DRAFT ENVIRONMENTAL ASSESSMENT

ELIMINATION OF "HIGH SPOT C" OBSTRUCTION TO NAVIGATION WITHIN THE NEW YORK BIGHT NAVIGATIONAL PRECAUTIONARY AREA - AMBROSE CHANNEL

NEW YORK AND NEW JERSEY 50 FOOT HARBOR DEEPENING PROJECT

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT

JUNE 2012

ABBREVIATIONS AND ACRONYMS

°C	degrees Celsius
APE	area of potential effect
ARPA	Archeological Resources Protection Act
BA	Biological Assessment
CAA	Clean Air Act
CADET	Channel Analysis and Design Evaluation Tool
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DPS	distinct population segment
EA	Environmental Assessment
EFH	essential fish habitat
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FNSI	Finding of No Significant Impact
FR	Federal Register
ft^2	square feet
HAMP	Harbor Air Management Plan
HAPC	habitat areas of particular concern
HARS	Historic Area Remediation Site
HDP	Harbor Deepening Project
LB	Lower Bay
m^2	square meter
mg/L	milligrams per liter
MLW	mean low water
MMPA	Marine Mammal Protection Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM	Nautical mile
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NYD	New York District
PA	Precautionary Area
PANYNJ	Port Authority of New York and New Jersey
ppt	parts per thousand
rkm	route kilometer
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SPC	specific conductance
TSS	Traffic Separation Scheme
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VTS	Vessel Traffic Service
WIS	Wave Information Study
yd^2	square yard
yd^3	cubic yard

TABLE OF CONTENTS

APPENDICES

FIGURES

TABLES

1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE), New York District (NYD) proposes to eliminate an obstruction to navigation (known as High Spot C) located in Federal waters within the New York Bight, near the approach to the New York and New Jersey Harbor. The obstruction is located just north of the Ambrose Channel Lighted Whistle Buoy A (see Figure 1). Ambrose Channel is the main entrance channel, or approach area, to the Port of New York and New Jersey (Port). The proposed action is to remove and/or shift approximately 6,000 yd^3 of rock and gravel material to a depth of 57 feet +2 feet at mean low water (MLW).

Environmental compliance documents under the National Environmental Policy Act (NEPA) have been completed for the navigational improvement project within NY/NJ Harbor, including the *Feasibility Report (Final Environmental Impact Statement) for New York and New Jersey Harbor Navigation Study* (USACE–NYD 1999a) and the *Environmental Assessment on Consolidated Implementation of the New York and New Jersey Harbor Deepening Project* (USACE–NYD 2004). The Recommended Plan in the 1999 Final Environmental Impact Statement (USACE-NYD 1999a) consisted of deepening the main shipping channels within the Harbor to 50 feet (52 feet in rock or otherwise hard material). This project was authorized for construction by Congress in §101(a)(2) of the Water Resources Development Act of 2000 (Public Law No. 106-541, December 11, 2000).

This NEPA documentation is required because High Spot C was not identified as an obstruction to safe navigation until recently, therefore, the previous NEPA evaluations were not inclusive of this project feature.

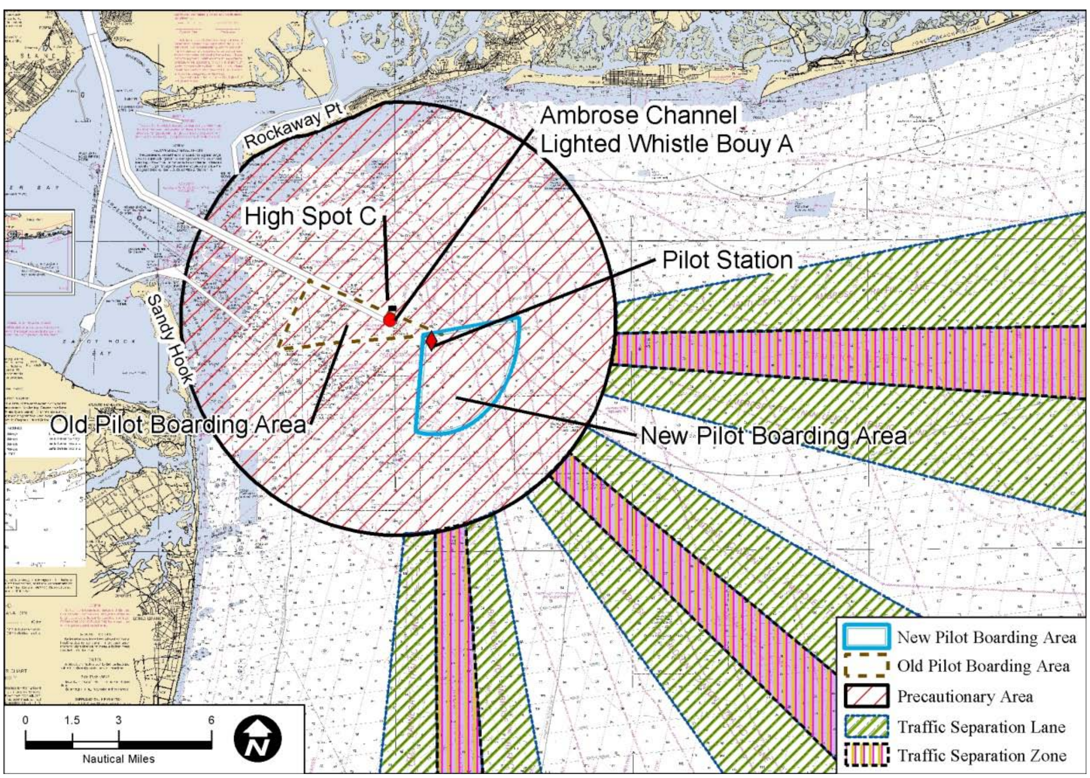


Figure 1. Location of High Spot C near the Ambrose Channel Entrance.

2. PURPOSE AND NEED FOR THE PROPOSED ACTION

The over-arching Purpose and Need for the proposed Ambrose Obstruction remains the same as that described in the USACE 1999 EIS for the 50 foot HDP, and is incorporated by reference.

The Ambrose Light Tower has been struck several times since the HDP feasibility study was completed. It has now been determined that the tower should be replaced with a lighted buoy. Due to this change, the U.S. Coast Guard (USCG) and NY and NJ Sandy Hook Pilots examined the approaches to the Ambrose Channel, resulting in a change to the Pilot Area and a closer look at potential hazards to navigation because the channel deepening would extend the Ambrose channel further seaward. On 22 February 2008, the USCG Sector NY sent a memorandum to the USACE-NYD that identified the potential hazards to navigation and requested that the three identified obstructions in or near Ambrose Channel be removed, and outlined vessel safety concerns if those obstructions were not removed. Leaving the obstruction to navigation in place would necessitate modifications to the pilot area, including changes to the current Precautionary Area (PA) and Traffic Separation Scheme (TSS) used to safely conduct vessel traffic into and out of the Harbor. Such changes would require vetting through the International Maritime Organization and would take several years to complete. The memorandum further requested USACE-NYD and the Port Authority of New York and New Jersey (PANYNJ) to investigate the obstructions. The investigation resulted with only one of those obstructions needing further examination based upon the depths of the obstructions and existing hydrodynamic conditions. This obstruction is centered on 40° 27′ 50.4″ N by 73° 50′ 7.5″ W.

A remote sensing survey conducted in 2008 identified a rock pile that measures approximately 700 feet north to south and 1,300 feet east to west (USACE–NYD 2009). The remote sensing survey indicated that the rock pile is a natural geologic formation and has a uniform, rocky bottom and there were no articulated vessel structures or debris piles (USACE–NYD 2009). The rock pile contains high spots, which have collectively been identified as an obstruction to navigation, and was labeled "High Spot C". The high spots include multiple, variable-sized obstructions of gravel- to boulder-size material that reduce the MLW depth to 53 feet.

Based on these investigations and a wave modeling analysis of the obstruction conducted by USACE Engineer Research and Development Center in 2011 (Briggs and Demirbilek 2011), the high spots on the rock pile are considered a navigational hazard to full use of the seaward approach to the Ambrose Channel and the recommendation was made to remove the high spots to 57 feet mlw. The Ambrose obstruction is considered a navigational hazard for several reasons:

1) The area in which the obstruction is located cannot be avoided by ships approaching the first gated buoys of the Ambrose Channel.

