ground were divided into smaller units to accommodate this growth. By the beginning of the 20th century, the population had increased to 1,064 residents.

In the early part of the 20th century, the island's residents began to switch from oystering to crabbing as the primary source of income. Agriculture also faded away as crabbing became the chief source of livelihood for the residents and less land became useable for agriculture. Crabs were caught and processed on the island and then shipped all

over the country from the railroad connection at Crisfield. The creation of a Federal channel through dredging in the early 1920's and a harbor in 1917 further enhanced the role of shellfishing in the island's residents.

In the early 20th century, residents of the more remote parts of Tangier began moving to the main portion of the island. By the beginning of World War II, Canaan and Oyster Ridges, which were located at the northern part of Uppards, had been abandoned, and the population became more concentrated on Main Ridge. After World War II, crabbing continued to be the dominant source of income to the island. However, tourism began to play an increasing role in the island's economy, with boats from Reedville and Onancock providing day trips in the summer for visitors. The end of the century saw a decline in the island's population, as the younger residents moved away to pursue more economic opportunities than the island could provide.

5.12.2 Architecture. A significant number of historic buildings exist on the southern, inhabited half of Tangier Island. There are also the archaeological remains of the historic occupations of Uppards, as well as prehistoric sites there. The Virginia Department of Historic Resources conducted a survey of Tangier Island, and evaluated it as historic district eligible for the National Register of Historic Places. The Tangier Island Historic District (DHR #301-0001) was placed in the Virginia Landmarks Register in March 2014, and listing in the NRHP is pending. The historic district consists of 227 contributing buildings and 12 contributing sites, mostly cemeteries but including prehistoric site 44AC0524. Because of known and inferred archaeological resources on Uppards, the boundary of the historic district includes all of Tangier Island except for the airport and the eastern islet known as "Port Isobel."

5.12.3 Archaeology. Evidence of archaeological resources on Tangier Island has come from both professional archaeologists and non-professionals. Lowery (2001) examined the western shoreline of Uppards during a survey of shorelines in Accomack County conducted for the Virginia Department of Historic Resources. He recorded the prehistoric site 44AC0524 which was mapped as covering the entire western shoreline of Uppards. This boundary, viewed in GIS with a USGS topo map base map, encircles the shoreline; but, when viewed with a recent satellite image as the base map, the boundary is entirely offshore. Lowery found only fire-cracked rock in his survey, but collectors had reported finds of artifacts ranging from the Paleoindian to Late Woodland Periods. These finds apparently had no more specific location that the west side of Uppards, hence the nature of the site boundary.

As part of a Feasibility Study for a proposed environmental restoration project at Uppards, a cultural resources reconnaissance study was carried out in 2003 (Richards and Cook 2003). This study resulted in a report entitled, "An Assessment of Cultural Resource Potential within 'Uppards' and Goose Island, Tangier Island, Accomack County, Virginia" (Cultural Resources, Inc.). As a result of this cultural resources investigation, two historic

period sites were identified. The first of these was located on the northern tip of the Uppards and contained the remains of a 19th century cemetery and well since recorded as 44AC0571. This cemetery was heavily impacted by Hurricane Sandy, with burials having washed out. Archaeologists from the Virginia Department of Historic Resources mounted a recovery operation in December of 2012. The second site was located on the northwestern tip of Goose Island and consisted of the remains of the pier associated with a store that once existed on the island

Richards and Cooke (2003) suggested that there is a moderate potential for shipwreck sites offshore and for prehistoric sites to exist within the now submerged land adjacent to the islands. Regarding the potential for shipwrecks, all alternatives of the current project are within areas which were land at least as recently as the 1960's (Figure 5 showing outlines of historic shorelines). Hence, there is little potential for archaeologically significant shipwrecks in these areas. There is clearly a high potential for terrestrial archaeological sites to have existed on lands west of the island that are now submerged. Both Lowery (2001) and Richards and Cooke (2003) suggest that deeply buried prehistoric archaeological components may survive in submerged strata. Historic components are less likely. The west side of Uppards is a high energy shoreline, and upper strata have been eroded by wave action.

Lowery observed artifacts, several fragments of fire-cracked rock, in a gleyed horizon beneath 2-4 feet of beach sand and tidal marsh "O" horizon. Observations of the stratigraphy from survey undertaken in July 2013 for this project are consistent (Haynes 2014), but no artifacts were discovered in this horizon. Surface artifacts all appeared to be recent, with the possible exception of a brick fragment. The brick fragment had a dried barnacle adhering to it, indicating that it had been cast up on the beach, probably by wave action. Any archaeological components surviving offshore would have had to have been buried, or intruded into soils, several feet to have survived the shoreline erosion.

5.13 Socio-Economic Conditions

The Town of Tangier, which is part of Accomack County, was initially incorporated in 1906. In 2010, the Town's population was 727, a 20 percent increase from 2000 and a reversal of a trend of population decline that began in 1960 (U.S. Census). Accomack County, by contrast, increased from 1970 to 2000, but then decreased in 2010 to a population of 33,164, a 13 percent decline from 2000. Tangier's population does not contain any racial or ethnic minorities.

Projections from the Virginia Employment Commission for Accomack County for the year 2030 show a population of 44,249, which indicates an average annual growth rate of 1.5 percent. However, these projections have not been revised to reflect the most recent census figures, so they may be too optimistic for Accomack County.

The economy of Tangier is based primarily on the seafood industry, especially blue

crabs, which are caught in the waters off Tangier and shipped to Crisfield, Maryland, and other and towns and cities. Many of the crabs caught between April and November are peeler crabs, which are held in crab houses until they shed and are sold as soft crabs. Much of the economic activity of the community is concentrated in the harbor area adjacent to the Tangier Channels. This is the location for both the boats that are berthed at the harbor and the crab houses that pack crabs primarily for the shipping to the northeast.

Data from the American Community Survey for 2005-2009 shows the importance of the seafood industry to the residents of the Town. An estimated 29 percent of the employed residents of the Town were working in the seafood industry. This percentage compares to a figure of 5 percent for agriculture, forestry, and fisheries together in Accomack County as a whole. The largest sector of employment for Tangier residents is the services industry (which includes educational and health services), which provided employment for 41 percent of the Town's workers, slightly below the 34 percent for the county. The remaining sectors of the economy each provide less than 10 percent of jobs for the residents, whereas in Accomack County, manufacturing, trade, and construction provide 38 percent of the county's employment for the county's residents.

Total employment in Accomack County has been increasing since 1980, with an average annual rate of growth from 1980 to 2008 of 0.65 percent (U.S. Department of Commerce, Bureau of Economic Analysis). However, most of this growth has been in the services sector with declines in most of the other sectors.

Income levels in Tangier in 2000 varied depending on the measure. Median annual household income for Tangier for the time period 2005-2009 was estimated to be $39,375 compared to $40,343 for Accomack County, both of which are considerably below the $60,316 for the state as a whole (American Community Survey, 2011). Poverty levels for the Town show 22 percent of the population below the poverty level compared to 16 percent for the county. Estimates for 2008 from the Bureau of Economic Analysis show Accomack County with a per capita income that was 63 percent of the state average and 70 percent of the national average, indicating an area significantly less prosperous than the rest of the state.

Housing in Tangier is almost totally owner-occupied and single family according to data from the American Community Survey. As of 2005-2009, 86 percent of the units were single family, 11 percent were manufactured or mobile homes, and only 3 percent were multifamily. At least 70 percent of the housing was built before 1960. The average value of the owner-occupied housing in Tangier was approximately $62,000 less than the value of owner-occupied housing in Accomack County, which is significantly below the state average.

5.14 Land Use

Development on Tangier Island is located on the three sand ridges that run north to

south and are known as Main Ridge, West Ridge, and Canton Ridge. Land use in Tangier is predominantly residential with most of the commercial uses concentrated in the northern part of the island. Commercial development consists of facilities associated with the seafood industry and the harbor, small shops, and several restaurants. Public and semi-public uses include a church, school, post office, airstrip, and the sewage treatment plant. The streets that run through the Town are very narrow and used by primarily by motorized carts, bicycles, and pedestrians. No significant land use changes are anticipated in the near future because of the totally developed nature of the Town and the physical constraints of the surrounding marshland. Any future development will be in the area of redevelopment rather than new development.

5.15 Recreational Resources

The predominant recreation resources in the study area are water related. Boating, fishing, and wildlife observation are the primary options for recreation on the island. Canada geese, various species of ducks, grebes, loons, herons, and egrets frequent the area. Saltwater fishing opportunities include striped bass, flounder, gray and speckled trout, croaker, bluefish, black drum, and channel bass.

5.16 Coastal Zone Resources and Permits

In accordance with the Coastal Zone Management Act of 1972, as amended, and the approved Coastal Management Program of the Commonwealth of Virginia, the proposed project has been evaluated for consistency with coastal development policies. The Virginia Department of Environmental Quality (VDEQ) serves as the lead agency for Virginia's networked coastal zone management program. Circulation of this NEPA document and receipt of appropriate permits by the non-Federal sponsor will ensure compliance with the Coastal Zone Management Act. In addition, a consistency determination will be submitted to VDEQ along with the Draft EA.

Permits will be applied for during the Design Phase of the proposed project, and receipt of all necessary permits will be necessary to construct the proposed project. The permits must be approved prior to construction via the Joint Permit Application (JPA) process. Permits to be obtained include a Virginia Marine Resources Commission (VMRC) permit for encroaching on state bottom pursuant to title 28.2 and 62.1 of the Code of Virginia and a VDEQ Virginia Water Protection permit pursuant to Sec. 401 of the Clean Water Act. USACE will act as the agent for the local sponsor, the Town of Tangier, and will acquire all necessary permits. Any conditions, such as time-of-year or other recommendations, required in the permits will be adhered to.

5.17 Air Quality

The open and nearshore waters of the study area are located in Accomack County, Virginia. Accomack County is located within the Northeastern Virginia Intrastate Air Quality Control Region (9VAC5-20-203). Accomack County is not included in any designated maintenance (9VAC5-20-203) or nonattainment area (9VAC5-20-204) for

criteria air pollutants. Air quality in the study area is in compliance with current USEPA National Ambient Air Quality Standards for ozone, sulfur dioxide, nitrogen oxides, carbon monoxide, airborne lead, and particulate matter.

5.18 Hazardous, Toxic, and Radioactive Waste

Coordination with VDEQ, Office of Waste Programs and a subsequent search of their database revealed that the study area around Uppards and Goose Islands is not located near any documented hazardous waste sites, management facilities, or Superfund sites. Considering the lack of industry other than commercial seafood harvesting in the local area, this is not surprising. The Uppards and Goose Islands have been uninhabited for many decades and only had a few residential buildings on them during their earlier period of human habitation.

6.0 ENVIRONMENTAL CONSEQUENCES

This section is summary of the environmental impacts that would result from the implementation of two project alternatives, the Preferred Alternative (PA) and the No Action Alternative (NAA).

6.1 Water Quality

The terrestrial area adjacent to the project is either wetlands or intertidal beach habitat and would not support large construction vehicles. As a result, construction of the stone structure would be completed entirely by barges positioned offshore. Barges would be maneuvered in and around the proposed project area during construction. Clean stone would be the only construction material used in this project, along with a geotextile fabric placed under the stone. No sand fill or excavation of the bottom will be needed.

The PA could result in a minor adverse impact to water quality, which is predicted to be temporary and localized. Impacts may include an increase in turbidity and total suspended solids (TSS). Increases in turbidity and TSS would be due to fine material included in the construction materials, as well as the suspension of bottom sediment at the placement site. Construction materials would be inspected and fine material would be removed prior to construction to ensure that excess amounts of fine material would not be introduced into the water column. TSS and turbidity levels are predicted to return to normal once construction activities have been completed. Increased turbidity and TSS levels also have the potential to lower the dissolved oxygen (DO) concentration in the water column. Reduced DO levels within the water column can stress aquatic organisms if the levels are low enough. This is unlikely, given typical DO levels and water circulation patterns in the local project area. If DO levels are affected by construction activities, they would return to normal once construction has been completed.

Over the life span of the project, it is predicted that water quality will improve locally. The project would reduce wave, storm and current energy within the project area,

ultimately reducing shoreline erosion. As a result, the amount of peat and organic sediment entering the water column from the eroding shoreline would be reduced, resulting in the reduction of TSS and turbidity.

The NAA would not change the existing water quality conditions.

6.2 Wetlands

The jetty will extend from the navigation channel and key into the existing sandy shoreline (Figure 4). As a result, an area of beach would be permanently covered by stone.

Long term, local wetlands would benefit from project implementation. The construction of the jetty would protect remaining vegetated wetlands in the project area from wave energy and greatly reducing erosion. This protection may allow a more positive sediment and peat deposition rate, relative to sea level rise, enabling the wetlands to persist longer than predicted trajectories under the NAA.

The NAA will result in the continued loss of wetlands at current or increased rates due to sea level rise.

6.3 Submerged Aquatic Vegetation

The most recent SAV surveys indicate that there are no beds of SAV located in the area affected by the PA, nor have there been for at least the past 10 years (VIMS, 2015).

Overall impacts to local SAV populations would be minor, but positive. By protecting the local area of the southwestern shore of Uppards from further erosion, existing SAV beds along the eastern shore of the Uppards may become denser due to local improvements to water quality (reduced TSS and turbidity) that would result from shoreline protection and reduction in wave and current energy.

Water visibility would either remain the same or decrease if the NAA was implemented. As a result, SAV resources in areas adjacent to the project would either not change or decline.

6.4 Fauna of the Project Area

Adverse impacts to the fauna within the proposed project area are predicted to be minor. Construction of the PA would impact a total of two acres, of which approximately 0.7 acres will be shallow-water and intertidal benthic habitat. This area would be permanently covered with stone. The direct impacts to wildlife resulting from the implementation of this project would include injury and mortality of slow moving or sessile organisms. Non-motile organisms currently residing in the sediments within the footprints of the jetty would be crushed and/or buried. Although individuals would be lost due to construction, this habitat is common in the local area. Therefore, this project is not expected to adversely impact the health of the entire population of species which rely on

subaquatic sandy bottom or unvegetated beach habitats.

Although the PAwould permanently change the type of substrate in the footprint of the jetty, from sandy bottom to a rock reef, the project would provide hard structure, which is a habitat type that supports a different faunal community. Horseshoe crabs and terrapin that may currently utilize the project footprint area will no longer be able to do so. The jetty would provide attachment sites for a wide variety of estuarine invertebrates, as well as foraging habitat for more motile aquatic life. Although of lesser habitat value than natural hard structure, such as oyster reefs, rock structures do provide hard substrate and crevices for protection that many species utilize. Over time, the proposed stone structures would become habitat to various organisms that are important for supporting base-level food chains, filter feeders (such as oysters and mussels), and others. Additionally, rock structures generally attract mobile aquatic fauna, which subsequently make these areas attractive for foraging birds, such as terns.

Impacts to avian fauna should be minimized as due to the expected time-of-year restrictions. Construction would not take place during the bird nesting season. During construction, birds will likely avoid the project area due to the noise and earthmoving. This disturbance would be temporary, lasting only while construction is taking place.

The NAA would result in no change to the fauna within the project area.

6.5 Essential Fish Habitat

. Step 1 of the EFH consultation process was accomplished by notifying NOAA that this EA was being prepared and further coordination has been done regarding the selected alternative. Step 2 involved the preparation of an EFH Assessment by the Federal agency proposing the action. The EFH assessment included: (1) a description of the proposed action; (2) an analysis of the effects of the action on EFH and associated species; (3) the Federal agency's views regarding the effects of the action on EFH; and (4) a discussion of proposed mitigation, if applicable. The EFH assessment can be found in Appendix C. Step 3 of the consultation process will be completed after NOAA reviews the Draft EA. NOAA will then provided EFH Conservation Recommendations as needed. This response, in writing, will describe the measures proposed by the agency to avoid, mitigate, or offset the impacts of the action on EFH pursuant to NOAA recommendations. We will consult with NOAA during the PED (Planning Engineering Design) to ensure compliance with ESA and EFH guidelines.

6.5.1 Description of proposed action. See Section 5.4 of this report.

6.5.2 Analysis of the effects of the action on EFH. A description of the species and at which life stage EFH has been determined by NOAA in the vicinity of the project can be found as an attachment to the Environmental Assessment. No Habitat Area of Particular Concern (HAPC) designations for any species exist in the project area. HAPC are

described in regulations as subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally-stressed area.

Potential adverse effects to EFH species, which locally are winter flounder, windowpane flounder, scup, black sea bass, king mackerel, Spanish mackerel, cobia, red drum, sand tiger shark, Atlantic sharpnose shark, dusky shark, and sandbar shark, may result from the construction of the proposed project. These include changes in water quality, direct encounters with construction materials and equipment during project construction, conversion from one habitat type to another and impacts to populations of prey items.

Construction of the stone jetty may result in a temporary decrease in water quality; specifically, turbidity and the concentration of suspended solids and dissolved nutrients may increase while dissolved oxygen levels and water clarity may decrease. These changes could impact fish by interfering with the respiration of organisms with gills and predators which hunt by sight. Water quality will quickly return to pre-project levels once construction has been completed.

There will be a conversion of a small area of open shallow water and beach habitat to hard structure due to the construction of the chosen alternative. The transitions would result in population increases for reef dependent species. The transitions of soft bottom habitat to a rock structure may cause a decline in populations that rely on soft habitat at the construction sites; although this project is not expected to cause significant changes to the overall populations of species reliant on open bottom because significant amount of that habitat type will remain available.

Another direct impact of construction is the possibility that individual fish may be injured or killed due to direct encounters with stone and heavy equipment. Fish, however, are extremely motile and are expected move out of the area during construction. Injury or death to slower moving animals may result if the organisms are buried during construction or if the organisms cannot move away from the project site when heavy equipment is being operated. Natural behaviors, such as foraging and hunting, may be interrupted while construction activities occur. Organisms that are able to leave the immediate area may be scared away from the affected sites, but behaviors should return to normal once the construction phase has been completed.

The placement of stone may reduce the population of prey species used by some EFH species. Relatively non-motile benthos, such as polychaetes and mollusks, will be destroyed at the project sites; this may cause fish to move out of the project area for foraging. These impacts will be relatively minor due to amount of sandy bottom habitat that will remain unaltered that surrounds the project area. Fish species will have small distances to travel in order to locate populations of prey species.

6.5.3 Department of the Army's views regarding the effects of the action on EFH. The significance of direct impacts resulting from this project on EFH species will depend on life stage and the usage of the project area. For example, it is more likely that eggs and larval fish will be affected to a greater extent than adults and juveniles, because the older life stages have greater swimming abilities and will be able to move away from construction activities. Demersal species, such as the windowpane flounder and the winter flounder, are mobile and should be able to avoid project construction as well; however, because of their demersal nature, individuals that remain on the seafloor during the placement of materials, and could be buried and destroyed.

Direct impacts to water quality are predicted to be minor and temporary in nature. Due to the relatively small amount of fine material that might be included in the stone that is placed, increases in turbidity and decreases in dissolved oxygen are expected to be small and localized to the construction area. Once construction has been completed, water quality is expected to return to pre-project conditions almost immediately.

The transition of shallow soft bottom habitat to stone habitat will not be temporary in nature. However, the area that will be converted is relatively small compared to the amount of soft bottom habitat that will remain undisturbed. The benthic and fish community that utilize soft bottom habitat will be able to move to sites adjacent to the project area to access the preferred habitat type.

Most indirect impacts of the project are also expected to be minor, temporary and localized to the footprint of the project area. It is expected that the benthic community in the project will recover and fish usage will return to pre-project conditions once construction has been completed. For further details, please see the EFH assessment attached to this document after the USFWS coordination documents.

6.6 Federally-Threatened and Endangered Species and State Species of Special Concern

No significant negative impacts to aquatic TES species are expected as a result of project implementation, including bottlenose dolphins, sea turtles, sturgeon, northern diamondback terrapin and bird species. Some species may derive some benefits from the construction of the project. Sea turtles, with the exception of the leatherback turtle, would likely derive benefits from the proposed project due to increased availability of prey items within the restored habitat. Green sea turtles are primarily herbivorous as juveniles and adults. SAV, in particular eelgrass, is a preferred food item of the green turtle, and the proposed project is highly likely to provide minor benefits to SAV due to lowering of local TSS levels in nearshore waters.

The Northeastern Beach Tiger Beetle (*Cicindela dorsalis dorsalis*), federally-listed as threatened, was found in small numbers at two sites near the proposed project area

during a survey that was completed in 2004. A more recent survey has shown that there are no tiger beetles present in the local project area (see the USFWS Planning Aid Report in the Environmental Appendix). Due to the erosion of the southern beach spit of Tangier Island, the island may no longer have a viable population, as USFWS only found one adult beetle during a survey in 2014. Because of the absence of tiger beetles in the project area, no significant, adverse impacts on this species are expected.