2) The depth of the obstruction at 53 feet at MLW is shallower than the depth of the seaward approach to the channel (60 feet), and therefore poses a hazard to navigation because the larger vessels entering the Port have a deeper draft than the highest point of the obstruction.

3) The obstruction poses a risk to humans and the environment through potential vessel-obstruction strikes, increased vessel maneuvering, and potential release of hazardous materials releases from a grounded container ship or tank vessel.

The purpose of the Proposed Action is to provide a more fully functional and safer navigational passage to the Port of NY/NJ for larger and heavier vessels by removing the navigational hazard. Based on the navigational considerations outlined by USCG Sector NY and the Pilots, removal of this hazard would allow vessels to more fully realize the benefits of the 50 foot HDP, allowing the Port of NY and NJ area to continue to accrue the economic benefits of deeper navigation channels.

3. SCOPE OF THE DOCUMENT AND DECISION TO BE MADE

This EA was prepared in accordance with the NEPA of 1969 (42 United States Code [U.S.C.] 4321 et seq.) and the Council on Environmental Quality's (CEQ) *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 Code of Federal Regulations [CFR] Parts 1500–1508).

Direct, indirect, and cumulative effects of the Proposed Action and alternatives including the No Action Alternative are identified. If the analyses presented in the EA indicate that implementation of the Proposed Action would not result in significant environmental impacts, a Finding of No Significant Impact (FNSI) would be prepared. A FNSI briefly presents the reasons why the Proposed Action would not have a significant adverse effect and why an EIS would not be necessary. If significant environmental issues would result from the Proposed Action that cannot be sufficiently mitigated, an EIS would be required, or no action would be taken.

4. PROPOSED ACTION AND ALTERNATIVES

The range of reasonable alternatives for the Proposed Action considered in this EA is constrained to those that would meet the authorized project's purpose and need, which is to provide safe and efficient navigation in an economically and environmentally sound manner (USACE-NYD 1999a). Such alternatives must also meet essential technical, engineering, and economic threshold requirements to ensure that each is environmentally sound and economically viable, and complies with governing standards and regulations.

The USACE-NYD developed selection criteria to assist in evaluating suitable alternatives for the Proposed Action. The criteria used to evaluate alternatives include the following:

- Improves navigational safety requirements?
- Provides for the maximum use and function of a 50 foot channel as described in the Purpose and Need for the 50 foot HDP?
- Minimizes potential environmental impacts to the fullest extent?
- Minimizes potential project costs to the fullest extent?

4.1 Proposed Action

The Proposed Action is to remove the High Spot C obstruction and modify the rock pile by reducing the high points to a depth of 57 feet +2 feet at MLW. The total area within the footprint of High Spot C that needs to be lowered to reach this depth is approximately 65,000 ft^2, or approximately 7 percent of the total area of the rock pile (i.e., 910,000 ft^2). This would require the movement of approximately 6,000 yd^3 of material.

The duration of the Proposed Action would be approximately one month without adverse weather conditions and/or equipment failure/maintenance; and is therefore considered short-term. The construction is expected to occur in either the spring or summer, but can occur at any time during the year dependent on the contract award.

This EA evaluates the potential environmental impacts of the Proposed Action and alternatives on removing the High Spot C obstruction and modifying the rock pile to a depth of 57 feet +2 feet at MLW. The EA formally addresses three alternatives (the No Action Alternative and two project alternatives). The purpose of identifying several available alternatives that address both environmental concerns and still meet the underlying purpose and need of the Proposed Action is to ensure that all options are considered and fully examined.

Alternative 1- No Action

The No Action Alternative represents what would occur if USACE-NYD were not to carry out the Proposed Action. Under this alternative the obstruction to navigation would not be removed. By not taking action, High Spot C would continue to pose a risk to navigation and the environment through vessel-obstruction strikes, increased vessel maneuvering, and potential hazardous materials spills from a grounded container ship or tank vessel, and would become more of a risk once the entire 50 foot deepening project is completed. The No Action Alternative assesses the impact of not modifying, removing, or transporting all or part of the obstruction to navigation. Although the No Action Alternative does not meet the Purpose and Need of the Proposed Action, it is evaluated in accordance with CEQ regulations and serves as a baseline against which the action alternatives can be evaluated.

Alternative 2- Relocate Obstruction Materials to Areas Inside the Footprint of the Rock Pile (Preferred Alternative)

Under Alternative 2, the High Spot C obstruction would be removed and the depth of the rock pile would be lowered to 57 feet +2 feet at MLW within the existing footprint of the rock pile. The total area within the footprint of High Spot C that needs to be modified is approximately 65,000 ft^2. To modify the rock pile to a depth of 57 feet +2 feet at MLW would require moving approximately 6,000 yd^3 of rocky material.

The material would be repositioned to low points within the footprint of the rock pile using a variety of methods, including but not limited to: (1) a tugboat dragging an I-beam at a depth of 57 feet +2 feet at MLW to push the material to deeper locations; (2) a clamshell dredge or backhoe to remove and relocate the material directly to nearby deeper locations within the footprint of the rock pile; and (3) a clamshell dredge or backhoe and a scow to remove, transport, and relocate material to deeper locations within the rock pile (approximately 1 to 3 scows would be filled). The material would be spread out so as not to create additional high spots; therefore, the area to be reprofiled plus the relocation area would be approximately 130,000 ft^2 (or approximately 15 percent of the total footprint of the rock pile).

Alternative 3- Relocate Obstruction Materials to Areas Outside the Footprint of the Rock Pile

Alternative 3 would entail removing the High Spot C obstruction and lowering the depth of the rock pile to 57 feet +2 feet at MLW by using a clamshell dredge or backhoe and scow to remove, transport, and relocate the materials to an offsite disposal area outside of the rock pile footprint. Under this alternative, the total area within the footprint of High Spot C that would be reprofiled is 65,000 ft^2 and would require moving approximately 6,000 yd^3 of rocky debris to an area outside of the rock pile footprint. The offsite disposal area has not yet been identified, but could include a state-designated artificial reef site, an upland disposal site, or the Historic Area Remediation Site (HARS).

There are 11 artificial reef sites in NY and 15 artificial reef sites in NJ (NYDEC 2011, NJDEP 2011). The closest reef sites to High Spot C are Rockaway Reef in NY, which is approximately 4.6 nautical miles (NMs) to the north, and Sandy Hook Reef Site in NJ, which is approximately 8.2 NMs to the southwest. It is assumed that the upland disposal site would be up to 50 NMs from High Spot C in a designated disposal site in NJ or NY. The HARS is an approximately 15.7-square-NM area, which is up to 6.7 NMs south of High Spot C (USEPA 2010). The physical disposal of any material from High Spot C at the HARS, a reef site, or upland site does not require an assessment in this document since these facilities have been previously permitted under separate actions.

5. AFFECTED ENVIRONMENT

5.1 Biological Resources

5.1.1 Definition of the Resource

Biological resources include native or naturalized plants and animals, and the habitats in which they exist. Biological resources in the marine environment include benthic resources; fish and wildlife resources such as marine mammals, sea turtles, coastal and marine birds, and fisheries resources; and protected or sensitive species and habitats. Fisheries resources include fish, federally managed commercial and recreational fisheries, and essential fish habitat (EFH). Determining which habitats and species occur in the vicinity of each proposed project location was accomplished through either benthic invertebrate and fisheries surveys; an EFH assessment (Appendix A); systematic literature and data reviews; Internet searches; and coordination with appropriate Federal and state regulatory agency representatives, resource managers, and other knowledgeable subject matter experts.

5.1.2 Existing Conditions

5.1.2.1 Benthic and Epibenthic Resources

Benthic and epibenthic resources include those organisms living within and on the surface of bottom sediments in the subtidal zone, below the low tide line.

Benthic Invertebrate and Macro-invertebrate Surveys

A field sampling program (USACE–NYD 2010c), which included benthic invertebrate and epibenthic macro-invertebrate surveys, was conducted September 21 to 23, 2009, to determine the invertebrate communities inhabiting the rock pile and surrounding areas. The sampling program and gear types were selected based on a review and recommendations by the National Marine Fisheries Service (NMFS) to target species that are likely to use the rock pile for habitat, shelter or foraging activities.

Benthic Invertebrates. The benthic community sampled in the area of the rock pile during September 2009 was generally typical of the coastal Mid-Atlantic region. Similar to previous investigations summarized by Cerrato (2006), collections were dominated by annelids, *Polygordius* sp. and *Polydora ligni*, and to a lesser extent nematodes and arthropods, *Unciola* sp. and *Ampelisca abdita*. Blue mussel, *Mytilus edulis*, and two gastropod species were also identified from the samples near the obstruction. Community indices, such as diversity and evenness, indicated a slightly more diverse community inhabiting the area farther from the obstruction (beyond 150 m from the rock pile boundary), although average density was similar between sites closer to and farther from the obstruction (USACE–NYD 2010c).

Annelids, including *Polygordius* sp., are an important prey for many marine fish and shellfish and composed nearly 80 percent of the organisms collected during the benthic invertebrate sampling program. Annelids have been found to be among the common prey items of marine fish, including several EFH species (Collette and MacPhee 2002, Pereira *et al.* 1999, NMFS 1999a, NMFS 1999b, Drohan *et al.* 2007), suggesting the area around the obstruction provides foraging habitat for a variety of fish and macro-invertebrates. Arthropods were also common in samples collected and are important prey of black sea bass, cunner, and to a lesser extent conger eel and lobster, while mollusks are eaten by cunner and rock crab (Auster 1989, Drohan *et al.* 2007, Levy *et al.* 1988, Rebach and Ristvey 1999).

Epibenthic Macro-invertebrates. The majority of the organisms collected during the survey (n=233) were Atlantic rock crab (*Cancer irroratus*). American lobster (*Homarus americanus*) were also collected but were less common (n=6). One portly spider crab (*Libinia emarginata*) was also collected.

American lobster and Atlantic rock crab are two decapods that are common to the Atlantic coast of North America. They settle on rock and cobble substrate immediately following their pelagic larval stage where they use boulders as cover and protection from potential predators as they grow (Palma *et al* 1998, MacKenzie *et al* 1985). The project area meets this habitat description.

Fish collected during the 2009 field sampling program (USACE–NYD 2010c) are discussed in **Section 6.1.2.2,** and federally managed EFH species are discussed in **Section 6.1.2.4** and **Appendix A**.

5.1.2.2 Fish and Wildlife Resources

Marine Mammals

All marine mammals found within the project area are protected by the Marine Mammal Protection Act (MMPA) of 1972 and are discussed in **Section 6.1.2.3**. Furthermore, some marine mammal species are afforded additional protection due to their listed status under the ESA.

Sea Turtles

All sea turtle species found within the project area are protected under the ESA and are discussed in **Section 6.1.2.3**.

Coastal and Marine Birds

The NY Bight region, which is the area between the coast and the shelf break from Montauk Point, NY, to Cape May, NJ, contains a variety of habitats that provide important nesting, stopover, and wintering habitats for a diversity of bird species. These habitats include ocean waters, inshore shallows, beaches, dunes, bays, wetlands, mudflats, tributary streams, and associated uplands. High Spot C lies within the Atlantic Flyway, a major fall and spring migration route.

Waterfowl. Although several species of waterfowl nest and breed in the NY Bight watershed, the primary use of the NY Bight region by waterfowl is for resting and feeding during fall migration, which peaks in November, and as a wintering area. For several species of waterfowl, the mid-winter populations occurring in the NY Bight account for a major part of their total Atlantic Flyway population. The most common breeding waterfowl species include mallard (*Anas platyrhynchos*), American black duck (*Anas rubripes*), and Canada goose (*Branta canadensis*) (USFWS 1997).

Coastal Waterbirds. More than two-thirds of the waterbird species in the northeastern United States breed in the Mid-Atlantic and surrounding region, and of these, nearly 74 percent nest in colonies.

Breeding birds are largely present in the region for half the year, during spring and summer months. Nonbreeders include migrants and wintering birds, most of which, as adults, nest farther north in North America or Europe; however, some nest in the tropics or Southern Hemisphere (MANEM 2006).

Seabirds. Seabirds are composed of members of several different bird families, and could be broadly characterized as coastal (nearshore) or pelagic (oceanic). Coastal seabirds are most common within 4.8 kilometers (3 miles) of land and include sea ducks, loons, grebes, and gulls (USFWS 1997).

Shorebirds. Approximately 30 species of shorebirds, plovers, sandpipers, avocets, and oystercatchers regularly use and migrate through the NY Bight watershed for breeding, wintering, northward (spring) migration, or southward (fall) migration. Shorebirds migrate through the NY Bight almost year-round, with northward migration beginning in late winter and lasting through June, and southward migration beginning in late June with peaks in late July and lasting into the fall (USFWS 1997).

Neotropical Migrants. Of the 132 bird species listed as short-distance or long-distance migrants that regularly breed in the northeastern United States, 115 breed in the NY Bight watershed. Important migration corridors and stopover habitat in the NY Bight watershed include the Hudson River; the urban core of New York City; the north-south-oriented ridges of NY (NJ Highlands and Shawangunk-Kittatinny Ridge); and the coastal corridor of barrier beaches, back barrier lagoons, wetlands, and forests along the shorelines of Long Island and NJ (USFWS 1997).

Fisheries Resources

More than 60 species of marine and anadromous fish use the nearshore waters surrounding the project area. Fish species that use the NY Bight include both cold-temperate and warm-temperate seasonally migratory and resident species (Pearce 2000, Sherman *et al.* 1996, USFWS 1997). In addition, this area supports a variety of shellfish and macro-invertebrate species (see **Section 6.1.2.1)**. Due to the large diversity of species and the high biological productivity of the area, recreational and commercial fisheries are a major ecological and socioeconomic influence in the NY Bight.

Steimle and Zetlin (2000) compiled a list of fishery species that are commonly found on reef or structure-like habitats in the NY Bight. Some examples of species expected to occur on or near the rock pile would include cunner (*Tautogolabrus adspersus*), oyster toadfish (*Opsanus tau*), spot (*Leiostomus xanthurus*), striped bass (*Morone saxatilis*), juvenile Atlantic cod (*Gadus morhua*), juvenile tautog (*Tautoga onitis*), black sea bass (*Centropristis striata*), scup (*Stenotomus chrysops*), rock gunnel (*Pholis gunnellus*), conger eel (*Conger oceanicus*), American eel (*Anguilla rostrata*), red hake (*Urophycis chuss*), and northern puffer (*Sphoeroides maculates*) as well as gobies (*gobisoma* sp.) and sculpins (*Cottus* sp.).

Fish Community Sampling. During the 24-hour fish sampling events conducted during the field sampling program in September 2009 (USACE–NYD 2010c), 171 fish from three species (black sea bass, conger eel and cunner) were collected on the obstruction while 37 fish from three species (black sea bass, conger eel and little skate) were collected within the near field area up to approximately 250 m from the obstruction. Cunner, the most abundant fish collected (n=128), was only collected on the obstruction. Little skate, a species identified as an EFH species, was collected (n=1) near the obstruction. An assessment of the federally managed EFH species found within the project area is presented in **Appendix A** and discussed in **Section 6.1.2.4**.

The benthic invertebrate and macro-invertebrate surveys suggested that the rock pile and adjacent sandy sediments might provide habitat for a benthic and epibenthic community that is likely used as a forage base for some fish species, including those species inhabiting the obstruction. The sampling conducted during September 2009 indicates that the rock pile and adjacent sandy sediments provides potential prey and the rock pile provides shelter habitat for structure-oriented species collected during the survey, such as black sea bass, conger eel, and cunner. The food habits of black sea bass, conger eel, and cunner are, in part, a primary reason why these species use the rock pile. Cunner are perennial inhabitants and forage on benthic and epibenthic invertebrates including mussels, barnacles, clams, isopods, amphipods, shrimp, and small crab and lobster (Auster 1989). Black sea bass forage on benthic and epibenthic invertebrates including crustaceans (primarily rock crab and sand shrimp), isopods, amphipods, shrimp, crab, lobster, and fish (Drohan *et al.* 2007). Conger eel feed primarily on decapod crustaceans and fish; with smaller eels (less than 80 centimeters total length) feeding most heavily on decapod crustaceans and larger eels (more than or equal to 80 centimeters) consuming more fish (Levy *et al.* 1988).