The Atlantic sturgeon (*Acipenser oxyrinchus*) is currently listed as federally threatened. The known population in the Chesapeake Bay is very small. The largest remaining group are located in the James River, Virginia, and consists of approximately 300 individuals and is a spawning population. As the sturgeon is an anadromous fish it is only in the Bay during part of the year. Adults migrate up tributary rivers of the Bay to spawn in fresh water in the spring. Juveniles may stay in the rivers and Bay mainstem for the first years of their life, but eventually migrate into oceanic waters where they spend most of their lives. Due to their migratory pattern in the Bay, it is unlikely that adults would be found in the project area. Construction will produce noise and turbulence such that any sturgeon that might be in the local area will depart. The Atlantic sturgeon, being a benthic feeder, may benefit from the increased diversity and numbers of benthic organisms within the study areas provided by the increased bottom habitat type. Both negative and positive impacts are unlikely, because sturgeon are not usually found in such nearshore island habitat. The shortnose sturgeon (Acipenser brevirostrum), listed as Endangered, can also be found in Chesapeake Bay, but there are no records of it from the local project area. No significant negative impacts to sturgeon are expected.

USACE has consulted with NOAA and USFWS and will continue to consult with the two Federal agneciesduring the circulation of the draft EA. The USACE determined that the project *may affect but is not likely to adversely affect* the federally listed species found in the project area.

The NAA would have no effect on rare, threatened or endangered species found in the project area.

6.7 Cultural Resources

No negative impacts to cultural resources are anticipated as result of the implementation of the proposed project. In accordance with Section 106 of the National Historic Preservation Act, implementation of the proposed project would have no adverse effect on any known cultural resources in the study area. The small section of the north jetty to be constructed along the shoreline (<2 acres) would involve the disturbance of culturally sterile upper strata of recently deposited sand and salt marsh peat. Offshore sections would involve little to now bottom disturbance, and construction access would be by barge. The proposed project would reduce erosion on the south west tip of Uppards, thereby providing some protection to any sites that may exist nearby on Uppards, as well as protect buildings in the Tangier Island Historic District. Although it is possible that there

are prehistoric resources buried deeply in the areas that would be covered by breakwaters, it is impractical to investigate this possibility.

A brief survey was conducted in the project area of potential effect, reported along with historical research in a cultural resource survey report (Haynes 2014). No significant archaeological resources were identified; however, submerged portions of site 44CS0524 may be in or near the project area. Site 44CS05524 is a prehistoric site listed as contributing to the Tangier Island Historic District (DHR #309-0001). In consultation with Virginia Department of Historic Resources (DHR, i.e., State Historic Preservation Office [SHPO]), it was determined that this project would have no adverse effects to historic properties including site 44CS0524 and the Tangier Island Historic District (letter July 9, 2014, Greg LaBudde DHR, to John Haynes USACE-NAO, DHR file # 2014-3419).

6.8 Socio-Economic Resources

No negative effects on the socio-economic resources of the area are anticipated from construction of the proposed project, impacts are expected to be highly positive. Fishing or crabbing opportunities would not be reduced and would be enhanced by implementing the proposed project. Navigation needs would be met; the harbor of refuge would be better protected along with nearshore seafood industry infrastructure. No changes in the areas of public facilities and services, community cohesion, property values, and community and regional growth are expected from implementation of the proposed project. Similarly, no displacement of people, businesses, or farms would occur, and there would not be any adverse effect on any racial, ethnic, or other minority group.

6.9 Air Quality

The selected alternative would result in minor and temporary decreases of air quality while construction takes place. Increased air emissions would be associated with construction equipment, including a tugboat, cranes, front end loaders and other the diesel equipment used to place the stone. Air emissions would include temporary increases in volatile organic compounds, nitrogen oxides, sulfur dioxide, and carbon monoxide. As the Accomack County is located in an attainment area, Northeastern Virginia Intrastate Air Quality Control Region (9VAC5-20-203), for all known air pollutants, calculations are not needed to estimate emissions of the six criteria pollutants. No formal Clean Air Act conformity determination for the proposed project is required (9VAC5-160-30). The emissions produced during transportation and construction is not expected to exceed ambient air quality standards. No significant negative impacts as a result of implementing the PA are expected.

The NAA would not be expected to result in changes to air quality in the project area.

6.10 Noise Pollution

The use of construction equipment to place the rock on the proposed sites and the

barges required to transport the rock to the site would likely increase noise levels in the local area during the construction period. There are no residential areas in proximity to the proposed construction, and only local watermen are likely to notice the noise as they travel through the channel toward open water near the area. Local wildlife may be disturbed close to and on the sites, but should experience no adverse effects and should return to the area immediately after construction is complete. No significant impact from noise is expected.

The NAA would not result in noise pollution in the project area.

6.11 Hazardous, Solid, Toxic, and Radioactive Waste

Construction of the proposed project is not expected to result in the identification and/or disturbance of any hazardous, solid, toxic, or radioactive waste (HTRW). Best management practices (BMP's) would be used to secure any fuel supplies used by vessels or vehicles used during proposed project construction. No significant impacts involving HTRW are expected.

The NAA would not be expected to result in the identification or disturbance of HTRW or solid waste.

6.12 Cumulative Impacts

The cumulative impact assessment is the evaluation of the effects that other past, present, or reasonably foreseeable future actions, alternatives, or plans might have on the environment when considered along with the proposed project's impacts. Cumulative impacts can be either additive or interactive. Additive impacts are those that can collectively have a profound effect on a given resource due to the collective magnitude of the effect. Interactive impacts are impacts that accrue as a result of assorted similar or dissimilar actions, alternatives, or plans that tend to have similar effects, relevant to the resource in question.

6.12.1 Past Actions. Past actions on the Uppards were the construction of the Town of New Canaan, along with several smaller towns on Uppards Island, in the 1800s and their eventual abandonment in the early 1900s. During the heyday of New Canann, in the 19th century, there were also various dirt roads constructed and a wooden corduroy road connecting New Canaan with what is now the Town of Tangier. These roads are not usable today, yet remnants of several of the roads can still be seen from the air. Related past actions include the construction of at least one wooden pier, which is still usable by small boats today though it is in poor condition and almost decrepit. The only other action to occur on the Uppards was the placement of small, seasonally-used duck-hunting blinds and several small trailers used by duck hunters near the wooden pier (all the preceding actions were non-Federal).

The Uppards has also been used as a placement site for dredged sediments (Federal action) removed from the navigation channel between Uppards and Tangier Islands. The material has been placed in relatively thin layers on several areas. These areas were not containment sites and do not have dikes built to contain the material. This placement of dredged sediments was done partly in an attempt to combat subsidence of the island, and partly to minimize disposal costs. Most dredged material today is placed on Tangier Island in an attempt to raise several areas to make them high enough for human use and habitation. In addition, there has been a shoreline revetment placed along much of the western shore of Tangier Island to protect the shore from further erosion. The small airport on Tangier Island lies very close to the present western shore. The revetment was designed to be rather porous, and wetlands have been maintained between the airport and revetment. Also at Tangier Island, as mentioned before, a navigation channel is maintained and the need to maintain it is one of the primary reasons for the proposed project.

A final modification was the creation of a small harbor of refuge between the Town of Tangier and the Uppards. All of these actions resulted in relatively minor impacts to the Uppards and Tangier Islands, with two exceptions, the construction of the airport, which did pave a significant area of riparian zone vegetation, and the channel between Uppards and Tangier Islands. This channel likely accelerated the erosion of the areas along the western shore of Uppards and Tangier Islands closest to the channel mouth.

The proposed project would maintain navigation needs, protect the harbor of refuge and associated boats, docking and seafood industry infrastructure and provide minor reductions in erosion of the Uppards Island. The loss of additional land from the southwest tip of the Uppards would further expose the harbor and navigation channel to the strong currents and wave energy resulting from the long fetch from the western shore of the Chesapeake Bay, which is a significant problem already and one of the reasons for the proposed project. The proposed project jetty along Uppards Island would protect a small portion of the southwest tip of Uppards and Northwest tip of Tangier Island.

6.12.2 <u>Present and reasonably foreseeable future actions</u>. No present actions are taking place in the local area of the Uppards that would result in any cumulative effects. Due to the island's being uninhabited, having poor facilities for docking, and having no reason other than to hunt waterfowl to dock on the island, it is likely to remain almost undisturbed for the foreseeable future. There is the potential for additional placement of unconfined dredged sediments on the island, but this helps maintain the Uppards landmass by adding additional sediments and slowing or reversing subsidence. The proposed Section 107 project would protect the western mouth of the navigation channel between Uppards and Tangier Islands. This area is eroding much more rapidly than the rest of the two islands, and is exposing the harbor of refuge to increased and current energy. The proposed action will add to the amount of hardened shoreline Bay-wide, but this action is necessary for the Town's survival. Similar actions have taken place at nearby Smith Island, MD, for

similar reasons.The cumulative impact of the proposed project is not significant and requires no mitigation or compensation of any kind.

6.12.3 Sea Level Rise and Local Subsistence. The structure designs presented in this report incorporated the latest USACE guidance on sea level rise. The subsidence refers to the general subsidence of the Chesapeake Bay. Borings taken at the proposed jetty location indicated local subsidence should be expected. The structure design will incorporate both relative SLR and settlement due to compaction of softer (fine sands) substrate found at much of the proposed construction site. More detailed information on Sea Level Rise and Local Subsidence and how they are incorporated in the design are presented in the March 2015 ERDC CHL Report provided in Appendix A.

Taking the NRC-I sea level rise as a most likely case, and adding 0.65 ft for subsidence, depth at the structure will increase by 1.34 ft in 50 yrs. Assuming the NRC-II as the upper bound of the expected sea level rise, and adding 0.65 ft for subsidence, the depth at the structure could increase by as much as 2 ft in 50 yrs.

If depth at the structure increases, the jetty freeboard is reduced by the same amount. The seaside armor stone calculations are not affected by the freeboard, but the leeside armor stones will be unstable if the freeboard is reduced. If depth increases by 1.34 ft (NRC-I plus subsidence) or 2.0 ft (NRC-II plus subsidence) near the jetty then the project design must be altered, specifically jetty head stone weights have been increased by 25 percent to offset the depth increase resulting from sea level rise.

6.12.4 No Action. If no action is taken, the navigation channel will experience more frequent shoaling and exposure to increased wave and current energy. The harbor of refuge and associated docking and seafood industry infrastructure will also be exposed to this increased energy, resulting in more extensive economic damages with storm events and eventual abandonment of the current harbor. This will severely impact the residents of the Town of Tangier and its working watermen.

7.0 MITIGATION

7.1 Avoidance

The proposed project was designed to avoid impacts to the greatest extent practicable. The project design was developed to avoid impact to sensitive habitat types and species. For example, the design avoids the placement of stone on vegetated wetlands and surveys were completed in order to ensure that the project would not negatively impact a threatened insect species that is known to inhabit Uppards Island. Impacts to the environment were minimized by ensuring that the minimum of rock would be placed to provide the reduction of wave energy. There will be no mitigation required for this project.

7.2 Minimization

Several measures have been incorporated into the proposed project design and

construction to minimize any impacts or potential for impacts. These include implementation of BMP's, deployment of stone by barges from the water, and abiding by time-of- year restrictions as stipulated by the USFWS and NOAA through the coordination process, if any are needed. The stone material will also be inspected prior to placement to ensure fines are minimal, in order to eliminate chances for increased TSS as a result of construction activities.

7.3 Compensation

No compensation will be required.

8.0 COMPLIANCE WITH ENVIRONMENTAL STATUTES AND EXECUTIVE ORDERS

1. Anadromous Fish Conservation Act of 1965, as amended

Compliance: Anadromous fish species would not be affected. The project has been coordinated with the NOAA and is in compliance with the act.

2. Archaeological and Historic Preservation Act of 1974, as amended, 16 U.S.C. 469 et seq.

Compliance: The VDHR has been coordinated with concerning historic and/or archeological resources in the study area. Continued coordination with VDHR, where required, signifies compliance.

3. Clean Air Act, as amended, 42 U.S.C. 7401 et seq.

Compliance: Submission of this report to the Regional Administrator of the USEPA for review pursuant to Sections 176 (c) and 309 of the Clean Air Act signifies compliance. The project area is located in the Accomack County, Virginia (Chapter 20, Section 200), which is in attainment for all criteria pollutants; therefore an estimate of emissions is not required. Although there will be minor, temporary air pollution increases from construction equipment, these increases will be short-term and below *de minimis* levels. No impacts to air quality will result from the project; therefore no permits would be required for this project.

4. Clean Water Act of 1977 (Federal Water Pollution Control Act Amendments of 1972 and Water Quality Act of 1987) PL 100-4, 33 U.S.C. et seq.

Compliance: A Section 404(b)(1) Evaluation and Compliance Review has been incorporated into this report. A VMRC permit and State Water Quality Certification under Section 401 will be obtained if required.

5. Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990

Compliance: There are no designated coastal barrier resources in the project area that would be affected by this project.

6. Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1431 et seq.

Compliance: A Federal consistency determination will be submitted to VDEQ concurrently with the circulation of the Draft EA. According to USACE analysis, the proposed project is consistent with the CZMA. Issuance of applicable permits and concurrence of consistent to the maximum extent practicable by VDEQ, VMRC, and the state agencies with enforceable policies of the Virginia Coastal Zone Management Program signifies compliance.

7. Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq.

Compliance: Coordination with USFWS as well as coordination with NOAA has yielded no formal consultation requirements pursuant to Section 7 of the Endangered Species Act. USACE has agreed to follow USFWS recommended time-of-year restrictions for sand placement, therefore no formal consultation is required nor are impacts expected to be significant. Time-of-year restrictions were initially recommended due to the presence of the federally-threatened northeastern beach tiger beetle, *Cincindela dorsalis dorsalis*, within the project footprint. These beetles are no longer found in the project area, and the Corps has further coordinated with USFWS on the need for this time-of-year restriction, which is no longer necessary. NOAA (NMFS) and the USACE will coordinate regarding the listing of the Atlantic sturgeon with respect to any potential for project impacts to the sturgeon. None are expected.

8. Estuarine Areas Act, 16 U.S.C. 1221 et seq.

Compliance: Coordination of the Draft EA report, with appropriate Federal and state resource agencies, signifies compliance with this act.

9. Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601-12 et seq.

Compliance: Coordination of the Draft EA with the National Park Service (NPS) and the Virginia Department of Conservation and Recreation, relative to the Federal and state comprehensive outdoor recreation plans, signifies compliance with this act.

10. Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq.

Compliance: Coordination of the Draft EA with the USFWS, NMFS, and the Virginia

Department of Game and Inland Fisheries signifies compliance with this act.

11. Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 4601-4 et seq.

Compliance: Coordination is not required because the proposed project does not involve an undertaking that will or may affect properties of facilities acquired or developed with the assistance from this Act.

12. Magnuson – Stevens Fishery Conservation Act also known as the Fishery Conservation and Management Act of 1976

Compliance: This act has been fully described in Sections 8.6 of this report and the EA and EFH assessment that are located in Appendix C. The EFH Assessment for this project can be found in Appendix C and coordination with the NOAA will be included in Appendix E after coordination has been completed.

12. Marine Protection, Research, and Sanctuaries Act of 1972, as amended 33 U.S.C. 1401 et seq.

Compliance: Not applicable; proposed project does not involve the transportation or placement of dredged material in ocean waters pursuant to Sections 102 and 103 of the Act, respectively.

13. National Historic Preservation Act of 1996, as amended, 16 U.S.C. 470 et seq.

Compliance: Completion of Section 106 review signifies compliance with this act, documented in letter of 9 July 2014 from VDHR.

14. National Environmental Policy Act of 1969, as amended, 42 U.S.C. 432 et seq.

Compliance: Preparation of the Draft EA and public coordination and comment signifies partial compliance with NEPA. Full compliance is achieved with the signing and issuing of the Finding of No Significant Impact (FONSI) statement which is included as a draft with this EA.

13. Rivers and Harbors Appropriation Act of 1899, as amended, 33 U.S.C. 401 et seq.

Compliance: Exempt.

14. Watershed Protection and Flood Prevention Act, as amended, 16 U.S.C. 1001 et seq.

Compliance: No requirements for USACE activities.

15. Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271 et seq.

Compliance: The proposed project has been evaluated reference to this act. The proposed project would not adversely impact any component of the Virginia Scenic Rivers System. There are no wild and scenic rivers in the proposed project area. Coordination of the Draft EA with the NPS and the Virginia Department of Conservation and Recreation, relative to the Virginia Scenic Rivers System, signifies compliance with this act.

16. Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601-9675.

Compliance: The proposed project has been evaluated reference to this act. No hazardous substances on subaqueous lands in the proposed project construction area, including for construction operation and maintenance, have been currently identified. The proposed project is in compliance with this act following state and Federal agency concurrence with the findings of this EA.

Executive Orders
1. Executive Order 11988, Floodplain Management, 24 May 1977, as amended by Executive Order 12148, 20 July 1979.

Compliance: The proposed project would not stimulate development in the floodplain. Circulation of this report for public review fulfills the requirements of Executive Order 1988, Section 2(a)(2).

2. Executive Order 11990, Protection of Wetlands, 24 May 1977.

Compliance: No significant negative impacts to wetlands would occur by implementing the proposed project. Wetlands would have significant positive impacts resulting from project implementation. SAV may experience minor but positive benefits as a result of project implementation. Circulation of this report for public review fulfills the requirements of Executive Order 11990, Section 2(b).

3. Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, 4 January 1979.
Compliance: Not applicable; proposed project is located within the United States.

4. Executive Order 12898, Environmental Justice in Minority Populations and Low-Income Populations, 11 February 1994.

Compliance: No adverse impacts are expected to occur to any minority or low income communities in the study area. Indirect benefits that lead to increases in the commercial harvest of blue crabs would benefit local watermen and their communities, including the

Town of Tangier. The Draft EA was made available for public comment to all individuals who have an interest or may be affected by the proposed project. This Draft EA will incorporate the comments made after public and agency review.

5. Executive Order 13508, Chesapeake Bay Protection and Restoration, 12 May 2009.

Compliance: The proposed project will provide some protection to Uppards Island wetlands against erosion.

6. Executive Order 13653, Preparing the United States for the Impacts of Climate Change, 1 November 2013.

Compliance: The proposed project will provide a small amount of protection to Tangier and Uppards Islands against the impacts of sea level rise by reducing climate-changed induced storm surge damage for the expected life of the project.

Executive Memorandum
1. Analysis of Impacts of Prime or Unique Agricultural Lands in Implementing NEPA, 11 August 1980.

Compliance: Not applicable; proposed project does not involve or impact agricultural lands.

9.0 CONCLUSIONS

The conclusions of this Draft EA are based on an evaluation of the effects that the proposed action would have on the human environment and local area ecosystems, including the land, air, and aquatic systems of the Uppards, part of Tangier Island, Tangier Sound, nearby islands, and the Eastern Shore.

The present shoreline of the Uppards is rapidly eroding, and the Uppards is projected to disappear entirely in several decades. The proposed project seeks to protect a small region at the southwest of the Uppards while providing for the navigation needs of the Town of Tangier

The proposed project should contribute significantly and positively to the maintenance of navigation needs for the citizens of the Town of Tangier and provide minor, positive environmental benefits. These minor benefits are due to protecting wetlands in the lee of the structure that are currently eroding at over 10 feet/year. Therefore, although adverse short-term impacts would occur to some fauna inhabiting the present substrate within the study area due to the placement of the jetty, negative environmental impacts are expected to be short term and minor. No significant negative impacts are expected.
Surveys for both larval and adult stages of the federally threatened northeastern beach tiger

beetle have indicated the presence of a small, likely transient population of adults only within the project footprint (8 adults were found) in 2004, and conditions today indicate the beetles have likely been extirpated from Uppards Island and that no beetles were found in the project area as of 2014. No formal consultation was required, as the project may affect and is not likely to adversely affect the tiger beetle.

The conclusion of this investigation isthat the Preferred Alternative would not have a significant adverse effect on the environment and, therefore, does not require the preparation of an Environmental Impact Statement.

10.0 COORDINATION

The draft Detailed Project Report and draft EA will be made available to the public by notice of availability for a 30-day review and comment period. The documents will be made available on the USACE website and local libraries. The documents will also be sent to the following Federal, state and local agencies for review and comment.

NMFS - National Marine Fisheries Service
NPS – National Park Service
USEPA - U.S. Environmental Protection Agency
USFWS - U.S. Fish and Wildlife Service
VDGIF - Virginia Department of Game and Inland Fisheries
VDCR - Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation
VDEQ - Virginia Department of Environmental Quality
VDH - Virginia Department of Health
VDHR - Virginia Department of Historic Resources
VIMS - Virginia Institute of Marine Science
VMRC - Virginia Marine Resources Commission
Accomack-Northampton Planning District Commission
County of Northampton
County of Accomack
Town of Tangier

Comments that are received during the public review period will be addressed and include in the Comment and Response Section of the final version of this document. A FONSI will be signed and included in the final document.