5.1.2.3 Protected Species

Several laws protect marine species and habitat areas, including the ESA and MMPA (16 U.S.C. 1361 et seq.). The ESA is administered by the USFWS and NMFS and establishes protection and conservation of threatened and endangered species and the ecosystems upon which they depend. Section 7 of the ESA requires that all Federal agencies consult with the NMFS or USFWS, as applicable, before initiating any action that could affect a listed species. Section 7 states that any project authorized, funded, or conducted by any Federal agency should not "…jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined to be critical."

On November 5, 2010, a letter was sent to the NMFS Protected Resources Division at the Northeast Regional Office requesting information on the known presence of threatened and endangered marine species (USACE–NYD 2010a). On March 1, 2011, NMFS responded to the information request (NMFS 2011) and provided a summary of Federally listed species, and also informed the USACE-NYD that the Atlantic sturgeon was proposed for listing under the Endangered Species Act. In May 2011, conference was initiated to determine the potential impacts to Atlantic sturgeon from remaining construction of the 50 foot HDP and a subsequent Biological Assessment (BA) was developed (Appendix C). The formal listing of Atlantic sturgeon took effect April 6, 2012; and a Biological Opinion was pending at the time this document was in development.

A concurrent request was sent to the U.S. Fish and Wildlife Service (USFWS) NJ Field Office in Pleasantville, NJ, on November 5, 2010 (USACE–NYD 2010b). On March 16, 2011, the USFWS responded that no federally listed or proposed threatened or endangered flora or fauna under USFWS jurisdiction are known to occur within the proposed project's impact area; therefore, no further consultation pursuant to the ESA is required (USFWS 2011).

Marine Mammals

The U.S. Department of Commerce, through the NMFS, is charged with protecting whales, dolphins, porpoises, seals, and sea lions.

Several listed species of whales can occur seasonally in the offshore waters of NY. Federally endangered humpback whales (*Megaptera novaeangliae*) are found off the coast of NY from February through April and from September through November. The endangered fin whales (*Balaenoptera physalus*) and sperm whales (*Physeter macrocephalus*) are also seasonally present in the waters off NY, but are typically found in deeper offshore waters. Federally endangered North Atlantic right whales (*Eubalaena glacialis*) are found off the coast of NY from September 1 through March 31. North Atlantic right whales are known to use a portion near the project area (i.e., the waters off the mouth of the Lower Bay (LB) of NY Harbor/Ports of NY and NJ) as a migratory route to and from calving grounds, primarily during the months of November 1 through April 30. During this period of time, NMFS has designated this area as a seasonal management area (50 CFR 224.105) for right whales.

Sea Turtles

The NMFS and the USFWS share jurisdiction for sea turtles. The NMFS has lead responsibility for the conservation and recovery of sea turtles in the marine environment. The USFWS has lead responsibility for sea turtles on nesting beaches, which are not affected by this project. The NMFS has not designated any waters in the project area as critical habitat for any of the sea turtle species (NMFS 2000).

A Biological Opinion for impacts on sea turtles from the 50 foot HDP was issued in 2000 and is incorporated by reference; minor updates to the associated 1999 sea turtle BA for the HDP are included in the 2012 BA (Appendix C). There are four federally listed threatened or endangered sea turtles under the jurisdiction of NMFS that may occur seasonally in the coastal waters of NY: the endangered Green sea turtle (*Chelonia mydas*); the endangered Kemp's ridley sea turtle (*Lepidochelys kempi*); the endangered leatherback sea turtle, (*Dermochelys coriacea*); and the threatened Northwest Atlantic Ocean distinct population segment of loggerhead sea turtle (*Caretta caretta*).

The seasonal population of sea turtles that could be found in the project area consists largely of juvenile loggerheads and Kemp’s ridleys, and to a much lesser extent green turtles (USACE 1999b). The leatherback is not often documented in nearshore waters and occurs more typically in deeper, offshore waters (NMFS 2011).

If present in the NY Bight, sea turtle activities would be relatively confined to depths between 5 m (16 ft) and 15 m (49 ft), which is where light and food are most suitable for foraging turtles (Morreale and Standora 1990; USACE 1999b). Loggerheads and Kemp’s ridleys feed extensively on benthic biota, mainly crabs and some mollusks. When green turtles are present, they feed on benthic and floating algae. Based on two habitat suitability models described in the USACE 1999 BA, suitable turtle habitat was found in and around the LB in the model that used less restrictive criteria and was considered a more liberal model. In general, it was determined that the habitat seems to support crabs and mollusks. Biological surveys in and around the Ambrose obstruction (USACE 2010c) also confirm the availability of some sea turtle prey, including the Atlantic rock crab (Cancer irroratus) and the blue mussel (Mytilus edulis).

Marine Bird Species

No federally listed or proposed threatened or endangered birds under USFWS jurisdiction are known to occur within the Proposed Action area (USFWS 2011).

Marine Fish Species

The NMFS, Protected Resources Division has the principal responsibility for federally listed marine fish species.

Shortnose Sturgeon. A population of the federally endangered shortnose sturgeon (*Acipenser brevirostrum*) occurs in the Hudson River and has been documented from the Troy Dam (route kilometer [rkm] 248) to the waters near Staten Island in the NY Harbor (rkm 5.6). Since NMFS advised that only rare, transient sturgeon are likely to be present within the project area (NMFS 2011), impacts to shortnose sturgeon were not further analyzed in this assessment.

Atlantic Sturgeon. The NY Bight distinct population segment (DPS) of Atlantic sturgeon was listed as an endangered species under the ESA on Monday February 6, 2012 (Federal Register Vol 77, No. 24; 50 CFR Part 224). Atlantic sturgeon are known to migrate from marine habitat through the Lower and Upper Bays of NY/NJ to access spawning grounds in the Hudson River. The 50 foot HDP BA for Atlantic sturgeon (Appendix C) describes the behavior and biology of Atlantic sturgeon, and their occurrence in the NY/NJ Harbor.

Atlantic sturgeon are anadromous, spending the majority of their adult phase in marine waters, migrating up rivers to spawn in fresh water and migrating to brackish waters in the juvenile growth phases (Bain 1997). Adult females migrate from the marine environment to spawning grounds in the Hudson River mid-May (Dovel and Berggren 1983), spawn from May through July or possibly August, and return to marine habitat the following fall (Dovel and Berggren 1983, Van Eenennaam et al. 1996). Mature males are present in the Hudson River for a longer time period than mature females, extending from April to November (Dovel and Berggren 1983) and appear at spawning sites in association with females (Van Eenennaam et al. 1996).

Overall, sturgeon appear to feed indiscriminately throughout their lives (Bigelow and Schroeder 1953, Vladykov and Greeley 1963, Murawski and Pacheco 1977, van den Avyle 1984, as cited by Gilbert 1989) and are generally characterized as bottom feeding carnivores (Bain 1997). Adult Atlantic sturgeon feed on polychaetes, oligochaetes, amphipods, isopods, mollusks, shrimp, gastropods, and fish (Johnson et al. 1997, Haley 1998, Bigelow and Schroeder 1953, Vladykov and Greeley 1963, Smith 1985b, as cited in Gilbert 1989).

From 1995 to the present, there have been 5 observations of Atlantic sturgeon in and around the NY/NJ Harbor area during USACE programs: 3 in Ambrose, 1 in Port Jersey, and 1 between Belmar and Manasquan, NJ.

5.1.2.4 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 U.S.C. 1801 et seq.) calls for direct actions to stop or reverse the continued loss of fish habitats. EFH is defined under Section 305(b)(2) of the MSFCMA (Public Law 94-265), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.” The statute includes a mandate that Federal agencies must consult with the Secretary of Commerce on all proposed activities authorized, funded, or undertaken by the agency that might adversely affect EFH.

EFH that is identified as particularly important to the long-term productivity of populations of one or more managed species, or EFH determined to be particularly vulnerable to degradation, might also be identified by Fishery Management Councils and the NMFS as habitat areas of particular concern (HAPC). There are no HAPC for any EFH designated fish species for the area of High Spot C (Drohan *et al.* 2007).

EFH has been designated for 30 federally managed species in the vicinity of the project area based upon the NOAA EFH Designation Tables and online EFH Mapper (NOAA 2011). These 30 species have been grouped by life history needs to distinguish the relative importance of the rock pile for each species and to provide a basis for characterizing potential impact. Among the 30 designated species, the use of the rock pile for life history activity varies widely but constitutes potential habitat for only five EFH species: Atlantic cod, black sea bass, monkfish, red hake, and scup. See **Appendix A** for additional details on EFH species; this assessment was provided to NOAA on March 20, 2012.

5.2 Navigation

5.2.1 Definition of the Resource

Navigation for the Proposed Action consists of marine transportation, which includes all vessels that use navigable waterways, and the processes associated with vessel movement within and adjacent to the Proposed Action area. The vessels include those engaged in commercial, recreational, Federal, and state functions.

5.2.2 Existing Conditions

High Spot C is in Federal waters just north of the Ambrose Channel Lighted Whistle Buoy A, approximately 7 NMs east of Sandy Hook, NJ, and 6 NMs south of Rockaway Beach, Queens, NY. It is at the entrance to the Ambrose Channel, the main shipping channel providing access to the Port of NY and NJ and several smaller commercial fishing ports, recreational marinas, and inlets along the coasts of NY and NJ. The area over the rock pile is a commercial and recreational fishing area as evidenced by the presence of fishing vessels and lobster buoys during a remote sensing survey in 2008 (USACE–NYD 2009a). High Spot C is identified on nautical charts as having a depth of 53 feet. The areas surrounding High Spot C are deeper with identified depths of 72 to 80 feet.

A variety of vessel traffic occurs in the area of High Spot C including commercial shipping and fishing, passenger cruise ships, recreational fishing and boating, and the operation of charter vessels engaged in fishing and diving. In 2010, more than 4,800 commercial vessels called on the Port of NY and NJ and more than 5.2 million containers were handled worth a total in excess of $175 billion (PANYNJ 2011). Vessel movements into, out of, and between the facilities that make up the Port are controlled through a variety of established systems, such as Vessel Traffic Service (VTS) and Traffic Separation Schemes (TSSs).

VTS is operated by the USCG at Fort Wadsworth on Staten Island, NY, and has the responsibility of coordinating vessel traffic movements in the Port. The NY VTS area includes the entrance to the Harbor via the Ambrose and Sandy Hook Channels, the Lower and Upper NY Bays, NB, and Raritan Bay. Approaching and departing ships are monitored by the NY VTS with radar coverage extending at least out to the pilot boarding area.

Use of a pilot is required for all foreign and American vessels larger than 65 feet entering or departing from the Port. Pilots provided by the NY and NJ Sandy Hook Pilots Association embark/disembark vessels in the pilot boarding area, which is approximately 1.5 NMs southeast of the Ambrose Channel Lighted Whistle Buoy A and High Spot C; and then direct the vessels to their destinations.

High Spot C is within a circular precautionary area that has a 7-mile radius centered at 40°27.50′ N, 73°49.90′ W. Mariners are advised to exercise caution within the precautionary area because traffic in this area can consist of vessels making the transition between the Ambrose or Sandy Hook Channels and one of the TSSs. Three TSSs (i.e., Eastern Approach, Off Ambrose Light TSS; Southeastern Approach TSS; and Southern Approach TSS) converge into this precautionary area. Each TSS consists of two one-way traffic lanes with a separation zone between them to maintain a safe distance between the routes. The precautionary area and the TSSs are known collectively as the Off NY TSSs, and form the outer approaches to the Harbor to assist the safe movement of ships within the congested waters accessing the Port's facilities.

5.3 Socioeconomics

5.3.1 Definition of the Resource

Socioeconomics are defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Socioeconomic data at local, county, and state levels permit characterization of baseline conditions in the context of regional and state trends.

5.3.2 Existing Conditions

The Proposed Action would occur primarily in the Atlantic Ocean. This area of the Atlantic Ocean is known as the NY Bight and is commonly used for shipping, commercial and recreational fishing, and recreational boating and diving. The area over the rock pile is a popular commercial and recreational fishing area (USACE–NYD 2009a). Party fishing boats are also frequently observed in the area. Scuba diving also occurs in the NY Bight; however, there are no common dive sites at High Spot C (NJScuba.net 2009).

5.4 Cultural Resources

5.4.1 Definition of the Resource

Cultural resources is an umbrella term for many heritage-related resources including prehistoric and historic sites, buildings, structures, districts, or any other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or other reason. Depending on the condition and historic use, such resources might provide insight into the cultural practices of previous civilizations or they might retain cultural and religious significance to modern groups.

Several Federal laws and regulations govern protection of cultural resources, including the National Historic Preservation Act (NHPA) (1966), the Archaeological and Historic Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archeological Resources Protection Act (ARPA) (1979), and the Native American Graves Protection and Repatriation Act (NAGPRA) (1990).

The EA process and the consultation process prescribed in Section 106 of the NHPA require an assessment of the potential effect of an undertaking on historic properties that are within a proposed project's area of potential effect (APE), which is defined as the geographic area(s) "within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist."

A Programmatic Agreement and Amendment were developed for the overall 50 foot HDP and signed in 2000 and 2003 respectively by the NY and NY State Historic Preservation Offices (SHPOs) and USACE-NYD. The Programmatic Agreement stipulated the work that the USACE-NYD would undertake as part of the HDP to identify historic resources.

5.4.2 Existing Conditions

In accordance with Section 106 of the NHPA, the APE for the Proposed Action is defined as High Spot C and the surrounding rock pile. Because High Spot C is more than 3 NMs from shore, only the potential for underwater archaeological resources exists. A detailed evaluation of High Spot C and the rock pile was made by Panamerican Consultants, Inc., during spring 2008 for the USACE. During this evaluation, archival research was conducted on High Spot C and surrounding area. Additionally, the rock pile was examined extensively using side-scan sonar, a subbottom profiler, and a magnetometer. Results of the evaluation were published by the USACE in a Remote Sensing Survey Report (USACE–NYD 2009a).

The examination of the rock pile did not indicate the presence of any large ferrous masses, nor did the subbottom data indicate the presence of any large buried masses. The side-scan data also did not reveal any apparent debris, structure, or other indications that the rock pile represents a significant historic resource. The results of the remote sensing survey determined that the rock pile is a geologic formation and is not considered potentially historically significant. The Final Remote Sensing Survey Report recommended no further cultural investigations at the obstruction (USACE–NYD 2009a). This work was coordinated with the NYSHPO who concurred with this Corps' findings and recommendations.

5.5 Hydrodynamics, Geology, and Water Quality

5.5.1 Definition of the Resource

Hydrodynamics is the study of fluids in motion. Specifically, within the ocean, hydrodynamics consists of the circulation resulting from currents, waves, and tides.

Geological resources consist of the Earth's surface and subsurface materials. Geological resources within coastal systems consist of marine sediment and bedrock materials of the seafloor. These resources are typically described in terms of bathymetry, sediment geotechnical properties, mineral resources, and geologic hazards (e.g., seismicity). There are no mineral resources (e.g., sand and gravel borrow sites) near the Ambrose Obstruction proposed action; therefore, mineral resources are not discussed in this EA (Byrnes *et al.* 2004).

Water quality conditions are evaluated by the measurement of factors that are considered important to the health of the ecosystem or the existing or intended water use. Baseline water quality constituents include temperature, salinity, dissolved oxygen, nutrients, pH, hardness, contaminants, and turbidity (the load of suspended matter as it relates to water clarity). The primary values that affect water quality are water temperature, total dissolved solids (salinity), suspended solids (turbidity), and nutrients. In coastal waters, salinity and temperature parameters are governed by the interaction of marine and terrestrial influences including tides, nearshore circulation, freshwater discharges from rivers, and local precipitation. In addition to these natural inputs, human activities can affect water quality through discharges, runoff, burning, dumping, air emissions, and oil or chemical spills.

5.5.2 Existing Conditions

Hydrodynamics

The existing hydrodynamic conditions in the project area were assessed using the 20-year hindcast wave data set provided by the Wave Information Study (WIS) for buoy WIS126 located south of the entrance to Ambrose Channel (Briggs and Demirbilek 2011). The most common wave direction is between 168.8 and 191.3 degrees, with a mean of 178.4 degrees. The overall mean wave direction is 164.1 degrees. Wave periods range from 1 to 23 seconds, with variable band limits. The most commonly occurring wave period band is from 1 to 5 seconds, with a mean of 4.0 seconds. The overall mean wave period is 4.9 seconds. Wave heights range from 0 to 22 feet, with variable band limits. The most common wave height is from 2 to 4 feet, with a mean of 2.8 feet. The overall mean wave height is 2.6 feet. The largest wave height is 21.3 feet, with corresponding peak period of 12.5 seconds and wave direction of 91.4 degrees. However, this is a very rare occurrence (Briggs and Demirbilek 2011).