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12.0 TABLES

Table 2. FISH SPECIES COMMONLY OCCURRING WITHIN THE OPEN WATERS OF TANGIER AND POCOMOKE SOUND PROJECT AREAS

COMMON NAME	SCIENTIFIC NAME
American shad	*Alosa sapidissima*
American Eel	*Anguilla rostrata*
Alewife	*Alosa pseudoharengus*
Atlantic sturgeon	*Acipenser oxyrhynchus*
Atlantic sharpnose shark	*Rhizopriodon terraenovae*
Atlantic croaker	*Micropogonias undulatus*
Black sea bass	*Centropristus striata*
Bluefish	*Potomatomus saltatrix*
Bay anchovy	*Anchoa mitchilli*
Blueback herring	*Alosa aestivalis*
Dusky shark	*Charcharinus obscurus*
Grey Trout (Weak Fish)	*Cynoscion regalis*
Speckled Trout	*Cynoscion nebulosus*
Menhaden	*Brevoortia tryrannus*
Rockfish (Striped Bass)	*Morone saxatilis*
Spot	*Leiostomus xanthurus*
Summer Flounder	*Paralichthys dentatus*

White Perch	*Morone americana*
Windowpane flounder	*Scopthalmus aquosus*
Winter flounder	*Pseudopleuronectes americanus*
Scup	*Stenotomus chrysops*
King mackerel	*Scomberomorus cavalla*
Spanish mackerel	*Scomberomorus maculatus*
Cobia	Rachycentron canadum
Red drum	Sciaenops occelatus
Silver perch	Bairdiella Chrysoura
Sand tiger shark	Odontaspis taurus
Sandbar shark	Charcharinus plumbeus
Sea lamprey	Petromyzon marinus

Table 3. THREATENED AND ENDANGERED SPECIES AND SPECIES OF SPECIAL CONCERN OCCURRING OR POTENTIALLY OCCURRING WITHIN THE TANGIER AND POCOMOKE SOUND PROJECT AREAS

STATUS	COMMON NAME	SCIENTIFIC NAME
Federally Endangered	Atlantic hawksbill sea turtle	*Eretmochelys imbricata imbricata*
Federally Endangered	Kemp's Ridley sea turtle	*Lepidochelys kempii*
Federally Endangered	Leatherback sea turtle	*Dermochelys coriacea*
Federally-threatened	Bald Eagle	*Haliaeetus leucocephalus leucocephalus*
Federally-threatened	Green sea turtle	*Chelonia mydas*
Federally-threatened	Loggerhead sea turtle	Caretta caretta caretta
Federally threatened	Atlantic sturgeon	Acipenser oxyrinchus
Federal Species of Concern	Northern diamondback terrapin	Malaclemys terrapin terrapin
State Species of Concern	Gull-billed tern	Sterna nilotica aranea
State Species of Concern	Atlantic sturgeon	Acipenser oxyrhynchus
State Species of Concern	Brown pelican	Pelecanus occidentalis carolinensis
State Species of Concern	Caspian tern	Sterna caspia
State Species of Concern	Sandwich tern	Sterna sandvicensis acuflavidus
State Species of Concern	Forster's tern	Sterna forsteri
State Species of Concern	Least Tern	Sterna antillarum
State Species of Concern	River otter	Lontra canadensis lataxina

Source: Virginia Department of Game and Inland Fisheries Online Database, 2015.

404(b)(1) EVALUATION

I. Project Description

Location – Northern Virginia Chesapeake Bay area, just offshore of the western and northern shoreline of the Uppards, part of Tangier Island (see Figures 1 and 2).

General Description – a stone jetty will be constructed, connected to the present southwest tip of Uppards Island. These will be an aid to maintaining the present navigation channel, turning basin and harbor of refuge along with associated commercial and recreational fishing vessels as well as seafood processing facilities.

Authority and Purpose – Proposed project is being designed and constructed under the authority of Section 107, Navigation, as amended. The general purpose of the proposed project is to improve navigation and protect the harbor of refuge and associated infrastructure of the citizens of the Town of Tangier.

General Description of Dredged or Fill Material – Clean stone

Description of the Proposed Discharge Site – The estimated amount of land that would be affected by the construction of the project includes 0.07 acres supratidal land, 0.09 acres of inter-tidal habitat, and 0.6 acres of subaquatic shallow Bay bottom. Location (map) – See Figures 1 and 2.

Size – The total size of the study area (proposed project), 16,000 square feet, with a larger area of open shallow water (approximately an acre) used temporarily as a construction staging area.

Type of site – Eroding/subsiding Chesapeake Bay Island.

Type of habitat – Estuarine wetlands and shallow waters.

Timing and duration of discharge – Construction of the jetty is expected to take place in 2017.

Description of Placement Method – Rock will be barged into the restoration sites and placed directly into the water by equipment on the barge. No excavation or sand fill is anticipated. Geotextile will be placed under the stone. There are no roads available to provide access to the proposed project construction sites, nor will any roads to provide access be built. Barge grounding is unlikely and not anticipated. If in the unlikely event it does occur, the bottom in this area is sandy w/ no significant negative impacts likely.

II. Factual Determination

a. Physical Substrate Determinations

Substrate elevation and slope – Very gentle slope (less than 1 percent slope for project sites), mean tidal range is 1.8 feet for Tangier Sound.

Sediment type – Predominately sand; some peat and organics are present, mainly due to the erosion of the Uppards.

Dredged/fill material movement – Minor.

Physical effects on benthos – Loss of most present benthos within the footprints of the breakwater and jetty, rapid recovery, and overall increase in BIBI expected due to attachment sites provided by the sub and inter-tidal stone.

Other effects – Minor and short-term changes in TSS during placement of sand.

Actions taken to minimize impacts – None required.

b. Water Circulation, Fluctuation, and Salinity Determinations

Water. Consider effects on:

Salinity – No effect.

Water chemistry – Minor and temporary effects on DO, TSS, and biological oxygen demand during construction.

Clarity – Minor and temporary turbidity increases may be caused by sand deployment during construction.

Color – Minor and temporary change due to turbidity.

Odor – No change.

Taste – No change.

Dissolved gas levels – Minor and temporary reduction in DO levels.

Nutrients – Minor and temporary increase.

Eutrophication – No change.

Temperature – Minor or no changes expected.

Others as appropriate – None.

Current patterns and circulation

Current patterns and flow –Current energy and flow will be altered in the vicinity of the proposed project as it is designed to reduce it in the local area, navigation channel, turning basin and harbor of refuge. Wave energy will be deflected by the proposed breakwater and jetty, allowing for less frequent maintenance dredging of the navigation channel, more sheltered waters within the project area and better protection provided by the harbor. The local water flow will change, but based on the model will not change significantly, currents are not expected to become stronger in the channel as a result of project implementation.

Mean velocity – No change anticipated.

Stratification – No change.

Hydrologic regime – Estuarine; no change.

Normal water level fluctuations – No change.

Salinity gradients – No change.

Suspended Particulates/Turbidity Determinations

Expected changes in suspended particulates and turbidity levels in vicinity of construction – Minor and temporary during construction.

Effects (degree and duration) on chemical and physical properties of the water column – Temporary during construction.

Light penetration – Minor decrease during construction; temporary effect. Increase expected due to drop in TSS and organic fines from erosion of the Uppards.

DO – Minor decrease during construction; temporary effect.

Toxic metals and organics – None present; no effect.

Pathogens – None present; no effect.

Aesthetics – Minor degradation during construction; will be significantly improved post-construction.

c. Effects on biota

Primary production, photosynthesis – Temporary increase in suspended solids would reduce light transmission and photosynthesis. Long-term increase expected due to reduction of TSS, increases to local SAV beds. Populations of benthic diatoms expected to expand in area, further increasing primary productivity.

Suspension/filter feeders – Would be temporarily affected by minor increase in suspended solids. Additional hard substrate for attachment of filter feeders will be provided by the breakwater and jetty.

Visual feeders – Would be temporarily affected by minor increases in suspended solids.

Actions taken to minimize impacts – BMP's will be used to minimize turbidity.

d. Contaminant Determinations

No reason to suspect presence of contaminants, i.e., no heavy industry or agriculture in

local study area; no Superfund or other hazardous waste sites in local area.

e. Aquatic Ecosystem and Organism Determinations

Effects on plankton – Would be temporarily affected by increases in suspended solids during Construction Phase.

Effects on benthos – Loss of most of existing benthos at construction sites. Overall improvements in benthic habitats expected.

Effects on nekton – Would be temporarily affected by increase in suspended solids and disturbance to feeding areas during construction. Fishes will benefit in the long-term by utilizing more productive SAV, intertidal rock, intertidal wetlands, and sheltered shallow water habitats post-construction. Water clarity may improve due to lower local TSS due to less shoreline erosion in the local area.

Effects on aquatic food web – Would be temporarily impacted by minor loss of benthos and increase in suspended solids in water column. Post construction, benefits will be positive though minor.

Effects on special aquatic sites

Sanctuaries and Refuges – No effect.

Wetlands – No negative effect, significant positive effects resulting from reducing rates of erosion in the local area, aiding in wetlands preservation.

Mudflats – No effect.

Vegetated shallows – No effect.

Riffle and pool complexes – N/A.

Threatened and endangered species – No significant negative impact. Federally-threatened northeastern beach tiger beetles once but not now present.

Other wildlife – Resident wildlife (including aquatic life) may be disturbed at the breakwater and jetty sites during construction. They will recolonize the area rapidly post construction. New species will colonize previously unavailable habitat types, such as the rip-rap stone.

Actions to minimize impacts – None.

f. Proposed Placement Site Determinations

Depth of water – All construction will take place in shallow waters just offshore of the Uppards and Tangier. Maximum water depth in which construction shall occur is -6 feet

m.l.w.

Current velocity – Variable, no significant negative impact expected. Current energy will be reduced in the local area and within the navigation channel and harbor of refuge as a result of project implementation.

Degree of turbulence – Negligible. Post construction, local turbulence will be reduced.

Stratification – Negligible.

Placement vessel speed and direction – Placement vessel will approach from the western Chesapeake Bay and remain near the western opening of the navigation channel for the duration of the construction. Vessel speed will be low (< 10 knots) while near the islands and placing stone.

Rate of placement – 100 cubic yards of stone per day.

Dredged material characteristics –N/A.

Determination of compliance with applicable water quality standards – All applicable water quality standards will be complied with.

g. Potential effects on human use characteristic

Municipal and private water supply – Proposed project would not affect municipal or private water supply.

Recreational and commercial fisheries – Short-term and minor turbidity increases, and minor impacts to benthos from construction would minimally affect fisheries. Recreational and commercial fishing vessels will benefit from the greater protection offered by the harbor of refuge. The turning basin and navigation channel will be a less energetic environment, allowing for safer navigation post-construction. Commercial seafood processing facilities will be better protected from high energy storm events post-construction.

Water-related recreation – No impact.

Aesthetics – No impact. The proposed improvements would not change aesthetic quality of study area.

Parks, national and historical monuments, national seashores, wilderness areas, etc. – None affected.

h. Determination of Cumulative Effects on the Aquatic Ecosystem

The proposed project involves construction of a rockstraight jetty, which would contribute to hardening of Bay shorelines. No significant cumulative impacts.

i. Determination of Secondary Effects on the Aquatic Ecosystem

Effects on local ecosystem will be small but positive as a result of project implementation. Local wetlands, and sheltered shallow-water will benefit, while the stone will provide benthic habitat for sessile invertebrates that prefer hard substrate. Motile fish that favor hard structure will be attracted to the local area. Small loss of eroding, natural shoreline.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

The evaluation of the proposed Section 107 navigation improvement project at the Uppards and Tangier Islands in shallow waters of Tangier Sound, Virginia, was made consistent with 404(b)(1) Guidelines.

The selected plan was chosen for its ability to meet the needs of the local sponsor, the Town of Tangier, due to the navigational needs expressed by the local citizens. There were several alternatives evaluated in the feasibility report document and associated Draft EA. The selected plan was chosen based on its acceptability from an environmental, social, and economic perspective.

The planned construction of a single, stonejetty will not violate any applicable state water quality standards. USACE, acting as an agent for the local sponsor, will submit the required permit application for this project through the JPA process. There would be a short-term increase in suspended solids in the water column during construction. Construction activities would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

Use of the selected sites for construction would not harm any endangered species or their critical habitat. Consultation with USFWS is ongoing for federally-threatened northeastern beach tiger beetle, recently (2014, see USFWS PAR) the beetles were determined to no longer be present. Time-of-year restrictions on construction may be required to avoid impacts. If time-of-year restrictions are necessary to avoid impacts to the beetles, they will be adhered to by USACE. EFH for species of concern will not be significantly impacted.

The proposed construction would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife would not be adversely affected. Effects on aquatic ecosystem diversity, BIBI, productivity, and stability would be limited and localized during the construction period.

Appropriate steps, including use of BMP’s, will be taken to minimize potential adverse impacts to aquatic systems resulting from construction activities.

On the basis of the guidelines, the proposed sites for construction of the project are specified as complying with the inclusion of appropriate and practical conditions to minimize pollution and other adverse effects to the aquatic ecosystem. Project impacts to

the aquatic ecosystem will be temporary and minimal, with small, permanent positive and negative impacts post construction.

CULTURAL RESOURCE SURVEY AND EVALUATIONS FOR THE TANGIER JETTY SECTION 107 NAVIGATION STUDY

Accomack County, Virginia.

June 2014

DHR file #2014-3419

U.S. Army Corps of Engineers
Norfolk District

John H. Haynes, MA, RPA

Archaeologist

CULTURAL RESOURCE SURVEY AND EVALUATIONS FOR THE TANGIER JETTY SECTION 107 NAVIGATION STUDY

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757-201-7008

MANAGEMENT SUMMARY

The Tangier Jetty Section 107 project is a project carried out under the US Army Corps of Engineers Continuing Authorities Program (CAP). The purpose is to install a stone jetty which will protect vessels and facilities in Tangier Harbor from wave action, and reduce sedimentation in the federal navigation channel. This project will also result in a reduction of erosion on the southwestern shoreline of the 'Uppards' portion of Tangier Island. The proposed project consists of constructing a near shore jetty that would key into the southern shoreline of Uppards Island and extend southward into the navigation channel. The length, crest elevation, and crest width of the structure are 494 ft (151 m), 3.3 ft (1 m, MTL) and 13 ft (4 m), respectively. This point used to shelter a small beach, but this has mostly transitioned to shallow open water habitat. The proposed jetty(s) would connect to the shoreline for about 100 feet, with a width of 50 feet, and will be placed on top of a geotextile that lies on the existing bottom sand. It is planned that the jetty would be constructed with water based equipment and that staging will be from a barge. The amount of land that would be affected by the construction of the project includes 0.068 acres supratidal land, 0.085 acres of inter-tidal habitat, and 0.62 acres of subaquatic shallow Bay bottom. An additional acre may be required during the construction phase.

The onshore and near shore portion Area of Potential Effect (APE) at the southwest tip of Uppards Island includes site 44AC0524 which has been included as a contributing property to the National Register of Historic Places eligible, and Virginia Landmarks Register listed Tangier Island Historic District. Site 44AC0524 was recorded based on copious finds of prehistoric artifacts along the western shoreline of Uppards, and is mapped as covering the entire western shore. Archaeological testing at an unspecified location identified deeply buried artifacts. One shovel test undertaken for this project in the APE found no artifacts.

Construction of the proposed project is evaluated as causing ***no adverse effects to historic properties***, due to the depth of any potential archaeological deposits, lack of direct evidence of their presence, and protection the project would afford to the Tangier Island Historic District.

Cover illustration: Detail from 'Erosion History (Updated) Uppards, Tangier Island, VA, US Army Corps of Engineers, Norfolk District, 2010.

TABLE OF CONTENTS

LIST OF FIGURES

APPENDIX: Site Form 44AC0524

PROJECT DESCRIPTION

This study was conducted under the Section 107 Navigation Authority of the Water Resources Development Act of 1996 (Public Law 104-305), as amended, and is part of the Continuing Authorities Program. This study to investigate navigation needs of the Town of Tangier and was requested by the Town of Tangier through a letter of intent.

The study site is located primarily on the southwestern shore of Uppards and the north end of the Tangier Island seawall and in the channel that lies between them. There are three nearby Federal projects. The nearest existing Federal project is a continuous shoreline revetment (often referred to as a "seawall") along the southwestern side of Tangier Island (see Figure 2) that was built to protect the small airport and western side of the island. This seawall was constructed in 1990 and runs for 5,700 feet. It has proven to be quite stable over the years, as major storms such as Hurricane Isobel and Sandy did not negatively impact the seawall. The second project, the Tangier Channel to the Chesapeake Bay (or North Channel), provides a channel 7 feet deep at mean low water (m.l.w) and 60 feet wide from the anchorage basin at the Town of Tangier, northwesterly through Tangier Creek to the Chesapeake Bay, a total length of approximately 3,820 feet, and was authorized under the River and Harbors Act of 1960. The anchorage basin is 7 feet deep (m.l.w.) and 400 feet square. The third USACE project, the Tangier Channel to Tangier Sound, is located adjacent to the immediate study area and was authorized under the River and Harbors Act of 1919. It provides a channel that approaches the island from the east and is 8 feet deep at m.l.w. and 100 feet wide and 1,300 feet long in Tangier Sound, thence 8 feet deep (m.l.w.) and 60 feet wide and 4,800 feet long to the anchorage basin bay (the west) and Tangier Sound (the east). The navigation projects provide both commercial and recreational boating access to the harbor facilities at Tangier Island.

Several possible alternatives were considered and most were eliminated from detailed consideration. The navigational needs require providing shelter to the western channel opening that was once provided by land area that has since disappeared due to erosion, subsidence and sea level rise. Other options were considered. One was the use of moored, large floating structures that would reduce wave energy coming into the channel. Geotubes filled with sand and anchored in place was another option. These options, due to the expected maintenance costs and likely inability for these less durable structures to withstand a nor'easter or hurricane, were not carried forward in the planning analysis. Other options considered more practical were carried forward and fully analyzed along with the selected plan. These alternatives were several different jetty configurations that included what became the selected plan.

The alternatives carried forward for consideration include the following (illustrated in Figure 2):

- Plan A (Alternative 1) – One-piece straight north structure designed to decrease wave height
- Plan B (Alternative 2)– Two-piece dogleg north structure designed to decrease wave height
- Plan C (Alternative 3) – Two-piece dogleg north structure with straight spur structure, pointing north, attached to the south shoreline designed to decrease wave height

- Plan D (Alternative 4) – Primary two-piece dogleg structure attached to the north shoreline with spur structure attached to the south shoreline, pointing northwest, designed to decrease wave height

- Plan E (Alternative 5) – One-piece structure and a straight south spur structure, pointing northwest, designed to decrease wave height

No Action: With no action, Tangier Island and Uppards Island near the navigation channel will continue to experience significant erosion. The navigation channel, harbor, seafood processing facilities and harbor infrastructure will experience stronger wave action and associated damages as additional land erodes from the western shore of Tangier and Uppards. If no action is taken, it is likely these areas will be unusable for the purposes they serve at this time, and there is no better site to serve as a harbor of refuge on Tangier Island. Such an outcome may result in abandoning the Town of Tangier, as the local watermen have no alternative site they could use locally.

Technical and economic analysis of these alternatives identified Plan A/Alternative 1 as the selected plan/preferred alternative. This alternative would maximize the intended results of the project, protection of the navigation channel and harbor. The proposed project consists of constructing a near shore jetty consisting of the construction of a stone jetty that attached to the present southwestern tip of Uppards Island, extending south into the water approximately 494 feet from its point of origin. This point used to shelter a small beach, but this has mostly transitioned to shallow open water habitat. Figure 4 shows cross sections of the type of jetty planned. The proposed project would protect the western portion of the navigation channel the harbor for the town of Tangier and its associated seafood industry infrastructure. This infrastructure includes crab shedding operations and seafood facilities, docking and moorage facilities, and the working boats of Tangier watermen.