Geology

Bathymetry. Bathymetry of the NY Bight continental shelf along the Long Island nearshore areas are north-south sharply defined, linear shore-perpendicular to slightly shore-oblique rippled scour depressions occurring in a water depth of 26 to 62 feet (8 to 19 m) and extending from the nearshore to approximately 4.9 NMs (9 kilometers) offshore. The depressions contain rippled sandy gravel and gravelly sand with ripple crests aligned in an east-west trend. The ripples appear to be primarily generated by wave action (Schwab *et al.* 2000).

A remote sensing survey conducted in 2008 of the rock pile revealed the presence of a natural geologic formation of decreased depth with an uneven bottom (USACE–NYD 2009a). High Spot C has an irregular rocky bottom with a depth of 53 feet at MLW that is at a higher elevation (up to 21 feet) than the surrounding seafloor (USACE–NYD 2009a).

Marine Sediments. Extensive side-scan sonar surveys conducted by the U.S. Geological Survey indicate the presence of soft marine sediments and some hard substrates in the NY Bight. The existing geologic habitats at High Spot C include marine deep subtidal waters over a structured geologic formation consisting of rocks and gravel at a higher elevation than the surrounding sand and mud seafloor. The obstruction is composed primarily of gravel- to boulder-size material with a surrounding habitat of flat sandy areas (USACE–NYD 2009a). Based on field observations during a biological sampling program conducted in September 2009, sediment collected at several locations surrounding High Spot C ranged from sand with an admixture of pebbles, shells, and brick fragments, to sand with an admixture of fine sand and clay. All sediment color was brown or brown/gray (USACE–NYD 2010c).

Geologic Hazards. The NY Bight fault zone is the only major fault system identified in the vicinity of High Spot C. The 31-mile-long (50-kilometer-long) fault trends north-northeast for 19 miles (31 kilometers) from its southern end, then bends northeast, and continues northward beneath Long Island (Schwab *et al.* 2002, Hutchinson and Grow 1985). High Spot C is approximately 5.5 NMs from the NY Bight fault zone.

Water Quality

Bottom water characteristics were collected at several locations within and surrounding High Spot C during the biological sampling program in September 2009 (USACE–NYD 2010c). Water temperature at fish, lobster, and crab pots within High Spot C ranged between 17.4 and 18.0 degrees Celsius (°C) while dissolved oxygen ranged between 5.1 and 5.5 milligrams per liter (mg/L). Conductivity ranged between 48,710 and 49,420 (specific conductance [SPC] at 25 °C) and salinity ranged between 31.9 and 32.4 ppt (USACE-NYD 2010c).

Bottom water characteristics at sampling locations surrounding High Spot C included temperatures from 17.3 to 19.8 °C, dissolved oxygen from 5.1 to 6.4 mg/L, conductivity (SPC at 25 °C) from 47,830 to 49,420, and salinity from 31.2 to 32.4 ppt (USACE–NYD 2010c).

In order to supplement the fall water characteristics collected during the biological sampling program in September 2009, winter and spring water quality sampling was obtained from previous USACE surveys of nearby waters. These water quality data are presented in Table 2.

Ambrose Area Water Quality Data				
Season	**Temperature (C°)**	**Dissolved Oxygen (mg/L)**	**Conductivity (SPC@25 °C)**	**Salinity (ppt)**
Winter	3.8 – 9.4	8.0 – 11.0	48,030 – 48,965	28.7 – 31.5
Spring	5.5 – 13.1	9.4 – 13.0	42,810 – 46,965	29.5 – 30.5
Summer	20.5 – 22.6	4.4 – 5.3	39,810 – 43,030	25.4 – 27.9
Fall	17.3 – 19.8	5.1 – 6.4	47,830 – 49,420	31.2 – 32.4

Table 1. Existing Water Quality Conditions. Sources: USACE–NYD 2007, USACE–NYD 2010c, USACE–NYD 2010d

5.6 Noise

5.6.1 Definition of the Resource

Noise and sound share the same physical aspects, but noise is considered a disturbance while sound is defined as an auditory effect. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise perceived as annoying. The Noise Control Act of 1972 *(P.L. 92-574, 86 Stat. 1234, 42 U.S.C. 4901 et seq.)* initiated a Federal program of regulating noise pollution with the intent of protecting human health and minimizing annoyance of noise to the general public.

5.6.2 Existing Conditions

The ambient noise environment at High Spot C is generally very low due to its offshore location away from most noise sources. Ambient noise in this area is affected primarily by vessel traffic, nearby whistle buoys, and natural sources, such as waves and wind.

5.7 Air Quality

5.7.1 Definition of the Resource

Air quality is often defined as a measure of the quantity of harmful particles and chemicals in the air. The Clean Air Act (CAA) provides the principal framework for national, state, and local efforts to protect air quality and it requires the U.S. Environmental Protection Agency (USEPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. Air pollution may come from many different sources: stationary sources such as factories, power plants, and smelters; mobile sources such as for this project which may include waterborne vessels and mechanical dredges; and naturally occurring sources such as windblown dust, all may contribute to air pollution. Air Quality can be affected in many ways by the pollution emitted from these sources.

When a region fails to meet one or more NAAQS, it is designated as a nonattainment area by the USEPA. States are primarily responsible for ensuring attainment and maintenance of NAAQS. The CAA requires states that fall within a nonattainment area to develop State Implementation Plans (SIPs), an USEPA-approved plan in which the states present their specific plans and schedules to achieve compliance with the NAAQS. The CAA requires that actions conducted or sponsored by federal agencies are consistent with the SIPs through the General Conformity process. The General Conformity process takes the form of an emission analysis and ensures that emissions of air pollutants from planned federal activities would not cause new violations of the NAAQS, increase the frequency or severity of NAAQS violations, or delay timely attainment of the NAAQS or any interim milestone.

Existing conditions of and impacts to air quality by the 50 foot HDP, of which the proposed action is part of, were identified in the FEIS (USACE-NYD 1999a) and, more specifically, in the Harbor Air Management Plan (HAMP) (USACE-NYD 2003; USACE-NYD 2009b), all hereby incorporated by reference.

5.7.2 Existing Conditions

The ambient air quality at High Spot C is generally very good due to its offshore location away from most air pollution sources. Ambient air quality in this area is affected primarily by vessel traffic. High Spot C is located outside of the nonattainment area boundaries, which extends three nautical miles off-shore.

6. ENVIRONMENTAL IMPACTS

6.1 Biological Resources

6.1.1 Evaluation Criteria

The level of impact on biological resources is based on (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource, (2) the proportion of the resource that would be affected relative to its occurrence in the region, (3) the sensitivity of the resource to the proposed activities, and (4) the duration of ecological ramifications. Impacts on biological resources are considered significant if species or habitats of high concern are adversely affected over relatively large areas, or disturbances cause reductions in population size or distribution of a species of special concern. Additionally, an impact would be considered significant if a "take" of a threatened or endangered species were to occur under ESA. A habitat perspective is used to provide a framework for analysis of general classes of effects (i.e., habitat loss, direct mortality, and disturbance).

6.1.2 Environmental Consequences

6.1.2.1 Benthic and Epibenthic Resources

Alternative 1 – No Action

Under Alternative 1 the obstruction to navigation would not be removed. The risk of collisions between larger vessels and the obstruction would continue and could result in hazardous material spills and releases into the Bight, which could result in an adverse impact on benthic and epibenthic habitat and any species in the immediate area. The impacts from hazardous material spills and releases would be caused by either the physical nature of the material (i.e., contamination and smothering) or by its chemical components (i.e., toxic effects and bioaccumulation), the location of the spill, the level of contact with the animal, and the life stage of the animal.

Alternative 2 - Relocate Obstruction Materials to Areas Inside the Footprint of the Rockpile

Short-term, direct and indirect, minor adverse impacts on benthic and epibenthic resources would occur as a result of Alternative 2. Potential direct impacts include disturbance and possible crushing and burial of some shellfish (e.g., Atlantic rock crabs and American lobsters) during the construction, while indirect impacts could include temporary habitat loss and mortality of prey species. Benthic and epibenthic resources, however, would be expected to re-colonize the rock pile over a period of a few months up to approximately several years for sand and gravel substrate (Brooks *et. al.* 2006; Wilber and Clarke 2007). Habitat within the approximately 65,000 ft^2 footprint would be affected by the shift of material above 57 feet +2 feet at MLW to lower elevation areas. The transferred material would cover existing substrate, but would create areas of slightly raised profile and irregular bottom habitat similar to what was removed at the higher elevations. Transferring the material would not alter the substrate type, an important habitat component for benthic and epibenthic resources. Due to the short duration of the activities associated with Alternative 2 (one month), the impacts would be short-term, minor, and localized and the area's benthic and epibenthic communities are anticipated to begin recovering fairly quickly following the conclusion of activities.

Alternative 3 - Relocate Obstruction Material to Areas Outside the Footprint of the Rockpile

Under Alternative 3, direct temporary adverse impacts on benthic and epibenthic resources would occur as a result of removing 7% of the rock pile area. The disposal of the material could result in a beneficial, long-term impact by increasing fisheries habitat to existing permitted facilities, such as the NY or NJ State designated artificial reef programs, but this benefit would be associated with a separate program action. The physical transport of the material to a disposal location is unlikely to impact benthic and epibenthic resources. Therefore, adverse impacts on benthic and epibenthic resources from Alternative 3 would be expected to be short-term, minor, and localized.

6.1.2.2 Fish and Wildlife Resources

Alternative 1 – No Action

Under Alternative 1 the obstruction to navigation would not be removed. The risk of collisions between larger vessels and the obstruction would continue and could result in hazardous material spills and releases into the Bight, which could result in adverse impacts on the habitat and to coastal and marine birds as well as fisheries resources in the area.

Alternative 2 - Relocate Obstruction Materials to Areas Inside the Footprint of the Rockpile

Coastal and Marine Birds. No direct and indirect impacts to coastal and marine birds are anticipated as most, if not all, individuals would avoid the immediate area of the short-term construction.

Fisheries Resources. Alternative 2 could result in short-term, direct and indirect, negligible to minor adverse impacts on finfish and shellfish caused by sediment resuspension, noise, physical disturbance, and possibly crushing and burial to a few individuals during the construction. Direct impacts could occur to structure-oriented species such as black sea bass, cunner and tautog, which are the most likely to utilize the rock pile. Species, such as American shad and Atlantic sturgeon (see also protected and EFH species sections below), travelling to and from Hudson River spawning grounds during construction may be indirectly impacted. However, due to the location of the obstruction, there are approximately 66 square miles of open water available in and around the project area which migratory fish could use to easily avoid the short-term construction and it is expected that most spawning fish would simply move from the area in response to habitat disturbance to similar habitats located nearby.

Indirect negative impacts to a few individuals could occur if structure-oriented fish species were displaced from suitable cover and become more accessible to predation. An indirect adverse impact on fish and wildlife could occur from the reduction in food resources for benthic fishes. Short-term, indirect, negligible to minor adverse impacts could occur on fish in the immediate vicinity of the construction as a result of noise and sediment resuspension. Noise and sediment resuspension or turbidity would be generated from vessels, dredge, and cable movements. Under Alternative 2, construction activities would occur for approximately one month. Therefore, adverse impacts on fish resources from Alternative 2 would be expected to be short-term, negligible to minor, and localized.

Alternative 3 - Relocate Obstruction Material to Areas Outside the Footprint of the Rockpile

Implementation of Alternative 3 would result in similar impacts on fish and wildlife resources as described under Alternative 2. Under Alternative 3, the removed material would be disposed of outside of the obstruction footprint. Alternative 3 would disturb areas above 57 feet +2 feet deep at MLW at High Spot C. The primary indirect impact on fish and wildlife during the modification of the obstruction would be the reduction of food resources for benthic fishes until they are recolonized over a period of a few months up to approximately several years. Impacts on fish and wildlife resources from modification activities under Alternative 3 would be expected to be short-term, minor, and localized.

6.1.2.3 Protected Species

Alternative 1 – No Action

Under Alternative 1 the obstruction to navigation would not be removed. The risk of collisions between larger and heavier vessels and the obstruction would continue and could result in hazardous material spills and releases into the Bight, which could result in adverse impacts on the habitat and to protected marine mammals, sea turtles, and Atlantic sturgeon in the area.

Alternative 2 - Relocate Obstruction Materials to Areas Inside the Footprint of the Rockpile

Marine Mammals. Although humpback and fin whales are not expected to occur in the action area, the North Atlantic right whale may be present in the area. There is a potential for right whales to interact with a working dredge onsite or while in transit to/from the site, but it is anticipated that a whale would avoid an active dredge. While in transit, the USACE-NYD would recommend that the contractor comply with regulations under the right whale ship strike reduction rule (50 CFR 224.105; 62 FR 6729). Therefore, effects to this species are likely to be negligible. Discussions with NMFS regarding this matter resulted in concurrence with this determination.

Sea Turtles. Short-term, direct and indirect, negligible to minor adverse impacts on sea turtles could occur as a result of disturbance to food resources and interaction with the dredge during construction activities. The 2000 HDP BO for sea turtles identified hopper dredging in Ambrose channel as the location and dredging type of concern for entraining sea turtles. The proposed action being considered for the Ambrose obstruction does not include use of a hopper dredge. Instead, mechanical dredges and operations are being proposed such as a clamshell dredge, backhoe dredge, or use of an I-beam. Sea turtles are not known to be vulnerable to capture in the proposed methods, and they would be expected to avoid this type of equipment, which is either stationary, relatively slow moving or impacts small areas at a given time.

If sea turtles are not directly harmed by dredging gear, then the main impact would most likely be the indirect effects of dredging activities on their food resources, namely crabs and mollusks (USACE 1999b). The Ambrose obstruction proposed action would not be expected to significantly alter the food resources available to sea turtles for several reasons. The obstruction represents a very small area in the NY Bight and surrounding Lower and Raritan Bays (see Figure 1), and the actual area of impact is approximately 15% of the total area of the rock pile making up the obstruction (see EFH Assessment in Appendix A). The disturbed area would progressively recover its aquatic community starting within weeks of the end of construction and reaching nearly full recovery in approximately one year (see EFH Assessment in Appendix A). The proposed action is a one time modification of the physical substrate which would allow for long term community stability to be re-established at the site.

Marine Bird Species. No federally listed or proposed threatened or endangered birds under USFWS jurisdiction are known to occur within the Proposed Action area (USFWS 2011).

Marine Fish Species, shortnose sturgeon. Analysis not warranted (See Section 5.1.2.3).

***Marine Fish* Species, *Atlantic sturgeon*.** Short-term, negligible direct and indirect impacts on Atlantic sturgeon could occur as a result of disturbance to food resources and interaction with dredge equipment during construction associated with Alternative 2. The proposed action could have a direct negative impact on Atlantic sturgeon, but it is unlikely to occur. The majority of the documented sturgeon takes from Atlantic and Gulf Coast dredging activities were from entrainment in a hopper dredge. Since hopper dredges would not be used for the Ambrose obstruction project, entrainment of Atlantic sturgeon would not occur. The risk of Atlantic sturgeon interactions with the proposed equipment is reduced by the short duration of the project and the small size of the area of impact compared to the NY Bight and surrounding Lower and Raritan Bays, which provides many opportunities for Atlantic sturgeon to avoid active dredges.

Indirect negative impacts could occur due to a temporary and short term loss and/or shift in the benthic community within the localized project area; however, given the availability of resources surrounding the area of impact (i.e., the proposed Ambrose Obstruction project area compared to the NY Bight and Lower and Raritan Bays), and that Atlantic sturgeon are indiscriminate feeders, the impact of removing the obstruction on food resources is unlikely to have an adverse impact on the species (see Appendix C).

Alternative 3 - Relocate Obstruction Material to Areas Outside the Footprint of the Rockpile

Implementation of Alternative 3 would result in similar impacts on protected species as described under Alternative 2, except for a possible, but unlikely, increase in collision risk between protected resources and moving vessels during increased transport of the material to a disposal site, which would not occur under Alternative 2. Impacts would be expected to be short-term, minor, and localized. Under Alternative 3, the removed material would be disposed of outside of the obstruction footprint.