Figure 1 Project Location

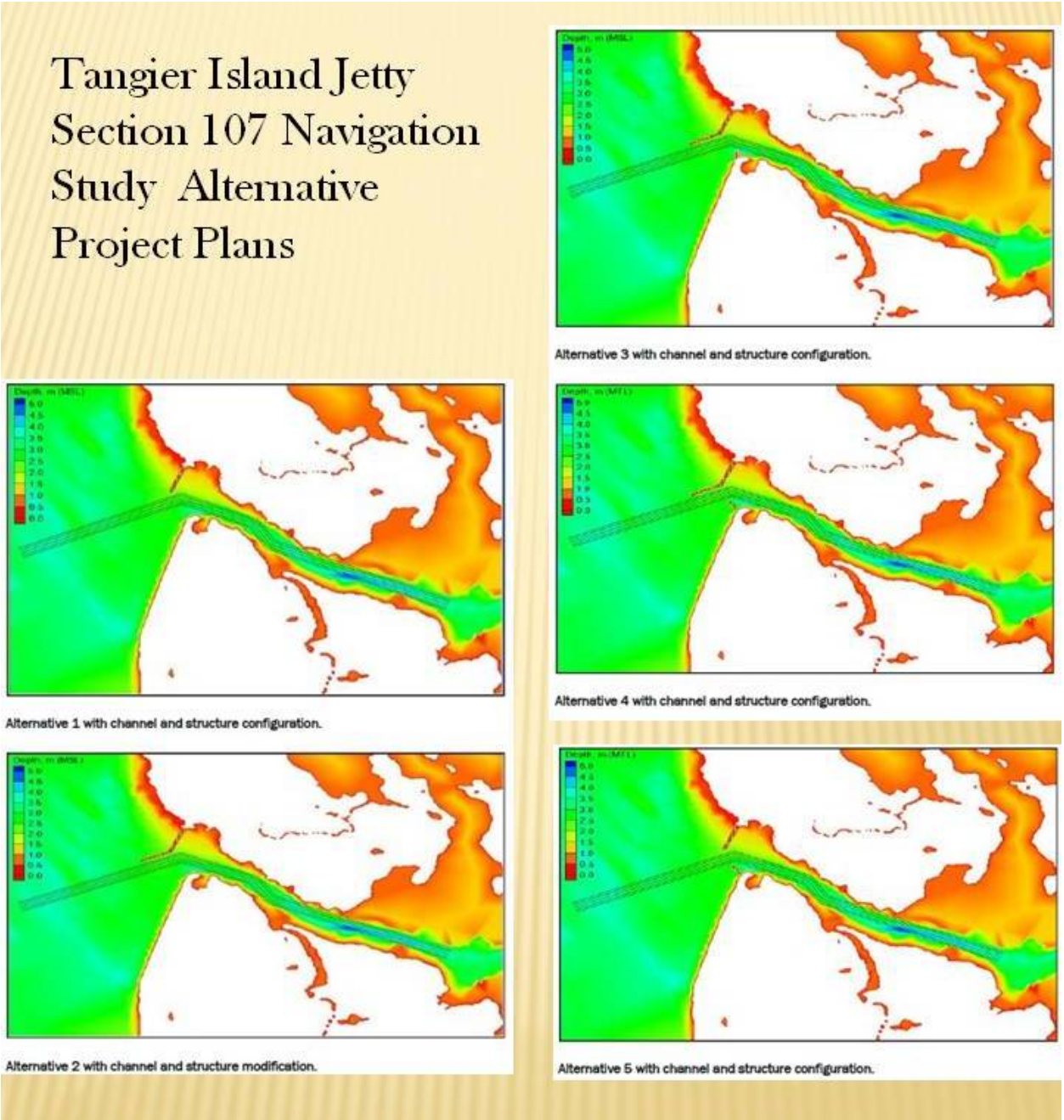

Figure 2 Alternative Project Plans

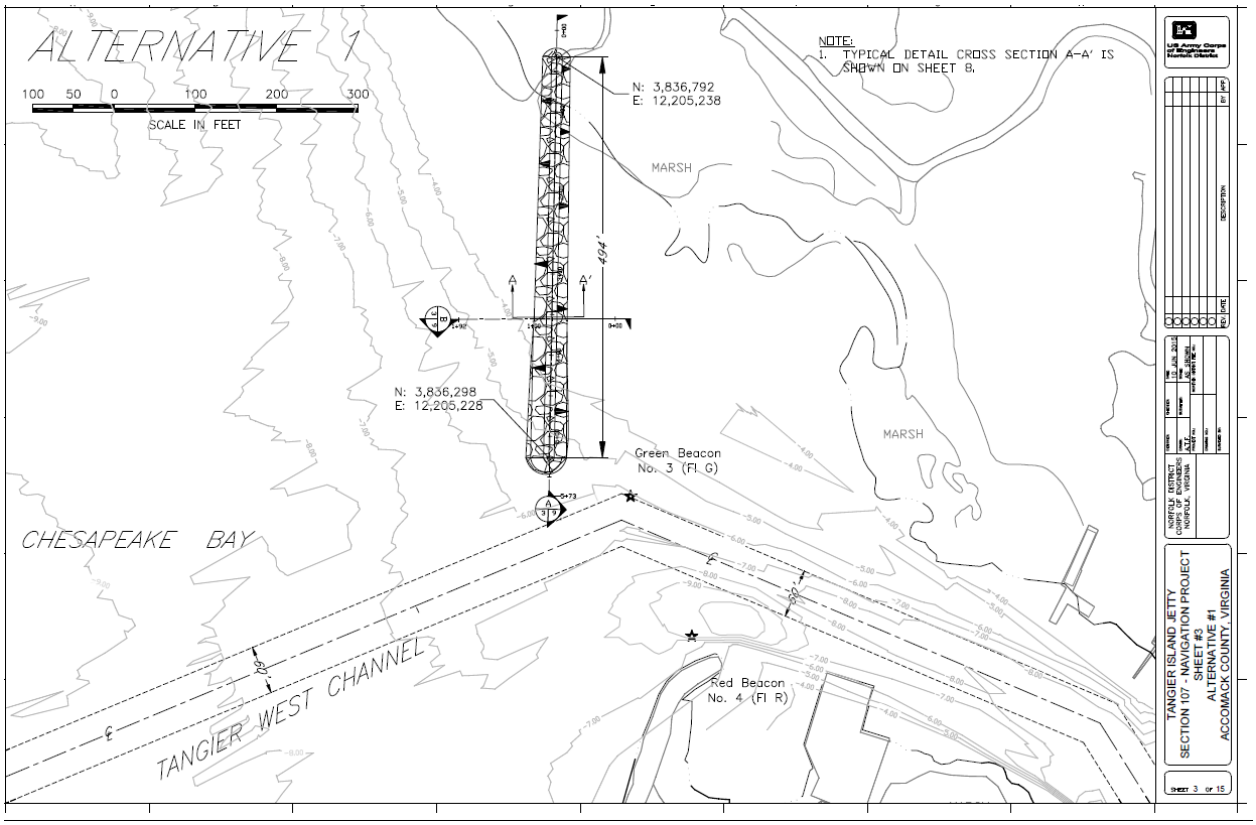

Figure 3 - Preferred Alternative

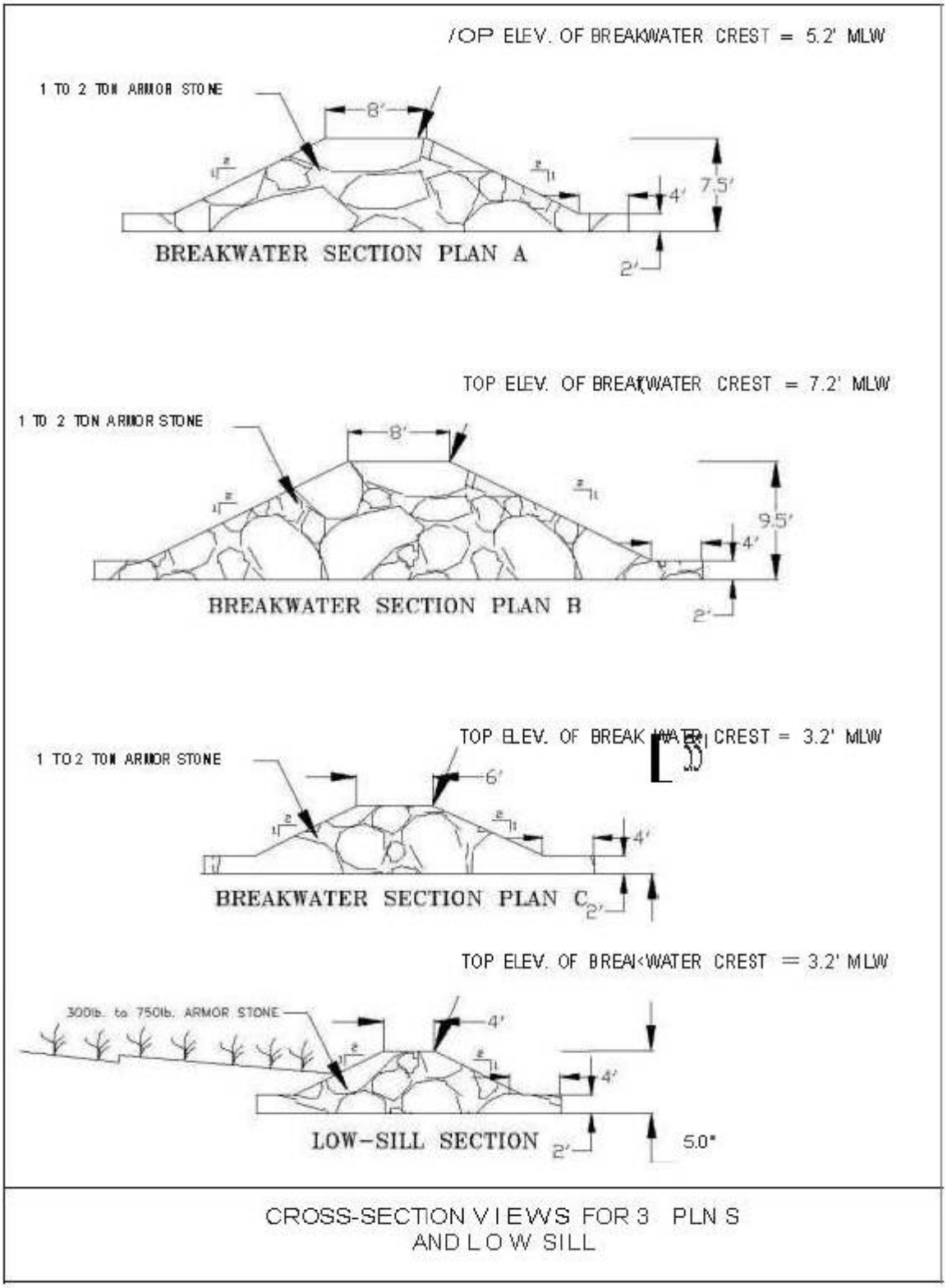

Figure 1 - Cross Sections of a Typical Jetty Design

PROJECT AREA DESCRIPTION

Tangier Island (75.99º W, 37.83º N) is the southern most of a string of islands that separate the deep portions of Chesapeake Bay to the west from shallower Tangier Sound to the east (Figure 1). The island, approximately 5 miles long by 2 miles wide, is located in the Virginia portion of Chesapeake Bay 20 miles southwest of Crisfield, MD and 70 miles north of Norfolk, VA. Tangier Island is comprised of a few low fine-grained sand ridges with intervening marshlands having numerous islets and tidal creeks. The island's highest elevations are only a few feet above mean tide level (MTL). The populated areas are primarily three interconnected ridges on the southern portion of the island. Abundant seafood and tourism are two sources of livelihood for the island residents.

The proposed project occurs in near-shore waters of Tangier Sound, adjacent to Tangier and the Uppards Islands. These two islands, along with Goose and Port Isobel Islands form an island complex (see Figures 1) that was contiguous and known as "Tangier." Nearby islands include Fox and Watts Island, which lies approximately 4.5 miles to the southeast of Tangier, is the southernmost island of this island chain. These islands represent the remnants of a peninsula extending from the Maryland Eastern Shore down into Virginia waters that has been mostly drowned during the end of the last Ice Age and continue to erode, subside, and decline in land area due to sea level rise (Figure 3). Tangier has lost essentially the western half of the island complex in the past 130 years, along with significant, though not as severe erosion along the eastern shore of the islands. The largest island that still has uplands, Tangier, holds a small inhabited town, also called Tangier, the last island town in Virginia waters of Chesapeake Bay. The town sits on the uplands, which were formerly five but now three ridges. Two were lost to subsidence and sea level rise and are now low-lying estuarine marsh. The flooding and subsidence that caused the loss of these two ridges also threatens the remaining three upland ridges.

Historic Land Use

Lower Tangier Island and Uppards Island were historically one contiguous island, although connected by a narrow area of shoreline. In the 1960's the navigation channel was extended westward, opening it to the bay on the western approaches of the island, and severing Uppards from the rest of the island.

The Uppards, which is the large, now uninhabited island of the Tangier Island complex, now consists entirely of estuarine wetlands and is eroding at a rate of 16 feet/year on the west side, which faces a longer fetch and stronger currents and wave energy than the east side. The region that provided shelter to the navigation channel and harbor has eroded considerably in recent years, following this general pattern along the West side of the island. These currents then deposit a significant portion of eroded sediments on the lee side of Uppards and Goose Islands.

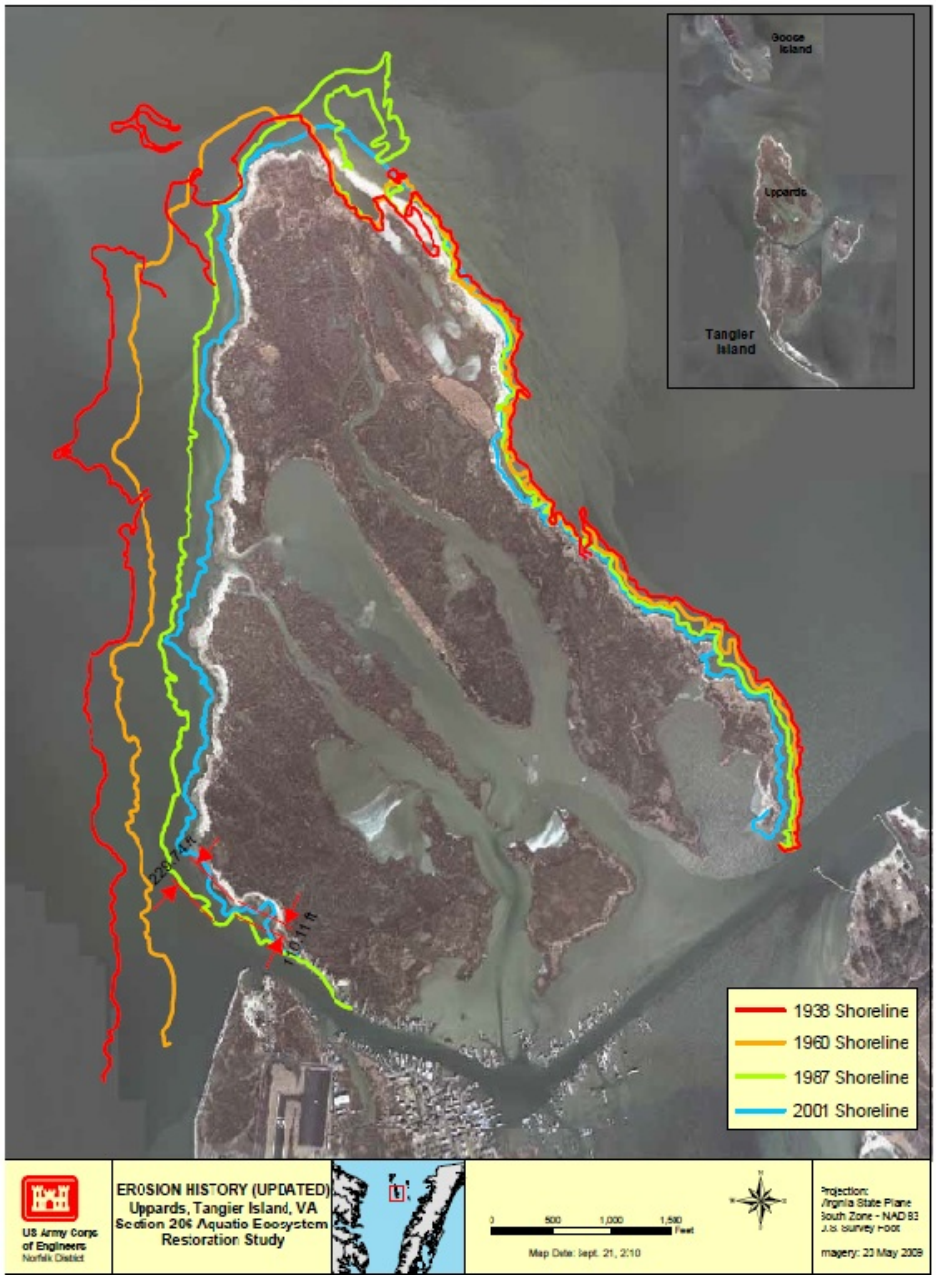

Figure 5 - Map: Erosion History of Uppards

PREVIOUS RESEARCH

Evidence of archaeological resources on Tangier Island has come from both professional archaeologists and non-professionals. Lowery (2001) examined the western shoreline of Uppards during a survey of shorelines in Accomack County conducted for the Virginia Department of Historic Resources. He recorded the prehistoric site 44AC0524 which was mapped as covering the entire western shoreline of Uppards. This boundary, viewed in GIS with a USGS topographic map base map, encircles the shoreline; but, when viewed with a recent satellite image as the base map, the boundary is

entirely offshore. Lowery found only fire-cracked rock in his survey, but collectors had reported finds of artifacts ranging from the Paleo-Indian to Late Woodland Periods. These finds apparently had no more specific location that the west side of Uppards, hence the nature of the site boundary.

As part of a Feasibility Study for a proposed environmental restoration project at Uppards, a cultural resources reconnaissance study was carried out in 2003 (Richards and Cook 2003). This study resulted in a report entitled, "An Assessment of Cultural Resource Potential within 'Uppards' and Goose Island, Tangier Island, Accomack County, Virginia" (Cultural Resources, Inc.). As a result of this cultural resources investigation, two historic period sites were identified. The first of these was located on the northern tip of the Uppards and contained the remains of a 19th century cemetery and well since recorded as 44AC0571. This cemetery was heavily impacted by Hurricane Sandy, with burials having washed out. Archaeologists from the Virginia Department of Historic Resources mouth a recovery operation in December of 2012. The second site was located on the northwestern tip of Goose Island and consisted of the remains of the pier associated with a store that once existed on the island

Richards and Cooke (2003) suggested that there is a moderate potential for shipwreck sites offshore and for prehistoric sites to exist within the now submerged land adjacent to the islands. Regarding the potential for shipwrecks, all alternatives of the current project are within areas which were land at least as recently as the 1960's (Figure 5). Hence, there is little potential for archaeologically significant shipwrecks in these areas. There is clearly a high potential for terrestrial archaeological sites to have existed on lands west of the island that are now submerged. Both Lowery (2001) and Richards and Cooke (2003) suggest that deeply buried prehistoric archaeological components may survive in submerged strata. Historic components are less likely. The west side of Uppards is a high energy shoreline, and upper strata have been eroded by wave action.

Lowery observed artifacts, several fragments of fire-cracked rock, in a gleyed horizon beneath 2-4 feet of beach sand and tidal marsh "O" horizon. Observations of the stratigraphy from survey undertaken in July 2013 for this project are consistent (Haynes 2013), but no artifacts were discovered in this horizon. Surface artifacts all appeared to be recent, with the possible exception of a brick fragment. The brick fragment had a dried barnacle adhering to it, indicating that it had been cast up on the beach, probably by wave action. Any archaeological components surviving offshore would have had to have been buried, or intruded into soils, several feet to have survived the shoreline erosion.

HISTORIC CONTEXT

Prehistory

The Chesapeake Bay and its estuarine tributaries are the drowned valleys of the Pleistocene Susquehanna River and its tributaries. During the Wisconsin glacial maximum, sea level was some 400 feet below current levels in Virginia. Following the Wisconsin Glaciation, subsiding about 13,300 years

ago, sea levels rose to fill those valleys. This was primarily due to the volume of water held in the continental glaciers which covered much of the northern hemisphere, but to a lesser degree the effect the weight those glaciers had. In areas just south of the glaciers the earth's crust bulged upward, responding to the weight of ice which could be miles thick. During the Wisconsin glacial period, not only was the Chesapeake Bay a mostly dry river valley, but the coast was some forty miles further east, to the edge of the continental shelf, and at that point it was some 200 feet down sheer cliffs to the sea. Fossils of extinct Pleistocene fauna, like mammoth and mastodon, have been found by trawler fishermen near the edge of the continental shelf (TRC Environmental Corporation 2012).

Earliest human settlement of the Americas is the subject of much debate among archaeologists. A growing number of sites in North and South America are yielding evidence pre-dating the long established Clovis culture's appearance some 12,500 years ago. In Virginia, the Cactus Hill site in Dinwiddie County has artifacts dated to 17,000 years ago. More controversial is a leaf shaped biface, or spear-point, found in the scallop dredge of a trawler which had been dredging near Norfolk Canyon on the continental shelf many miles off Virginia. This artifact strongly resembles tools of the Solutrean culture, which is found in France and Spain, dating from 21,000 to 17,000 years ago. Some archaeologists argue that this artifact is evidence of people of the Solutrean culture having somehow crossed the Atlantic Ocean in this early period. The artifact does, however, also resemble some produced in the Missippian Period, 1200-1700 AD in Tennessee.

Whatever the temporal and cultural origins of that artifact, the region was inhabited during the millennia it took for the inundation of the Chesapeake Bay and tributaries to reach current high water marks. Although initially rapid, at least in geological terms, it took about 8,000 years for sea level to stabilize near current levels, although it continued to rise, and in recent decades is again accelerating. Submerged terrestrial sites would most likely date from the Clovis period, 12,500 years before the present, through the Late Archaic Period, around 4000 years ago. Sites would be on inundated land forms like those found in dry land areas today, typically on level high ground, especially where near a body of water. Drowned river channels within the bay, also called paleo-channels, would be the focus of larger sites, particularly higher areas near bends or confluences. Sites away from expanses of open water during inundation that had low energy shorelines would be the most likely to survive inundation intact. Although submerged terrestrial prehistoric sites are not documented, much less tested or excavated, artifacts have frequently been reported by watermen and others from shoals, shallows, and shorelines.

There is some evidence that Tangier and its adjacent islands, such as Goose and Watts Islands, were visited by Indian populations possibly prior to 8000 B.C. The archaeological evidence that has been found on these islands indicates that the Indians were most likely using the islands as a source of food but not for settlement (Richards and Cooke 2003). An archaeological site on Goose Island identified in 2001 encompasses almost the entire island and spans all periods of prehistoric occupation. No determination of this site's eligibility for listing on the National Register of Historic Places has been made. Goose Island is also rapidly eroding away, and has recently had a significant breach about midway up the landmass,

splitting the island in two. It is likely that Goose Island will be lost due to erosion and subsidence at some point in the next several decades unless action is taken to prevent it.

Historic Period

SETTLEMENT TO SOCIETY (1607-1750)

Tangier, Goose, and Smith Islands are mentioned in Captain John Smith's account of his 1608 exploration of the Chesapeake Bay. He named them the Russell's Islands after a member of this expedition, and described them lacking any inhabitants (Figure 6 showing detail of Smith's 1612 map).

COLONY TO NATION (1751-1789)

The earliest record of settlement on Tangier Island occurred in 1778 when Joseph Crockett and his family moved to the island after he purchased 450 acres there. Prior to this time, the island had become part of the holdings of the wealthy families of the Eastern Shore and was used for livestock grazing.

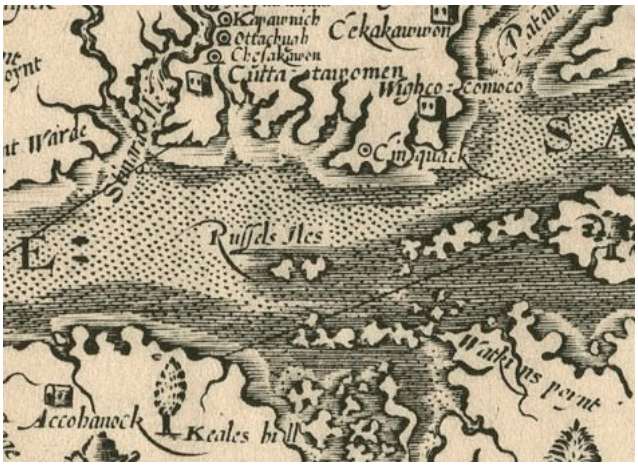

Figure 6 - Details of Capt. John Smith's 1612 Map Showing Russell's Iles

EARLY NATIONAL PERIOD (1790-1829)

It is a mystery why the island gained the name Tangier, but it could be linked to the fact that Morocco was the first foreign country to give diplomatic recognition to the United States in 1786. It was in Tangier, Morocco that George Washington opened the first foreign consulate in 1797. For most of the period from 1778 to 1860, the Tangier residents were farmers who lived on the various ridges in the present Town of Tangier, on the Uppards, and on Watts Island. At that point there was considerably more high ground than there is today. During the War of 1812, the British established a fortified position, Fort Albion (Figure 7), which was used as a staging area for their assault on Baltimore. Fort Albion also served as the training camp for the "Colonial Marines." The Colonial Marines were recruits of escaped or freed slaves serving the British. The location of the fort is thought to have been on the south end of Tangier Island, in an area now submerged (VDHR 2014).

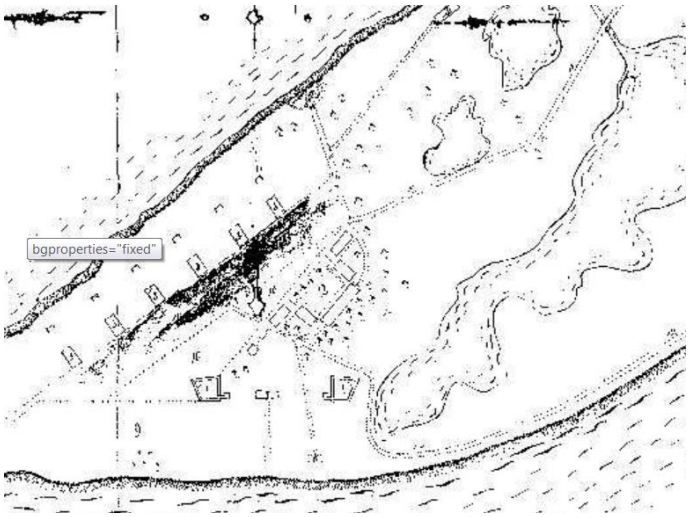

Figure 7 British Military Map of Fort Albion

ANTEBELLUM PERIOD (1830-1861)

By 1820, oystering was starting to replace farming as the predominant economic activity on the island. This trend accelerated with the arrival of the railroad in Crisfield, Maryland, and the advent of refrigerated railroad cars, which enabled oysters to be shipped to points much further away.

THE CIVIL WAR (1861-1865)

The only noted incident was the visit by the gunboat *USS Penguin* on July 3, 1861. Noting the Union flag flying above the town during his patrol of the bay, Commander J.W. Livingston brought the *Penguin* into the harbor. There he was told by three men who "seemed strong Union" that there was but one man on the island who was secessionist, and he had vowed to raise the secessionist flag there on the 4th, along with supporters from Accomack. The Penguin stayed on through the 4th with no incident (ONR Series I Vol 5: 767). Later that summer, Union gunboat captains reported considerable trade going from the Eastern Shore over to the York and Rappahannock Rivers through Tangier and Pocomoke Sounds. Residents of Tangier and Watt Islands complained to Acting Master William Budd of the *USS Resolute* of constant threat of attacks by "marauding parties from east Virginia" in late July of 1861 (ONR Series I Vol 4: 586). This and reports of supplies being smuggled from ships across the Eastern Shore, and then onto Confederate forces in mainland Virginia prompted the Navy to step up its patrols in the area. On 7 August 1861 Tangier Island was visited by Lt. Pierce Crosby in the *USS Fanny*, who despite describing the residents as "strong Union" rounded up the men of the island, had them take loyalty oaths, and admonished them not to trade with the western shore else they would be imprisoned and their vessels confiscated (ONR Series I Vol 6: 73). Despite Union efforts to suppress secessionist activity on the Eastern Shore and interdict smuggling, as late as August 1864 a Union cavalry officer wrote requesting naval support as he described the Pocomoke Sound and River to "swarm with armed pirates and blockade

runners" (OR Series 1 Vol 43: 785). As a final note, a naval officer was dispatched to Pocomoke to go overland to Chincoteague and search for John Wilkes Booth in April 1865 after the assignation of Lincoln. If he was ever headed in that direction, Booth never made it that far.

RECONSTRUCTION AND GROWTH (1866-1916)

After the Civil War, Tangier's economy flourished, partially because of the development of the steam canning process that allowed for nationwide shipment of oysters. The island's population grew, and the lots on the high ground were divided into smaller parcels to accommodate this growth. By the beginning of the 20th century, the population had increased to 1,064 residents (Figure 8 detail of late 19th or early 20th c chart showing buildings on the island). In the early part of the 20th century, due to the depletion of oyster reefs in Tangier Sound and nearby Pocomoke Sound, the island's residents began to switch from oystering to crabbing as the primary source of income. During the 1890's competition over the declining stocks of oysters led to conflict between Virginia and Maryland watermen in the Pocomoke Sound, prompting the state governments to intervene. Agriculture also faded away as crabbing became the chief source of livelihood for the residents. Crabs were caught and processed on the island and then shipped all over the country from the railroad connection at Crisfield.

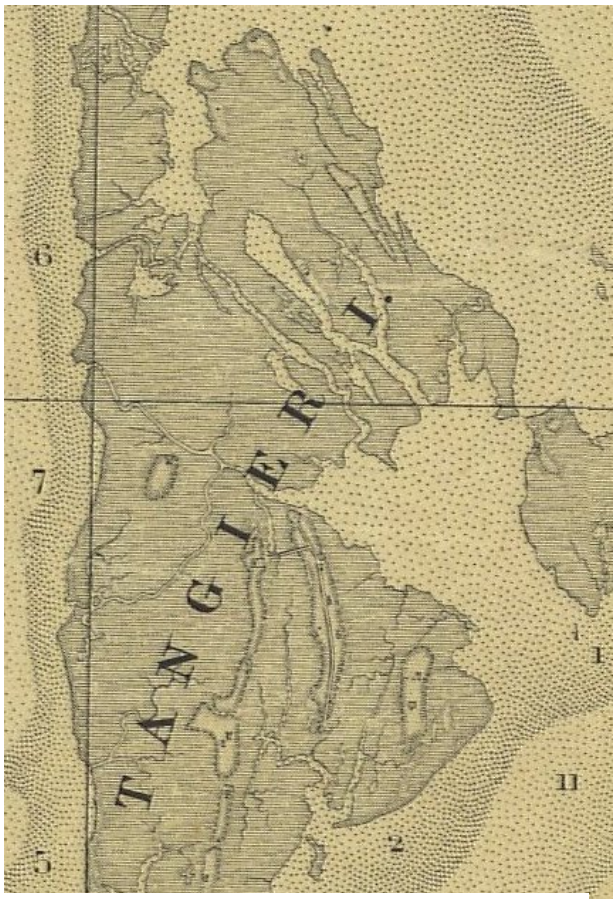

Figure 2 - Detail from an 1872 Chart (four small ridges at the north end of the island are all shown as having structures in now abandoned Uppards)

WORLD WAR I TO WORLD WAR II (11917-1945)

The creation of a Federal channel through dredging in the early 1920's and a harbor in 1917 further enhanced the role of shell fishing for the island's residents. In the early 20th century, residents of the more remote parts of Tangier Island began moving to the main portion of the island. By the beginning of World War II, Canaan and Oyster Ridges, which were located at the northern part of the Uppards, had been abandoned, and the population became more concentrated on Main Ridge. After World War II, crabbing continued to be the dominant source of income to the island.

NEW DOMINION (1945-2014)

Tourism began to play an increasing role in the island's economy with boats from Reedville and Onancock providing day trips in the summer for visitors. However, the end of the century saw a decline in the island's population as the younger residents moved away to pursue more economic opportunities than the island could provide.

Figure 9 - Tangier Island Historic District Boundary

A significant number of historic buildings exist on the southern, inhabited half of Tangier Island. There are also the archaeological remains of the historic occupations of Uppards, as well as prehistoric sites there. The Virginia Department of Historic Resources conducted a survey of Tangier Island, and evaluated it as historic district eligible for the National Register of Historic Places. The Tangier Island Historic District (DHR #301-0001) was placed in the Virginia Landmarks Register in March 2014, and listing in the NRHP is pending. The historic district consists of 227 contributing buildings and 12 contributing sites, mostly cemeteries but including prehistoric site 44AC0524. Because of known and inferred archaeological resources on Uppards, the boundary of the historic district includes all of Tangier Island except for the airport and the eastern islet known as "Port Isobel."(Figure 9 shows the historic district boundaries in blue and contributing site 44AC0524 in red)

ARCHAEOLOGICAL SURVEY AND STUDY RESULTS

Figure10 - Project Site, Southwest Corner of Uppards, Facing South

A one day trip to the island was made on 25 July 2013 along with three other project team members. A regularly scheduled passenger ferry was taken from Onancock, which limited total time on Tangier to less than four hours. We were met at the dock at Tangier by a local waterman who took us to the project site in a small skiff. As the other members of the project team also wanted to survey the western shore of Tangier, including the existing bulwark of ballast stone along the island's airport, time on site was limited to less than 1 ½ hours. This very limited window of opportunity did, however, match the very limited onshore footprint which may be expected for the project design. Since there was still some doubt about exactly where the jetty would be located, visiting the site with key personnel charged with identifying the location was fortuitous. Less fortuitous was that on the day chosen high tide fell within the ferry schedule window of the visit. Although this limited the extent of littoral areas which could be investigated, it fostered more intense scrutiny of shore areas.

The focus of the investigation was the anticipated location of the landward side of the proposed

jetty, which is at a point forming the southwest corner of the Uppards (figure). Although had been a tentative location, Don Ward the coastal engineer accompanying the trip confirmed it would be his recommended siting for the jetty. The area is a sand beach which forms a berm about 2 or 3 feet above the mean high water, then gives way to salt marsh on the 'in-shore' side.

North from the point there is somewhat more substantial ground which might be stable. The area specific to the proposed jetty appears to have been thrown up over marsh in an ongoing process.

Figure 11 - Location of Shovel Test and APE

Exposed areas above the water were limited, but a number of artifacts, mostly trash and flotsam of recent origin, were observed. These included a recently deposited empty bottle of Gray Goose vodka, a plastic kiddie-car ATV, a plastic fan blade, and several shards of liquor pint bottles. Possibly dating earlier were a brown bottle neck (possibly early 20th century beer bottle), a brick fragment (which had barnacles on it) and a piece of unidentified material which might be flooring or insulation (possibly asbestos composite). All of these were on the surface of the narrow, 2-3 meter wide beach, and within about 10 meters of the point.

Figure 12 - Shovel Test Diagram

This area and a broader area to the east were swept with a Fisher Model 97 11 inch metal detector, which returned no hits.

At this time local resident Carol Moore happened by, returning to her skiff from a trip searching the shoreline of Uppards. It was Ms. Moore who had recently reported washed out graves at an old cemetery at the north end of Uppards, which was subsequently attended to by a team of archaeologists from the Virginia Department of Historic Resources. This was an excellent opportunity to discuss the project, and any known resources with perhaps the most knowledgeable local informant. She knew of no resources

Figure 13 - Shovel Test Photograph

immediately within the project area, but had just found a projectile point about 100 meters north of the area of potential effect, protruding from the sandy shoreline above the water line. This artifact was examined and photographed. It is made of fine-grained gray quartzite, and is tentatively identified as a Savannah River broad point (Figure 14). If so, the tool appears to have been repurposed from a hafted biface to a side-scraper or semi-lunar knife. Interesting features are marks from barnacles, indicting the artifact had been submerged and redeposited in the sandy shoreline where it was found (Figure 14).

After this a shovel test was excavated in the vicinity of the bottle and brick fragment finds, in a bare sand area. This was excavated four layers of sand, of consistent medium/fine texture to 29 cm, which was a layer of sandy peat with dead but undecayed smooth cordgrass (*Spartina alterniflora*) roots of undetermined depth, but excavated to 35 cm (Figures 12 & 13). The soil matrix, with the exception of the root matted peat was sieved through ¼ inch mesh hardware cloth. No artifacts were found in the shovel test.

Figure 3 - Projectile Point Found By Carol Moore

neck through below

Location with a

was recorded using a Motorola Droid Razor Maxx smartphone GPS Logger application.

RECOMMENDATIONS

This undertaking has the potential to cause effects to historic properties. Site 44AC0524, a contributing property to the Tangier Island Historic District, determined eligible and nominated for listing in the National Register of Historic Places. The Tangier Island Historic District mapped in the nomination as extending to the shorelines of all of Tangier Island and Uppards Island, with the exception of the air field area on Tangier Island, but not beyond the present shoreline. Lowery (2001) projected the probable existence of subsurface prehistoric cultural strata in submerged areas west of the western Uppards shoreline in recording 44AC0524. He did not test this, and it has not been tested by this study or others

due to the difficulty of methods and logistics in testing for submerged subsurface deposits. Surface survey and the single shovel test excavated in this study did not identify significant archaeological deposits, though notably the test was not excavated to the depths at which Lowery reported finding fire-cracked rock. A local resident (Ms. Carol Moore) knowledgeable of archaeological finds in Uppards reported no finds or the former presence of any historic buildings in the project APE. No nautical, i.e. shipwreck, archaeological resources exist in the project APE, which lies well within areas that were land at least as recently as the 1960's.

It is recommended that the preferred alternative for this project would not have an adverse effect on historic properties. The proposed jetty would not be visible from contributing buildings of the Tangier Island Historic District. There would be little or no impact to archaeological resources if they exist within the APE. An area of .13 acres would be disturbed on the landward end of the north jetty to a depth of 1 to 3 feet, and covered with jetty material. Jetty material would cover approximately 1.19 acres of bottom off shore. Observations of this study and those of Lowery (2001) found the sand berm along the shoreline to be recent deposition lacking in-situ archaeological deposits, above a stratum of salt marsh peat, also lacking archaeological potential. These together constitute strata with a depth of 3 to 6 feet below surface, and above the substrates where Lowery found artifacts. The offshore portions of the jetty would be constructed on top of geotextile, and although covering potential archaeological site areas, any deposits that might exist would be protected if inaccessible.

Very significantly, without this project Tangier harbor could become unusable, and therefore residency on the island untenable. That and the direct effects of wave action during storm tides could destroy the historic district. This project would also serve to reduce erosion on Uppards, protecting at least southern portions of site 44AC0524.

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US Fish and Wildlife Service

Coordination Act Report

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

September 10, 2014

Colonel Paul B. Olsen
District Engineer
U.S. Army Corps of Engineers
803 Front Street
Norfolk, Virginia 23510-1096

Attn: David Schulte

RE: *Tangier Island Section 107 Small Navigation Project*

Dear Colonel Olsen:

Enclosed is the U.S. Fish and Wildlife Service's Fish and Wildlife Coordination Act Report for the proposed Tangier Island Small Navigation Project, Tangier Island, Virginia. The present report summarizes pertinent information from our previous report dated August 2014 and supports the Corps' recommended plan to implement alternative at the project site.

If there are any questions, please contact Robbie Callahan at (410) 573-4524.

Sincerely,

Genevieve LaRouche
Supervisor

TAKE PRIDE® IN AMERICA

Fish and Wildlife Coordination Act Report

On

Tangier Island Section 107 Navigation Project

Prepared by:
Robbie Callahan
Fish and Wildlife Biologist

Under supervision of: Genevieve LaRouche, Supervisor
Chesapeake Bay Field Office
U.S. Fish and Wildlife Service

September 2014

INTRODUCTION

This constitutes the report of the U.S. Fish and Wildlife Service (Service) on the Tangier Island, Section 107 Navigation Project, Accomack County, Virginia. It is submitted in accordance with Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat 401, as amended; 16 U.S.C. et seq.) and Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1513 et seq.). The present report summarizes information on biological resources and project impacts, and provides the Service's official position on the Corps' recommended plan.

PROJECT DESCRIPTION

The primary goal of the project is to reduce the rapid erosion that occurs on Uppards Island and to help protect the federal channel and associated infrastructure located at the western entrance of Tangier Island, Virginia. The Corps' recommended plan (alternative four) which is described in the *Modeling Study for Tangier Island Jetties, Tangier Island, VA* report which the Service supports has two basic breakwater structures (Demirbilek et al. 2013). The first involves the construction of a breakwater structure at the northern entrance to the federal navigation channel that will tie into Uppards Island and run in a southwesterly direction towards the channel. The breakwater will be approximately 166.5 meters in length and contain a dogleg shape that will aid in protection from wind and wave erosional forces. The south breakwater structure would be approximately 39.8 meters in length and attach to the shoreline of Tangier Island near the mouth of the entrance to the channel. The structures would reduce the amount of wind and wave erosion along with reducing ice flows that would enter the channel to reduce the erosional forces on Uppards Island which is experiencing severe erosion.

FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

Tangier Island is located within the mesohaline zone of Chesapeake Bay. The salinity in this area typically varies between 7 and 22 parts per thousand. The mean tidal range for this area is 1.51 feet and the federal channel averages about 12 feet in depth. The annual Chesapeake Bay aerial surveys routinely identify beds of submerged aquatic vegetation (SAV) around Tangier Island. No SAV has been found at the project location but substantial beds are located in the waters along the eastern portion of the island and have persisted in that area for many years including the most recent survey in 2013. The fish community is composed of the typical mesohaline assemblages, but there is substantial seasonal variation with diversity reaching a maximum in late summer and early fall. Many of the species are marine migrants that enter the area at various times and life stages. This group includes many species with commercial or recreational value. Because of its low freshwater discharge Tangier Island does not support any significant anadromous fish spawning. Commercial fishing activity using pound nets and gill nets occurs in the neighboring Bay region. The catch includes: striped bass (*Morone saxatilis*), Atlantic menhaden (*Brevoortia tyrannus*), spotted sea trout (*Cynoscion nebulosus*), bluefish

(*Pomatomus saltatrix*), Norfolk spot (*Leiostomus xanthurus*), and Atlantic croaker (*Micropogonias undulates*).

The area supports a large commercial and recreational fishery for blue crab (*Callinectes sapidus*) which is the primary shellfish harvested in the area. Eastern oysters (*Crassotrea virginica*) also play an important role in the area as well although their population numbers have declined substantially due to the occurrence of two parasitic diseases MSX (*Haplosporidium nelson*) and Dermo (*Perkinsus marinus*). There are several public oyster grounds to the east of the island along Tangier Sound where fishing occurs.

The Atlantic Coast Joint Venture has identified this area and the surrounding Delmarva Peninsula as a waterfowl focus area for Virginia. Several high priority species depend on the area as a resting and wintering ground. These species are the American Black Duck (*Anas rubripes*), Greater Scaup (*Aythya marila*), and Lesser Scaup (*Aythya affinis*). Redhead (*Aythya Americana*) and Canvasback (*Aythya valisineria*) also winter in the same areas as the Greater and Lesser Scaup, feeding upon SAV upon the broad, shallow flats. Other waterfowl species that stage or winter in this area include, Atlantic Population Canada Goose (*Branta Canadensis*), Tundra Swan (*Cygnus columbianus*), Greater Snow Goose (*Chen caerulescens atlanticus*), Gadwall (*Anas strepera*), Blue-winged Teal (*Anas discors*), and Green-winged Teal (*Anas carolinensis*).

During the 2013 colonial waterbird breeding survey five sites were reported at Tangier Island. Three were on Uppards Island and two were at the southern end of Tangier Island along the sandy spit. At these five sites 12 different species were recorded, Black-crowned night heron (*Nycticorax nycticorax*), Glossy Ibis (*Plegadis falcinellus*), Little BlueHeron (*Egretta caerulea*), Snowy Egret (*Egretta thula*), Tricolored Heron (*Egretta tricolor*), Yellow-crowned Night-Heron (*Nyctanassa violacea*), Great Egret (*Ardea alba*), Great Black-backed Gull (*Larus marinus*), HerringGull (*Larus argentatus*), BlackSkimmer (*Rynchops niger*), Commom Tern (*Sterna hirundo*), and Royal Tern (*Thalasseus maximus*).

THREATENED AND ENDANGERED SPECIES

Except for occasional transient individuals, no federally proposed or listed endangered or threatened species under our jurisdiction are known to exist within the project impact area. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered. The Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) (NBTB) was documented at the Project site in July of 2004. However subsequent surveys conducted by the Service's Virginia Field Office and a survey conducted during a site visit in June 2014 resulted in no NBTB sightings and erosion in the project area has caused the loss of suitable habitat.

Transient species include the threatened Piping Plover (*Charadrius melodus*) and the endangered Roseate Tern (*Sterna dougallii dougallii*). These species are uncommon summer visitors with only piping plovers nesting in coastal areas in Virginia. The roseate tern has not nested in Virginia since the 1930s.

The National Marine Fisheries Service has indicated that six federally listed species under their jurisdiction may transit the project area on an occasional basis. They include four species of seaturtles (loggerhead, Kemp's Ridley, green, and leatherback) and two species of sturgeon (shortnose and Atlantic). No impacts to these species are expected.

FUTURE CONDITIONS WITHOUT PROJECT

Tracking changes based on aerial photography of the project site and nearby areas it appears that the shoreline is undergoing a substantial amount of erosion particularly along the western shoreline and in the project area. The erosion will cause the shoreline to recede, thereby converting marsh to shallow water. The shoreline near Tom's Gut which is located north of the project site on Uppards Island had an average erosion rate of 16 feet per year (Hardaway 2004). A breach has already occurred much faster than anticipated along Uppards Island at Tom's Gut and the erosional forces continue to work away at the Island. Hardaway (2004) and Mills et al. (2003) predicted that by the year 2100 Uppards Island will be completely eroded thereby eliminating any protection to Tangier Island and the SAV beds that occur to the east of Uppards Island. With Uppards Island gone SAV beds will disappear due to lack of protection.

BIOLOGICAL EFFECTS OF THE PROJECT

Impacts of building a breakwater would be the loss of benthos directly beneath the footprint of the structure. The breakwaters will reduce wave stress and erosional forces and may create habitat for benthic species in the lee of breakwater. The rocks may also be used as a hard attachment substrate by a variety of sessile organisms such as barnacles, mussels, and oysters. The rock epifaunal community could also include motile organisms such as amphipods, isopods, polychaete worms, flatworms, mud crabs, grass shrimp, and small fishes. The artificial breakwaters may act as a reef structure attracting larger fish to feed in the area. However, since the rock structures are located in shallow water shore zones with relatively high wave energy, the stress associated with wave impact, sediment scouring, and periodic exposure during low water events will likely reduce the community diversity and biomass compared to what would be expected in less stressful habitats (Moschella et al. 2005). The artificial breakwaters should also reduce turbidity within the nearshore zone due to decreased wave energy. This could potentially encourage colonization by SAV.

CONCLUSION

The construction of this project will result in the loss of some shallow water habitat below the breakwater structures themselves, although the loss should be offset by the creation of potential new habitat associated with the breakwater structures. The Service agrees with the Corps' recommendation of implementing alternative four as it incorporates the use of two breakwater structures, one connecting to Uppards Island with a dogleg feature for additional protection and a second smaller breakwater connecting to Tangier Island. It is anticipated that the jetty will help

reduce erosion rates of Uppards Island as well as help to protect the western entrance to the federal navigation channel that separates Uppards Island and southern Tangier Island. The jetty should also help to reduce wave heights and energy in the lee of the structure where the harbor is located. By protecting these two islands and reducing erosion it will also help to protect fish and wildlife resources utilizing these islands and the surrounding area. The Service supports construction of the proposed project under the authority of Section 107 of the River and Harbor Act of 1960 as amended.

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US Fish and Wildlife Service

Planning Aid Report

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

August 14, 2014

Colonel Paul B. Olsen
District Engineer
U.S. Army Corps of Engineers
803 Front Street
Norfolk, Virginia 23510-1096

Attn: David Schulte

RE: *Tangier Island Section 107 Small Navigation Project*

Dear Colonel Olsen:

Enclosed is a Draft Planning Aid Report for the subject study. In accordance with the scope of work dated April 2013, it contains information on the baseline environmental conditions, effects of the project, and suggestions to improve project outcomes. Based on our review we conclude that the project would result in the protection and enhancement of navigation, mooring facilities, and seafood processing infrastructure for the Town of Tangier, and therefore, it should be accomplished under the authority of Section 107 of the River and Harbor Act of 1960, as amended.

If there are any questions, please contact Robbie Callahan of my staff at 410-573-4524.

Sincerely,

Genevieve LaRouche
Field Office Supervisor

TAKE PRIDE IN AMERICA

United States Department of the Interior

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If there are any questions, please contact Robbie Callahan of my staff at 410-573-4524.

Sincerely,

Genevieve LaRouche
Field Office Supervisor

TAKE PRIDE IN AMERICA

Planning Aid Report:

Tangier Island Small Navigation Project Study

Prepared for:
U.S. Army Corps of Engineers
Norfolk District

Prepared by:
Carl R. Callahan
Fish and Wildlife Biologist

Under supervision of: Genevieve LaRouche, Supervisor
Chesapeake Bay Field Office
U.S. Fish and Wildlife Service

August 2014

INTRODUCTION

The Norfolk District, U.S. Army Corps of Engineers (USACE) is conducting the Tangier Island Small Navigation Project in Accomack County, Virginia. The study is being conducted under Section 107 of the River and Harbor Act of 1960 as amended which provides authority for the USACE to improve navigation including dredging of channels, anchorage areas, turning basins, and construction of breakwaters, jetties and groins. This report provides information on the baseline environmental conditions, effects of the project alternatives, and potential measures to improve project outcomes. It is based primarily on a review of the literature and a visit to the project site on June 17, 2014. It is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

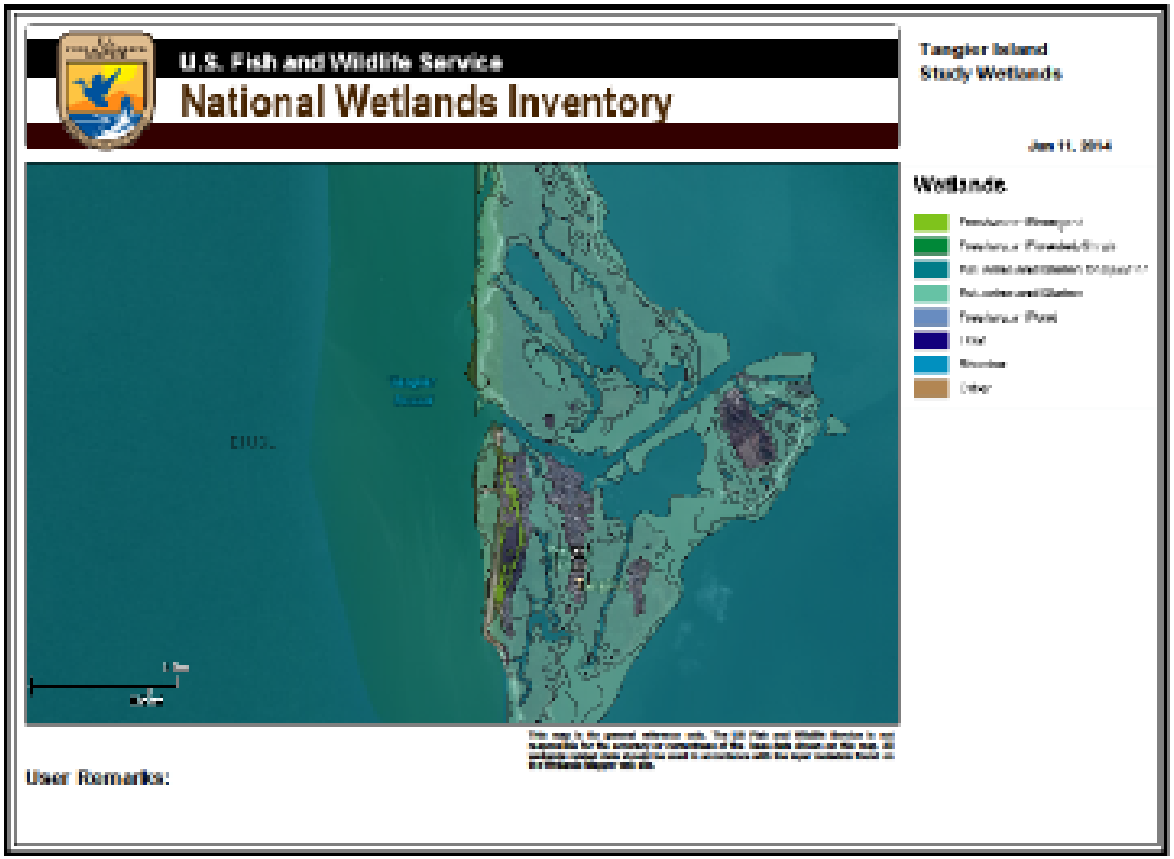
BASELINE ENVIRONMENTAL CONDITIONS

The study area is located on the west side of Tangier Island which lies approximately 13 miles out in the middle of Chesapeake Bay from Crisfield, Maryland. The area is located mostly on Uppards Island which is the northern portion of Tangier Island and is separated from the southern portion by a federal navigation channel (Figure 1). The island is classified by the National Wetlands Inventory as estuarine, intertidal, unconsolidated shore. The project shoreline consists of narrow sections of sandy beach bordered by marsh. At the time of the visit the marsh bordering the beach was vegetated with a mix of saltmarsh cordgrass (*Spartina alterniflora*), black needle rush (*Juncus roemerianus*), marsh elder (*Iva frutescens*), high tide bush (*Baccharis halimifolia*), and common reed (*Phragmites australis*). Despite the relatively barren appearance due to the frequent disturbance by wave action, the beach can provide important habitat for some animals. For example, the diamondback terrapin (*Malaclemys terrapin*) typically nests on bare or sparsely vegetated beaches above the level of the normal high tides. The horseshoe crab (*Limulus polyphemus*) also deposits its eggs in nests that are excavated on beaches, usually within the intertidal zone. While horseshoe crabs are known to inhabit the Virginia portion of the Chesapeake Bay, spawning areas are not well documented because spawning does not occur in easily observed concentrations, and spawning typically occurs at night (Butowski 1994). A variety of birds (e.g., shorebirds, gulls, and fish crows) utilize beaches for foraging. Several tern species have been noted to forage and nest in surrounding sandy areas on the island.

The mean tide range at the Tangier Island station (ID:8633532) is 1.51 feet and the spring range is 1.9 feet (NOAA 2014). The average salinity for the study area ranges between 10-20 parts per thousand (ppt) which indicates that the study area lies mostly within the mesohaline (5-18 ppt)

Figure 1. Location of Project Site at Tangier Island

Figure 2. Wetland Classification of Tangier Island



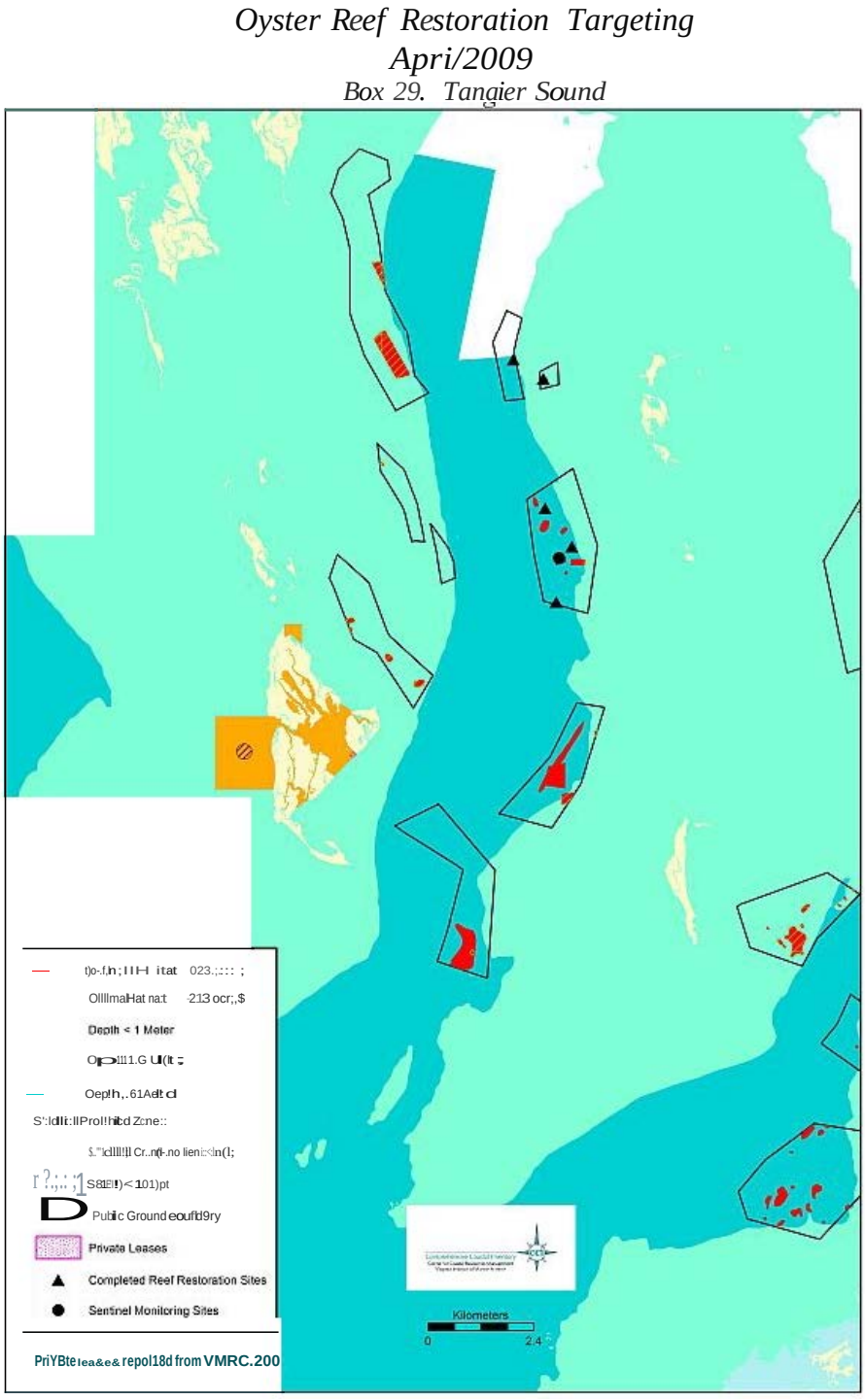
portion of the Chesapeake Bay. The water quality within this part of the Lower Chesapeake Bay is generally good, although the area does experience concentrations of dissolved oxygen in the deeper waters during the summer which often fail to meet the criteria established for aquatic life. Overall in 2013, the Lower Chesapeake Bay did receive good scores on the annual Bay Report Card receiving a B- for the area and highest score for any section of the main stem of the Chesapeake Bay (UMCES). Nutrient concentrations such as nitrogen and phosphorous received very good scores in the report suggesting nutrient concentrations in this area of the Chesapeake Bay are at healthy levels.

Review of submerged aquatic vegetation (SAV) aerial surveys conducted by the Virginia Institute of Marine Science from 1999 to 2013 revealed that several substantial SAV beds occurred on the eastern side of the island. These beds have existed for many years but appear to be declining in size in recent years. A University of Maryland study investigated causes for the decline of SAV around Tangier Island and determined that currents limit SAV distribution in the area by generating sediment (Koch 2004). Koch (2004) recommended three methods to decrease currents and sediment transport to help SAV growth: reduce current velocity between Tangier and Goose Islands; stabilize the sediments; and, reduce erosion of the shoreline along the northwest shoreline of Tangier Island (Koch 2004). There is a well-defined linkage between water quality and SAV distribution and abundance making SAV communities good barometers of the health of estuarine ecosystems (Dennison et al.1993). SAV is important not only as an indicator of water quality, but also as critical nursery habitat for many estuarine species. Blue crab post-larvae are 30 times more abundant in SAV beds than adjacent unvegetated areas (Orth 1992). Similarly, several species of waterfowl are dependent on SAV for food when they over-winter in the Chesapeake region (Perry and Deller 1995).

Various oyster resources are found in this region of the Lower Chesapeake Bay. The majority of the main stem of Tangier Sound that lies directly east of Tangier Island is delineated as public oyster grounds. These historically natural oyster producing regions are often referred to as Baylor Grounds, after the 1894 survey that resulted in their identification. The Baylor Survey was a state-wide survey that was primarily intended to identify general oyster producing regions and not the oyster beds themselves (Haven et al. 1977). The areas that are thought to have the best potential for oyster restoration based primarily on bottom type are shown in red in Figure 2. Oyster numbers have declined substantially in the area due mainly to the parasitic disease organisms MSX (*Haplosporidium nelson*) and Dermo (*Perkinsus marinus*).

Fishing is a major industry for most island residents. Blue crabs are the primary commercial shellfish resource. Commercially/recreationally important finfish species in the surrounding waters include white perch (*Morone americana*), striped bass (*Morone saxatilis*), menhaden (*Brevoortia tyrannus*), spotted sea trout (*Cynoscion nebulosus*), croaker (*Micropognius undulates*), weakfish (*Cynoscion regalis*), black drum (*Pogonias cromis*),

Figure 3. Oyster Resources in the Lower Chesapeake Bay Region and Tangier Sound



spot (*Leiostomus xanthurus*), red drum (*Sciaenops ocellatus*), summer flounder (*Paralichthys dentatus*), and bluefish (*Pomatomus saltatrix*). National Oceanic and Atmosheric Administration (NOAA) Fisheries Service has designated the area surrounding Tangier Island and the project site as Essential Fish Habitat (EFH) for nine species. EFH is a designation that applies to species which are managed under a fishery management plan. It was established under the 1996 amendments of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.), and it is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Act requires federal agencies to consult with the NOAA Fisheries Service on proposed actions, funded, permitted or undertaken by the agency that may adversely affect EFH.

Several American oystercatchers (*Haematopus palliates*) were observed foraging along the shoreline in the study area but no nesting activity was observed. There are two osprey (*Pandion haliaetus*) nests near the project site. One nest is located on the Green #3 Federal Channel Marker and the other nest is located on a dead snag that has washed ashore along the edge of the marsh. Both nests appear to be approximately 200-300 feet from the project site.

ENDANGERED AND THREATENED SPECIES

Northeastern Beach Tiger Beetle

The Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) (NBTB) is a beach-dwelling flying insect which is federally listed as a threatened species. In the Chesapeake Bay region the adult beetles, which are approximately 1.4 cm in length, emerge from larval burrows in the sand in early June, reach peak abundance in early July, and are present on the beach through early September when nearly all will have expired (USFWS 1993b). They forage along the water's edge for small amphipods, flies, and other beach arthropods. They also scavenge on dead crabs and fish. The adults mate and lay their eggs on the beach during this summer period. The resulting larvae reside in burrows that are located in a band centered around the upper intertidal beach. The larvae pass through three developmental stages and emerge as adults approximately 2 years after the eggs are laid. The larvae are predators which position themselves at the burrow entrance where they capture passing prey such as small amphipods. They plug the entrance and retreat down into the burrow when not actively seeking prey and during winter hibernation.

The extirpation of this species from most of its range resulted primarily from destruction and disturbance of natural beach habitat from shoreline developments, beach stabilization structures, and high recreational use (USFWS 1993b). These remain the major anthropogenic threats to the species along with pollution (e.g., oil spills). Human activity on the beach can disrupt adult foraging, mating, and ovipositing. The larvae are even more sensitive because they need to spend significant time at the top of their burrows waiting for prey, and are disturbed by even the

slightest activities such as vibrations, movement, and shadows. Shoreline alterations that directly or indirectly affect the character of the beach (i.e., width, profile, grain size, and vegetation) are a particular concern. In addition to the anthropogenic threats, this species is vulnerable to severe storms, beach erosion, and predators such as wolf spiders, asilid flies, parasitic wasps, and birds.

Historically, NBTB was common on coastal beaches from Cape Cod, Massachusetts to central New Jersey, and along Chesapeake Bay from Calvert County, Maryland through Virginia. Its current natural distribution (excepting two experimental transplanted populations which have questionable future viability) is restricted to Chesapeake Bay and a small remnant population at Martha's Vineyard, Massachusetts. The populations tend to be larger and more widely distributed in the Virginia portion of Chesapeake Bay.

NBTBs were documented at the project site on July 19, 2004 (Kinsley 2004). This survey included the entire section of Uppards Island and the sand spit at the southern end of Tangier Island. A small number of adults were found along the entire survey area and several were found near the proposed project site during the survey. However, April 2014 discussions with Mike Drummond with the U.S. Fish and Wildlife Service's (USFWS) Virginia Field Office suggests, based on recent years surveys, that there is very marginal larval habitat remaining only on the back side of the southern sand spit on Tangier Island. He also stated that there is no potential habitat near the harbor entrance where the potential project is proposed. On the site visit conducted by the USFWS, a single adult NBTB was observed on the backside of the southern sand spit, further confirming Mr. Drummond's statements. The beach has suffered severe erosion over the years and no suitable habitat remains in the project area. There is only a thin section of beach in a few areas and the beach contained peat and rhizomes which is not favorable NBTB habitat. Small numbers of the more wide spread hairy-necked tiger beetle (*Cicindela hirticollis*) were observed, a further indication that the habitat is not favorable for NBTB.

Except for occasional transient individuals, no federally proposed or listed endangered or threatened species under our jurisdiction are known to exist within the project impact area. Therefore, no Biological Assessment or further Section 7 Consultation pursuant to the Endangered Species Act of 1973 is required with the U.S. Fish and Wildlife Service. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

FUTURE WITHOUT THE PROJECT

By tracking changes to the project site and nearby areas, based on aerial photography, it appears that the shoreline is undergoing a substantial amount of erosion particularly along the western shoreline and in the project area. The erosion will cause the shoreline to recede, thereby converting marsh to shallow water. The shoreline near Tom's Gut, located north of the project site on Uppards Island, experienced an average erosion rate of 16 feet per year (Hardaway 2004). A breach has already occurred much faster than anticipated along Uppards Island at Tom's Gut and the erosional forces continue to work away at Uppards Island. Hardaway (2004) and Mills et al. (2003) predicted that by the year 2100 Uppards Island will be completely eroded thereby eliminating any protection to Tangier Island and the SAV beds that occur to the east of Uppards Island. With Uppards Island gone SAV beds will disappear due to lack of protection.

EFFECTS OF THE PROJECT ALTERNATIVES

Five alternatives are currently under consideration for the proposed project, all of which consist of a breakwater structure each having a different structural configuration. Three of the alternatives incorporate two separate breakwaters, one on each side of the federal navigation channel that will tie in with the shoreline of Tangier Island and Uppards Island. These alternatives will greatly reduce the wave energy reaching the shoreline, reduce erosion along the shoreline, and provide protection to the harbor of Tangier Island. The other two alternatives will incorporate a single breakwater structure of different lengths that will only tie into the shoreline of Uppards Island.

Impacts of building a breakwater would be the loss of benthos directly beneath the footprint of the structure. The maximum length of the breakwaters for any alternative is 650 feet with a height of 1 meter (3.3 feet) and a width of 4 meters (13 feet). The breakwaters will reduce wave stress and erosional forces and may create habitat for benthic species in the lee of breakwater. The rocks may also be used as a hard attachment substrate by a variety of sessile organisms such as barnacles, mussels, and oysters. The rock epifaunal community could also include motile organisms such as amphipods, isopods, polychaete worms, flatworms, mud crabs, grass shrimp, and small fishes. The artificial breakwaters may act as a reef structure attracting larger fish to feed in the area. However, since the rock structures are located in shallow water shore zones with relatively high wave energy, the stress associated with wave impact, sediment scouring, and periodic exposure during low water events will likely reduce the community diversity and biomass compared to what would be expected in less stressful habitats (Moschella et al. 2005). The artificial breakwaters should also reduce turbidity within the nearshore zone due to decreased wave energy. This could potentially encourage colonization by submerged aquatic

vegetation.

The intertidal portion is expected to be less colonized by epifauna although barnacles are common and oysters and mussels may also be present. Most shorebirds would not find the rocky shore suitable habitat for nesting or foraging. Exceptions include the purple sandpiper (*Calidris maritima*) which is an occasional winter visitor to Chesapeake Bay that is quite adept at feeding on rocky substrates, and possibly the American oystercatcher which prefers salt marsh edges and tidal flats but may feed on mollusks attached to the rocks.

The breakwaters are expected to tie into the marsh at the base end of the breakwater structure to aid in stability and resilience. The area where the breakwater structure will tie into is composed mostly of sunken marsh bottom with a few small sandy patches that gradually rise to form an area that is composed of saltmarsh cordgrass, common reed, and marsh elder. As the slope continues to rise, the marsh is dominated mostly by black needle rush; the predominate plant species associated with this section of the low to mid marsh profile.

It is possible that rock armored shorelines, which are not naturally present here, could attract undesirable alien species. Rocky shores in the freshwater zone of estuaries such as the Hudson River have been known to be focal points for invasions of important alien species (Strayer and Smith 2000). A recent survey of intertidal shorelines in the Maryland coastal bays documented the presence of three invasive alien species, all of which were found predominately in association with man-made rocky shorelines (Miller and Brown 2004). These species are the European green crab (*Carcinus maenas*), the Asian shore crab (*Hemigrapsus sanguineus*), and a macroalgae sometimes known as dead man's fingers (*Codium fragile*). To date, these species have displayed a mostly coastal distribution. However, the Asian shore crab, a relatively recent introduction to the U.S. AtlanticCoast first observed in New Jersey in 1988 (Cassanova 1999), has been found to survive salinities as low as 10 ppt under laboratory conditions (McDermott 1999). The degree to which these or other species may eventually spread up the Chesapeake Bay on artificial rocky shorelines is uncertain.

CONCLUSION

This project is being developed under the Section 107 of the River and Harbor Act of 1960 as amended which provides authority for the U.S. Army Corps of Engineers to improve navigation including dredging of channels, anchorage areas, turning basins, and construction of breakwaters, jetties, and groins. The construction of this project will result in the loss of some shallow water habitat below the breakwater structures themselves, although the loss should be offset by the creation of potential new habitat associated with the breakwater structures. The USFWS prefers alternative four as it incorporates the use of two breakwater structures, one

connecting to Uppards Island with a dogleg feature for additional protection and a second

smaller breakwater connecting to Tangier Island. It is anticipated that the breakwaters will help reduce erosion rates of Uppards Island and the southern section of Tangier Island, as well as help protect the western entrance to the federal navigation channel that separates Uppards Island and southern Tangier Island. The breakwaters should also reduce wave heights and energy in the lee of the structure where the harbor is located. Numerous mooring docks and seafood processing sheds line both north and south shorelines and are key infrastructure for Tangier Island's fishing fleet. Maintenance and improvement of this federal navigation channel will be critical to the economy of the island, but will also help to protect and restore fish and wildlife habitat, particularly tidal marsh and SAV, for the next 50 to 100 years. Tidal marsh and SAV habitat are vital resources to the Chesapeake Bay ecosystem and their protection is of the utmost importance. The USFWS supports construction of the proposed project under the authority of Section 107 of the River and Harbor Act of 1960 as amended.

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PHOTOS OF THE PROJECT SITE

Standing at the project location looking east back towards the Town of Tangier Island.

Photo Credit: Robbie Callahan (USFWS)

Standing at the project location looking west out over the Chesapeake Bay.

Photo Credit: Robbie Callahan (USFWS)

Standing behind the project location looking northwest over the marsh and out into the Chesapeake Bay.

Photo Credit: Robbie Callahan (USFWS)

ESSENTIAL FISH HABITAT (EFH) ASSESSMENT

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires all Federal agencies to consult with the National Marine Fisheries Service (NMFS) on all actions, or proposed actions, permitted, funded, or undertaken by the agency that may adversely impact Essential Fish Habitat (EFH). EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (NOAA, 1999). A Federal agency must identify the species of concern and prepare an analysis of the effects of the proposed action. The agency must also give its views regarding the effects of the proposed action and propose mitigation if applicable. NMFS has suggested that the EFH analysis and determination be incorporated as part of the National Environmental Policy Act (NEPA) process rather than in a separate document such as a biological assessment, which is prepared for endangered species. An EFH habitat assessment is included in the Environmental Appendix (C) of this Draft DPR. This assessment accessed the website: http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html on 18 APR 2016 and utilized the built-in location query capability to determine the specific fish species with EFH in the local project area.

EFH for local project area

Species	Eggs	Larvae	Juveniles	Adults

summer flounder *(Paralichthys dentatus)*	x	x	X	X
windowpane flounder *(Scopthalmus aquosus)*			X	X
scup *(Stenotomus chrysops)*	n/a	n/a	X	X
black sea bass *(Centropristus striata)*	n/a		X	X
Clearnose skate (*Raja eglanteria*)			X	X
Little skate (*Leucoraja erinacea*)			X	X
Winter skate (*Leucoraja ocellata*)			X	X
Bluefish (*Pomatomis saltatrix*)	X	x	X	X
Atlantic butterfish (*Peprilus triacanthus*)		X		X
sandbar shark *(Charcharinus plumbeus)*				X

Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Management and Conservation Act require Federal action agencies to consult with the NMFS regarding the potential effects of their actions on EFH, which is defined as those waters and substrates necessary to fish for spawning,

breeding, feeding, or growing to maturity. Step 1 of the consultation process was accomplished by notifying NMFS that this EA was being prepared. Step 2 is the preparation of an EFH Assessment by the Federal agency proposing the action. The EFH assessment shall include: (1) a description of the proposed action; (2) an analysis of the effects of the action on EFH and associated species; (3) the Federal agency's views regarding the effects of the action on EFH; and (4) a discussion of proposed mitigation, if applicable. Step 3 of the consultation process is completed after NMFS reviews the Draft EA for which NMFS provides EFH Conservation Recommendations within 30 days. This response, in writing, must either describe the measures proposed by the agency to avoid, mitigate, or offset the impacts of the action on EFH pursuant to NMFS recommendations, or it must explain its reasons for not following impacts to EFH.

(1) Description of proposed action: See page C-19, the Tentatively Selected Plan of the Draft EA within Appendix C.

(2) Analysis of the effects of the action on EFH: The EFH Assessment attached to the Draft EA in Appendix C describes the species and at which life stage EFH has been determined by NMFS in the vicinity of the project. No HAPC designations for any species exists in the project area. HAPC are described in regulations as subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally-stressed area. Potential adverse effects to EFH species result from the construction aspects of the proposed project, namely increased local turbidity, direct encounters with stone or sand as it is being placed, and impacts to populations of prey items. Increased turbidity has the potential to lower DO. There will be a conversion of what is now open shallow water to estuarine wetlands, beach, and stone nearshore revetments, though the shoreline configuration that results will mimic a historical shoreline. Turbidity increases will be of short duration, and DO levels, if affected at all, will return to pre-construction levels quickly. Due to

the open nature of this portion of the Bay, DO levels are not expect to vary significantly at all. Although motile, the potential exists for fish to be impacted throughout the water column by direct encounters with sand or stone as it is being placed. Adverse effects on prey items will occur if such organisms are buried during construction of the nearshore revetments and attached sand tombolos. Conversion of habitat may negatively impact some opportunistic prey items, although the primary effects of project will be positive, with benefits in increased productivity, species diversity, and habitat diversity as nearby SAV beds expand. These benefits will result in increased productivity at higher trophic levels, such as in the finfish community. To conclude, the USACE determination regarding EFH for the proposed project is that the project may affect but is not likely to affect EFH in the local region of the proposed project.

Department of the Army's views regarding the effects of the action on EFH: All of the fish that have EFH within the study area are mobile and would likely vacate the area during the construction period. Therefore, there are no significant negative impacts resulting from project implementation. The fish are anticipated to return soon afterwards. Overall, EFH in the study area would be more productive as a result of implementing the project. Fish species that have EFH in the local area should benefit from implementing the proposed project. SAV is expected to increase, many EFH species utilize SAV for foraging areas as well as cover to hide from larger predators. Prey diversity, abundance, and biomass should increase as SAV beds are highly productive. Specific EFH findings are listed by species, after the associated background information in the following species-specific text.

NMFS ESSENTIAL FISH HABITAT DESIGNATION

INTRODUCTION

The analysis includes the EFH species that are found within the area of the proposed project. Each species summary includes a discussion of the life cycle and history of the animal, the status of the fishery, and how the animal will be affected by the proposed project.

SUMMER FLOUNDER

Life Cycle and Habitat

This fish is a member of the flounder family, Parlichthyidae, and is a left-eye flatfish capable of changing its skin color to blend in with the surrounding bottom. They reach maturity in 2 years and typically weighs 0.5-1.5 kg, though individuals up to 11.8 kg have been recorded. They are a benthic predatory fish, mostly eating other fish and crustaceans. They are typically found partially buried in muddy to sandy bottoms. They range from Nova Scotia to Florida, and as they prefer warmer waters, are typically a summer visitor to the Bay, migrating offshore for winter. Spawning occurs in the open ocean along the continental shelf. Eggs and larvae are pelagic, and can be swept into the Bay. Benthic juveniles and adults are commonly found in the Chesapeake Bay.

The Fisheries

The commercial fishery for the summer flounder is mainly otter trawl, they are also taken in pound nets and gill nets. There is also a sizeable recreational fishery for the summer flounder, typically 40% of the total catch of summer flounder is via the recreational fishery. The stock is considered over-exploited but still at a medium population level compared to historical abundance.

Impacts to EFH

It is possible that juvenile to adult summer flounder could be found in the subtidal sand flats in the project ROI (region of impact). This species is highly mobile, and would likely leave the immediate project area, returning once construction is completed. No significant impacts to this species are expected.

SANDBAR SHARK

Life Cycle and Habitat

This shark can be found as adults in the local area. This species is the principal species caught in the commercial shark fishery of the U.S. Atlantic coast and is also important recreationally (Conrath and Musick, 2007). It is a large coastal ranging species, with females growing up to 2.5 m and males up to 1.8 m total length. They typically roam in small groups to schools, segregated by sex, and undergo seasonal migrations to avoid overwintering in cold, northern waters. Due to this, they range from Cape Cod to the western Gulf of Mexico, though they are not found north of the Carolinas in the winter months. Sandbar sharks, like many elasmobranch fishes, are viviparous, giving birth to live young. They typically give birth to less than 10 young, once per two years. The primary reason that the local waters are considered HAPC is because the lower Chesapeake Bay is one of the most important nursery grounds for this species on the U.S. East Coast. Female sharks give birth in the local area in large numbers, and the lower bay and lower Eastern Shore are important nursery grounds for the juveniles.

The Fisheries

The fishery is considered severely depleted. Restrictions on their take have been put in place to hopefully allow for species recovery. The status of the sandbar shark along much of the east coast is "protected," meaning that there is no permitted commercial harvest of the species in Federal waters but harvest does continue to occur in state waters under a quota set by NMFS. It does continue to be taken incidentally. Current numbers are low and do not support wide scale commercial fishing at this time.

Impacts to EFH

It is possible, though doubtful due to the shallowness; that sandbar sharks could be found in the subtidal sand flats in the project ROI (region of impact). This species is highly mobile, and would likely leave the immediate project area, returning once construction is completed. No significant impacts to this species are expected.

WINDOWPANE FLOUNDER

Life Cycle and Habitat

According to Essential Habitat Designations within the Northeast Region (Maine to Virginia), NOAA and NMFS describe habitat conditions for life stages of windowpane flounder. Eggs are found in surface waters around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras. Eggs are found where sea surface temperatures are less then 20 °C and water depths are less than 70 meters. In the middle Atlantic, eggs are often observed from February to November with peaks in May and October. It is a small left-eye flatfish, typical adults reach 25-35 cm in length.

Juveniles are found in bottom habitats consisting of a mud or fine-grained sand substrate around the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras. Juveniles are found in waters with temperatures below 25 °C, depths from 1-100 meters, and salinities between 5.5-36 ppt.

Adults are found in areas with bottom habitats consisting of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the Middle Atlantic south to the Virginia-North Carolina border. Adults are found in waters with temperatures below 26.8 °C, depths from 1-75 meters, and salinities between 5.5 and 36 parts per thousand (ppt). Spawning occurs in waters with temperatures below 21 °C, depths from 1-75 meters, and salinities between 5.5 to 36 ppt. Windowpane flounder are most often observed spawning during the months of February through December, with a peak in May in the middle Atlantic (NOAA/NMFS, 1999).

The Fisheries

The stock in the Chesapeake Bay region is considered overfished, though stocks to the north are in better condition, being fully exploited. Due to their small size, they are typically caught as by-catch when fishing for larger species of flounder, and there is no targeted fishery for windowpane flounder.

Impacts to EFH

It is possible that juvenile to windowpane flounder could be found in the subtidal sand flats in the project ROI (region of impact). This species is highly mobile, and would likely leave the immediate project area, returning once construction is completed. No significant impacts to this species are expected.

SUMMER FLOUNDER

Summer flounder or fluke (*Paralichthys dentatus*) live in estuarine and coastal waters from Nova Scotia to Southern Florida, with greatest abundance between Cape Cod, MA and Cape Hatteras, NC. Most summer flounder inhabit Chesapeake Bay in the summer and move offshore to depths of 120 to 600 feet of water during the fall and winter. However, some summer flounder over winter in the Chesapeake Bay. Flounder are more common in the deep channels of the lower Chesapeake Bay than in the upper Bay, extending as far north as the Gunpowder River.

Like other flounders, this species is a bottom-dwelling predator, relying on its flattened shape and ability to change color and pattern on the upper (eyed) side of its body. A predator with quick movements and sharp teeth, the flounder is able to capture the small fishes, squid, worms, shrimp, and other crustaceans that comprise the bulk of its diet. Summer flounder can live to 20 years of age with females living longer and growing larger than males (up to 95 cm total length [3ft]).

Life Cycle and Habitat

Summer flounder spawn during their offshore migration, from late summer to midwinter. Larvae and post-larvae drift and migrate in shore, aided by prevailing water currents, and enter the Chesapeake Bay from October through May. Larval flounder, which have body symmetry and eyes on both sides of their heads, more closely resemble the larvae of other fishes than they do adult flounder. Upon reaching the estuaries, larval flounder undergo a metamorphosis to the post-larval stage. During metamorphosis, the right eye of the larval flounder gradually migrates to the left side of the head–the feature distinguishing summer flounder from winter flounder, whose eyes are on the right side–and the body takes on the flattened appearance that it retains as

an adult fish. Once the metamorphosis is complete, the post-larval flounder assumes the adults' bottom-dwelling lifestyle. Juvenile summer flounder often live among eelgrass beds in the Chesapeake Bay.

The Fisheries

Summer flounder are of major recreational and commercial importance north of Cape Hatteras. Anglers catch summer flounder from the shore, piers, and boats with hook and line. The recreational catch far exceeds the commercial catch in the Chesapeake Bay and near shore coastal waters. The lower Chesapeake Bay and seaside inlets produce the bulk of the recreational landings. Between 1979 and 1985, the combined recreational harvest in Maryland and Virginia averaged 5.5 million pounds per year, with 90 percent taken from Virginia waters.

Commercial landings in Virginia have historically been greater than those in Maryland. Between 1981 and 1986, Virginia averaged 5.7 million pounds per year and Maryland averaged 583,000 pounds. However, more than 90 percent of the landings recorded for both states have come from outside state waters. The great bulk of the catch is produced by the winter trawl fishery that operates in mid-continental shelf waters. In the Chesapeake Bay, summer flounder are commercially-caught by haul seines, pound nets, and gill nets, but the species does not form a significant commercial fishery. In 1990, only 48,000 pounds of summer flounder were taken in Virginia's Chesapeake Bay and ocean waters. Since the mid-1980's, commercial and recreational catches have declined precipitously because of overfishing and year-class failure. The Chesapeake Bay record for summer flounder is a fish weighing 15 pounds, which was taken in Maryland waters (Chesapeake Bay Program, 1999).

Impacts to EFH

It is possible that juvenile to adult summer flounder could be found in the subtidal sand flats in the project ROI (region of impact). This species is highly mobile, and would likely leave the immediate project area, returning once construction is completed. No significant impacts to this species are expected.

BLUEFISH

Bluefish, *Pomatomus saltatrix*, is the sole representative of the family Pomatomidae and is closely related to the jacks, pompanos, and roosterfish. Commonly known as chopper, tailor, snapper, elf, skipjack, greenfish, and blue, the bluefish inhabits the continental shelf waters of temperate zones. Along the eastern United States, it is found from Nova Scotia to Texas and visits the Chesapeake Bay region from spring to autumn. The bluefish is abundant in the lower Bay and common most years in the upper Chesapeake Bay, although it is rare north of Baltimore.

Life Cycle and Habitat

Schools of like-sized bluefish can cover tens of square miles and undertake extensive coastal migrations. Adults overwinter off the southeastern coast of Florida and begin a northerly migration in the spring, following warmer water with local movements into and out of bays and sounds. Their movement patterns are complex and not well understood. Younger fish appear to follow different migratory routes than older fish.

Bluefish have a worldwide distribution with occurrences recorded in the Atlantic Ocean, the Mediterranean Sea, the Black Sea, and the Indian Ocean. Adult bluefish are found in a variety of habitats, usually in response to food availability and spawning cues. Bluefish are voracious predators and will feed on virtually any food they can catch and swallow, including butterfish, menhaden, sand lances, silversides, mackerel anchovies, sardines, weakfish, spotted seatrout, croaker, spot, white perch, shad, alewife, blueback herring, and striped bass. Due to their predacious nature, bluefish are in competition with adult striped bass, mackerel, and large weakfish. They have few predators and can live 12 years and weigh up to 20 pounds.

During the northward migration, a spring spawning period occurs from Florida to southern North Carolina. A second spawning occurs off the Mid-Atlantic coast during the summer. In the Chesapeake Bay area, peak spawning is in July and occurs over the outer continental shelf. Most bluefish mature at age two and have high fecundity. Females can produce 900,000 to 4,500,000 eggs. The distribution of bluefish eggs is related to temperature and salinity and can vary from year to year.

Bluefish larvae can be found offshore between Cape Cod, MA, and Palm Beach, FL, during every season of the year. After the spring spawn, bluefish move shoreward. The smaller fish generally enter the Chesapeake Bay, while the larger fish head farther north. Larval distribution is affected by the wind and currents. Larvae that originate from spawning off the Chesapeake

Bay are carried south and offshore. As larvae grow and are able to swim, they leave the surface for deeper water and move in shore. Early juveniles (young fish whose fins have formed) enter the lower Chesapeake Bay and its tributaries in the late summer and fall where estuarine areas provide food and shelter. In the early autumn, bluefish begin to migrate out of the Chesapeake Bay and move south along the coast. Peak abundance near the Chesapeake Bay mouth occurs from April to July and again in October and November.

The Fisheries

The bluefish commercial fishery in Chesapeake Bay accounts for about 20 percent of the total US landings of bluefish. Commercial landings from the Chesapeake Bay were generally high during the 1930's, modest to poor from the 1940's through the 1960's, and again high from the early 1970's through the mid-1980s. In recent years, overfishing has become a concern. Historically, the commercial bluefish harvest has been more important in Virginia than in Maryland, with 10 times the landings of Maryland.

The predominant commercial gear used in harvesting bluefish from the Chesapeake Bay has been pound nets but other gear also is used, including gill nets, otter trawls, haul seines, and hand lines. Currently, all commercial gears, except Virginia's hook and line fisheries, are required to have a license. The bluefish's aggressive feeding habits and spirited fight make it a popular and important sportfish. Landings from the recreational fishery are five to six times that of commercial landings. In the Chesapeake Bay, bluefish ranked highest in both number and weight among sportfish nearly every year from 1970 to 1990. Due to the high recreational value, the conservation effort by anglers has been strong (Chesapeake Bay Program, 1999).

Impacts to EFH

It is possible that juvenile bluefish could be found in the subtidal sand flats in the project ROI (region of impact). Adults are unlikely to be found in such shallow waters. This species is a highly mobile, fast-swimming pelagic predator, and would likely leave the immediate project area, returning once construction is completed. No significant impacts to this species are expected.

BLACK SEA BASS

The black sea bass (*Centropristis striata*) is a member of the family Serranidae, or true sea basses. Also known in the Chesapeake Bay area as "black will," "chub," or simply sea bass, they are year-round inhabitants of the Mid-Atlantic region. These bass are bluish-black fish as adults and brownish as juveniles; they have scales with pale blue or white centers.

Life Cycle and Habitat

The black sea bass population extends from Maine to the Florida Keys and into the Gulf of Mexico. Black sea bass found north of Cape Hatteras are seasonally migratory and from a stock that is considered distinct from that south of the Cape. In the Chesapeake Bay, adults migrate offshore and south to overwinter in the deep, 100-meter waters off the Virginia and Maryland coasts. In spring the fish return to the mid and lower Chesapeake Bay, as far north as Solomon's Island, and remain there until late fall. Black sea bass have been captured as far north as the Chester River, but most fish encountered near the shore are juveniles (1 to 2 years old).

Adult black sea bass are considered a temperate reef fish and are most often found on rocky bottoms near pilings, wrecks, and jetties. Visual feeders during daylight hours, black sea bass rely on swift currents and their large mouths to capture their prey, which include other fish, crabs, mussels, and razor clams. Although they do not travel in schools, they can be found in large groups around structures or during in shore-offshore migrations.

Black sea bass are protogynous hermaphrodites, which means that initially they are females, but some larger fish (between 9 and 13 inches) reverse sex to become males. Thirty-eight percent of females in the Mid-Atlantic demonstrate sex reversal, usually between August and April, indicating that reversal takes place after spawning.

In the Mid-Atlantic continental shelf waters (59-148 ft deep), spawning begins in June, peaks in August, and continues through October. The fish, ages 2 to 5, produce approximately 280,000 eggs, which are buoyant and contain a single oil globule. Larvae develop in coastal waters 2 to 50 miles offshore at depths of up to 108 feet, preferring salinities of 30-35 ppt and temperatures of 58-82 °F. When they are about 13 milimeter (mm) (0.5 inches [in]), young black sea bass move in shore into estuaries, bays, and sounds, where they find shelter in beds of SAV, in oyster

reefs, and among wharves, pilings, and other structures. Young black sea bass feed primarily on crustaceans, such as shrimp, amphipods, and isopods.

Juveniles migrate offshore in December, although some young-of-the-year may remain in the Chesapeake Bay throughout the winter. Black sea bass are reported to live as long as 20 years and reach a maximum adult size of two feet. However, individuals longer than 15 inches (approximately the size of an 8-year-old fish), are uncommon. Large fish are more common offshore than in the Chesapeake Bay.

The Fisheries

The black sea bass forms the base of an important recreational fishery. An estimated 1.5 million black sea bass were taken by anglers in the lower Chesapeake Bay in 1991. Anglers bottom fish using squid and other natural baits to catch this highly esteemed and flavorful fish. The commercial interest in the Chesapeake Bay is modest, however, with commercial landings averaging less than 2,275 kg (5,000 pounds) per year. Gear types include trawls, pots, and hook and line.

In 1996, the Chesapeake Bay Program developed the "Chesapeake Bay and Atlantic Coast Black Sea Bass Fishery Management Plan" to enhance and perpetuate black sea bass stocks in the Chesapeake Bay and its tributaries. Stock assessments before 1996 indicated that the species was being over-harvested in the Chesapeake Bay, which led the Mid-Atlantic Fishery Management Council/Atlantic States Marine Fisheries Commission to take several measures: implementing a 9-inch total length minimum size limit for 1996-97, with ensuing limits to be revised on an annual basis; requiring a 4-inch minimum mesh size for trawlers that harvest more than 100 pounds; and requiring all black sea bass pots to have escape vents and biodegradable hinges and fasteners. The goal is to reduce exploitation and to improve protection of the black sea bass spawning stock in the Chesapeake Bay and the Atlantic.

Impacts to EFH

It is possible that juvenile to adult black sea bass could be found in the subtidal sand flats in the project ROI (region of impact), though it is unlikely due to their preference for structure and rocky bottom, neither of which are found in the proposed project ROI. This species is highly mobile, and any individuals found would likely leave the immediate project area, returning once

construction is completed. The rock structure may provide habitat to the black sea bass in the ROI, a benefit to them. No significant impacts to this species are expected.

SCUP

The scup, *Stenotomus chrysops*, is a member of the family Sparidae, and is commonly known as the porgy. It can grow as large as 45 cm and 2 kg, but averages 0.25-.5 kg. They are a demersal fish as adults, typically being found near the bottom. Adults are benthic feeders. As juveniles, they can be found in shallower waters. Scup typically mature at 2 years of age. Eggs and larvae are pelagic. Smaller adult scup are often found in estuaries, large adults prefer more oceanic waters and deeper waters.

Life Cycle and Habitat

Scup are a migratory, schooling species commonly found along the continental shelf and are not common in Chesapeake Bay, though they can be found in estuaries, usually as small adults. Scup spawn offshore, along the inner continental shelf. Their larvae grow and metamorphose in nearshore waters, including the Bay mouth region. They are typically found in the local Tangier region as larger juveniles and adults.

The Fisheries

The scup fishery in the USA operates from Maine to Cape Hatteras. They are typically fished for using otter trawls, though other types of nets are also used. There is also a significant recreational fishery for the scup. The stock is considered a single stock in the mid-Atlantic bight region, which includes the Chesapeake Bay. Commercial landings have declined significantly since peak landings in the 1950s-early 60s, and recreational landings have also declined. The stock is currently considered overfished due to historically low abundance levels with catches that have exceeded F_{max} .

Impacts to EFH

It is possible that juvenile to small adult scup could be found in the subtidal sand flats in the project ROI (region of impact). This species is highly mobile, and would likely leave the

immediate project area, returning once construction is completed. No significant impacts to this species are expected.

ATLANTIC BUTTERFISH

The Atlantic butterfish (*Peprilus triacanthus*) is a member of the family Stromateidae, of which two species are found within the Chesapeake Bay. Butterfishes are characterized as being very deep-bodied and highly compressed, with adults lacking pelvic fins (Murdy et al., 1997). The Atlantic butterfish is a fast-growing, schooling, pelagic fish that ranges from Newfoundland to the Gulf Coast of Florida, but is most abundant in the region from the Gulf of Maine to Cape Hatteras. It is a rather small fish, with maximum adult length reported as 30 centimeters (cm) (Murdy et al., 1997). Short-lived, butterfish rarely live beyond 3 years of age and attain sexual maturity at 1 to 2 years of age. Butterfish are typically found in euryhaline (5-32 ppt) environments (Musick, 1972).

Life Cycle and Habitat

Butterfish occur in large schools in bays and over continental shelves. They are a pelagic species, typically found in waters over shallow bottoms. The butterfish occurs in the Chesapeake Bay from March through November and is considered common to abundant in the lower bay. Within the bay, the butterfish move northward in the spring, first appearing in Virginia waters in March but not found above the Rappahannock River before May. All leave the bay by December, overwintering offshore in deeper water (590-690 feet) (Murdy et al., 1997). Butterfish are broadcast spawners, and spawn offshore from May to July in the Chesapeake Bay. After hatching, juveniles move into the near-coastal waters, sometimes including bays and estuaries. The young often hide from predators in mats of floating seaweed or among the tentacles of jellyfish. Juveniles feed primarily on phytoplankton, while the adult diet is comprised mainly of jellyfish, small fishes, crustaceans, and worms. (Murdy et al., 1997).

The Fisheries

The butterfish fishery of the Chesapeake Bay is presently of minor commercial importance. Formerly, catches were much larger. For example, in 1920, Chesapeake Bay landings were reported as 590,000 kilograms (kg) (1.3 million pounds), with almost all catch from pound-nets.

In contrast, the reported catch for 1990 was 9,100 kg (20,000 pounds). Catches occur in two peaks, the first occurring from April-May and the second occurring from September-October. Butterfish are of only minor interest to recreational fishermen, as they rarely take bait (Murdy et al., 1997). The butterfish stock is not overfished nor approaching an overfished condition (Cross et al., 1999; NMFS, 1997).

Impacts to EFH

It is possible that juvenile to adult butterfish could be found in the subtidal sand flats in the project ROI (region of impact). This species is highly mobile, and would likely leave the immediate project area, returning once construction is completed. No significant impacts to this species are expected.

CLEAR NOSE SKATE

Life History and Habitat

This small elasmobranch skate occurs in the North Atlantic ranging from Nova Scotia to the Gulf of Mexico, though it is rare in the northern portion of its range and migrates from cooler northern waters as winter approaches. It is migratory in the local area, typically appearing in the Chesapeake Bay in April to November-December. In the Bay, the only records have been from the Bay mainstem; none have been caught in the tributaries. The maximum size is approximately 80 cm total length at an age of 5-6 years. They feed on small benthic organisms as well as on small fishes. Typical habitat is softer bottom areas along the continental shelf, though they can also be found in rockier habitat. As is common in skates, this species is an egg layer, typically laying up to 30 pairs of eggs in a season. Both juveniles and adults can be found in the Chesapeake Bay. They prefer higher salinity waters of > 22 ppt, with most being found in waters of at least 31 ppt.

The Fisheries

There is a commercial fishery for the clear nose skate. The primary means to capture them is via otter trawling, though they are also taken as bycatch in groundfish trawling and scallop dredging fisheries. This small species is typically used for bait, not human consumption. The current status is not overfished.

Impacts to EFH

It is possible that juvenile to adult clear nose skate could be found in the subtidal sand flats in the project ROI (region of impact). This species is highly mobile, and would likely leave the immediate project area, returning once construction is completed. No significant impacts to this species are expected.

WINTER SKATE

Life History and Habitat

This small elasmobranch skate occurs from the coast of Newfoundland to Cape Hatteras. It prefers colder waters than many fish species found in the Chesapeake Bay area. In the local area, it can be found from December to April. Its maximum size is approximately 1.5 m in total length. Similar to most skates, it is an egg layer. It is not known to lay eggs in the local area, preferring colder waters to spawn in, and juveniles are not commonly found in the Chesapeake Bay area, only rarely being observed near the Bay mouth in the winter. It typically feeds on a wide variety of invertebrate benthic organisms but also takes small fish and squid. It prefers sand and gravel bottoms but can sometimes be found on mud bottom habitat. It typically buries itself in the sand during the day, feeding at night.

The Fisheries

Otter trawling is the main method to catch most skate species, including the winter skate. This species is also caught as bycatch during groundfish trawling and during sea scallop dredging. The skate fishery is mainly a bait fishery, though this larger species does have a commercial market for its wing meat for human consumption. As a result of these uses, fishing pressure grew intense and the winter skate was overfished. However, it has since recovered and although its biomass is still well below its original level (about 25 percent of the observed peak) and it is not currently considered to be overfished.

Impacts to EFH

It is possible that juvenile to winter skate could be found in the subtidal sand flats in the project ROI (region of impact). This species is highly motile, and would likely leave the immediate project area, returning once construction is completed. No significant impacts to this species are expected.

LITTLE SKATE

Life History and Habitat

This is a small elasmobranch species, and adult maximum size is approximately 60 cm. It occurs from Nova Scotia to Cape Hatteras and is very abundant. Like most skates, it is an egg layer and has been known to lay eggs throughout the year. This skate typically feeds upon small invertebrates, primarily crustaceans, squid, and polychates, though fish and other organisms are sometimes consumed. They prefer sand or gravel bottoms, as do many skate species, though they can also be found on mud bottom habitat. The often bury themselves in the sand during the day and feed at night.

The Fisheries

There is a commercial fishery for the clear nose skate. The primary means to capture them is via otter trawling, though they are also taken as bycatch in groundfish trawling and scallop dredging fisheries. This small species is typically used for bait, not human consumption. The current status is not overfished, and the population biomass is estimated to be a medium level.

Impacts to EFH

It is possible that juvenile to adult clear nose skate could be found in the subtidal sand flats in the project ROI (region of impact). This species is highly motile, and would likely leave the immediate project area, returning once construction is completed. No significant impacts to this species are expected.

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COSTAL ZONE MANAGEMENT ACT
SUMMARY CONSISTENCY DETERMINATION
TANGIER ISLAND JETTY SECTION 107,
TANGIER ISLAND, ACCOMACK COUNTY, VIRGINIA

CONSISTENCY REVIEW: Information presented in this summary consistency determination can be found in the accompanying Draft Environmental Assessment, dated June 2016.

PROJECT DESCRIPTION: This project will involve the construction of a single stone jetty at the western limit of North Channel. This straight, stone structure will key into the southern shoreline of Uppards Island and extends southward into the navigation channel. The length, crest elevation, and crest width of the structure are 494ft (151 m), 3.3 ft (1 m, MTL) and 13 ft (4 m), respectively. A small area, 0.07 acres terrestrial land, 0.09 acres inter-tidal habitat, 0.6 acres subaquatic, and open shallow water habitat, will be affected by the placement of the stone. An additional acre may be required during the construction phase. Due to its isolation and lack of development, the Uppards has considerable value to various waterfowl species and other fish and wildlife. The navigation channel between the Uppards and the Town of Tangier on the main island of Tangier will be protected by the proposed project. Maintenance dredging may need to be done less often, and seafood industry structures, facilities and vessels will be protected as a result of project implementation. The southeast corner of Uppards island will also receive some protection against erosive forces due to the proposed project.

PROPERTY CLASSIFICATION: The project would occur upon lands included in the Commonwealth of Virginia's coastal zone.

IMPACTS TO RESOURCES/USES OF THE COASTAL ZONE: See following table.

DETERMINATION: Based upon evaluation of impacts analyzed in the Draft Environmental Assessment, the Norfolk District Corps of Engineers has determined that the proposed project will be undertaken in a manner consistent to the maximum extent practicable with the Commonwealth of Virginia's Coastal Zone Management Program.

DRAFT ENVIRONMENTAL ASSESSMENT,

TANGIER ISLAND, VIRGINIA

FEDERAL CONSISTENCY DETERMINATION

COASTAL ZONE MANAGEMENT ACT OF 1972, AS AMENDED

VIRGINIA COASTAL RESOURCES MANAGEMENT PROGRAM

Enforceable Program	Effect/Action
1. Fisheries Management	Finfish and Shellfish: No significant impact. Will obtain VMRC Permit. TBT Regulatory Program: No TBT possession, sale, or use related to project (N/A).
2. Subaqueous Lands Management	Will obtain VMRC Permit to encroach upon state-owned bottom for jetty construction below MLW.
3. Wetlands Management	No significant negative wetlands impacts (N/A). Project will protect wetlands.
4. Dunes Management	No destruction or alteration of primary dunes related to this project (N/A).
5. Non-point Source Pollution Control	Corps NEPA document dated June 2016 will be coordinated with DCR. Implementation of BMP's during construction.
6. Point Source Pollution Control	No VPDES impact. Will obtain DEQ Permit, if required.
7. Shoreline Sanitation	No activities related to installation of septic tanks (N/A).
8. Air Pollution Control	Although there will be minor air pollution increases during construction, these increases will be short-term and below *de minimus* levels. No Clean Air Act conformity determination required.
9. Coastal Lands Management	Project does occur along a tidal shore, a Resource Protection Area that is presently open shallow water. The purpose of the project is to construct a jetty to protect the navigation channel and port of refuge of the Town of Tangier, along with seafood industry infrastructure.