6.1.2.4 Essential Fish Habitat

In compliance with Section 305(b)(2) of the MSFCA, as amended by the Sustainable Fisheries Act of 1996, the USACE-NYD prepared an EFH assessment of the potential impacts on EFH resulting from the removal of High Spot C (see **Appendix A**). The EFH assessment includes an evaluation of the direct, indirect, and cumulative impacts of the proposed construction on those species and life stages for which EFH has been designated in the project area. The potential physical and biological impacts of modifying the rock pile on EFH and forage species were evaluated using information collected during site-specific sampling in September 2009 (USACE–NYD 2010c). Short-term and long-term impacts on the benthic habitat in the project area were assessed in terms of the seasonal distribution, relative abundance, and habitat requirements of the designated species within the project area relative to the Proposed Action.

Alternative 1 – No Action

Under Alternative 1 the obstruction to navigation would not be removed. The risk of collisions between larger vessels and the obstruction would continue and could result in hazardous material spills and releases into the Bight, which could result in adverse impacts on the habitat and the 30 EFH species designated in the area.

Alternative 2 - Relocate Obstruction Materials to Areas Inside the Footprint of the Rockpile

Alternative 2 could result in short-term direct and indirect impacts on EFH species. Direct impacts on EFH species could include physical alterations to benthic habitat of a particular EFH species. Potential direct impacts on EFH species within the project area could include the following:

- The collection of demersal eggs and larvae in dredging/reprofiling equipment
- Changes to and removal of EFH habitat in the project areas
- Localized changes in water column depth, bathymetry, hydrodynamics, and sedimentation rates
- Temporary and localized impacts associated with the proposed activities (i.e., water disturbance, noise, and vibrations)
- Short-term changes to water quality conditions typically associated with reprofiling operations including the resuspension of sediments in the water column.

Based on the site specific EFH assessment conducted for the project area (see **Appendix A**), potential short term direct impacts would be limited to a group of five species (Atlantic cod, black sea bass, scup, monkfish and red hake) with a primarily benthic life history and a preference for structure or rock/gravel substrate. Among these species only black sea bass were collected during the September 2009 sampling program at the obstruction. A few individuals of this species could experience a short-term direct impact by being displaced from the area of construction. The remaining undisturbed rocky habitat on the rock pile and in the general vicinity of the construction (see USACE-NYD 2009 for remote sensing survey of numerous other rock piles in the area), however, could provide temporary habitat for black sea bass. The other species in this group (Atlantic cod, monkfish, red hake and scup) would experience a low level of impact if they were using the rock pile for habitat at the time of construction. In all cases, impacts would be temporary and minimal because the project area is extremely small in relation to the extensive distribution of these species.

The primary indirect impact on EFH species during the removal of the obstruction under Alternative 2 would be the disturbance of benthic and epibenthic forage communities. Several EFH species are demersal or benthic feeders (e.g., red hake and black sea bass) that might experience a short-term, temporary change in feeding efficiency during and immediately following the construction activities. However, these species would return to the rock pile as soon as food resources recovered.

Alternative 3 - Relocate Obstruction Material to Areas Outside the Footprint of the Rockpile

Implementation of Alternative 3 would result in similar impacts on EFH species as described under Alternative 2. Under Alternative 3, the removed obstruction material would be disposed of outside of the obstruction footprint. Modification of the rock pile would disturb areas above 57 feet +2 feet deep at MLW at High Spot C. A reduction in food resources for benthic fishes would occur until they are recolonized over a period of a few months up to approximately several years. Adverse impacts on EFH species during the transport of material to a disposal location are not anticipated. Impacts on EFH species from Alternative 3 would be expected to be short-term, minor, and localized.

6.2 Navigation

6.2.1 Evaluation Criteria

Impacts on navigation would occur if the Proposed Action caused long-term interference with access to marine transportation routes, crowding of routes resulting in substantially increased risks of collisions, or other mishaps (e.g., grounding), or a substantial change over existing conditions.

6.2.2 Environmental Consequences

Alternative 1 – No Action

Under Alternative 1 the obstruction to navigation would not be removed and it would continue to be a hazard to navigation. Adverse impacts on navigation and vessel traffic would continue to impede the full use of the seaward approach to the Ambrose Channel and the economic benefits of the 50 foot HDP would not be fully realized.

Alternative 2 - Relocate Obstruction Materials to Areas Inside the Footprint of the Rockpile

Navigation and vessel traffic would be temporarily affected by the implementation of Alternative 2, but the impacts would not be significant. Activities associated with the removal of the obstruction and movement of material within the rock pile footprint would be temporary and short-term (one month). Minor adjustments to vessel approach courses would be necessary to avoid any potential collisions with project equipment. All navigation restrictions associated with Alternative 2 would be coordinated through the USCG and notification would be provided to mariners, thereby minimizing any potential impact that these restrictions might have on navigation within the Ambrose Channel.

Alternative 2 would also result in long-term, beneficial impacts on navigation by making the approaches to the Ambrose Channel safer. Alternative 2 would remove the existing hazard to navigation, which would reduce the potential for vessel groundings on the rock pile. It would also allow more efficient use of the surrounding deeper water near the Ambrose Channel Pilot Station, thereby spreading vessel traffic and reducing the potential for vessel-to-vessel collisions within the Precautionary Area.

Alternative 3 - Relocate Obstruction Material to Areas Outside the Footprint of the Rockpile

Implementation of Alternative 3 would result in similar adverse and identical beneficial impacts on navigation and vessel traffic as described under Alternative 2. Under Alternative 3, dredging equipment might be present within high vessel traffic areas (i.e., the entrance to the Ambrose Channel and within the Precautionary Area) for a shorter duration; however, the dredging equipment would then travel to an offsite disposal area. The distance of transit would be relatively short (i.e., up to 50 NMs) and the offsite disposal areas are not in high vessel traffic areas.

6.3 Socioeconomics

6.3.1 Evaluation Criteria

This section addresses the potential for direct and indirect impacts that the Proposed Action would have on the local or regional economy (i.e., new business or loss of business that affects employment), employment, and the procurement of goods and services and low-income and minority populations. If potential socioeconomic changes were to result in substantial shifts in population trends or in adverse effects on regional spending and earning patterns, they would be considered significant. A disproportionate high and adverse effect on a low-income or minority population would also be considered significant.

6.3.2 Environmental Consequences

Alternative 1 – No Action

Under Alternative 1 the obstruction to navigation would not be removed and would continue to pose a hazard to navigation that could potentially impact the regional economy dependent on the Port of NY and NJ which, according to a 2008 report by the NY Shipping Association, currently supports an estimated 270,000 direct and indirect jobs and nearly $29 billion in business activity in NY and NJ (PANYNJ 2011). High Spot C and the surrounding waters would continue to be used for commercial and recreational fishing, and other water-based activities, under this alternative.

Alternative 2 - Relocate Obstruction Materials to Areas Inside the Footprint of the Rockpile

Removal of the obstruction under Alternative 2 might temporarily reduce the quality of habitat for common commercial and recreational fish species, which could negatively affect fishing in the immediate area of High Spot C. Habitat within the approximately 65,000 ft^2 project area would be affected by the removal of material above 57 feet +2 feet at MLW. Additional area would be disturbed during transfer of this material to other areas within the rock pile footprint. If necessary, commercial and recreational fishers would relocate their activities to other areas within the rock pile or other nearby fishing areas in the NY Bight during construction. However, the fishery resources would be expected to return almost immediately upon completion of the project. Therefore, implementation of Alternative 2 would result in potentially adverse but temporary impacts on the local recreational fishing resources and community due to a temporary reduction of fishing habitat. See **Section 6.1.2** for more information on the potential impacts of Alternative 2 on biological resources, including fisheries.

If local contractors are selected to perform the proposed construction, then beneficial impacts on the local and regional economy would result from increased employment and purchase of supplies as local labor, equipment, and supplies would be needed to implement Alternative 2. In addition, modifying the rock pile to a depth of 57 feet +2 feet at MLW would remove the hazard to navigation and would (1) ensure a safer route for larger and heavier ships and (2) allow vessels to fully utilize the benefits of the 50 foot HDP.

Alternative 3 - Relocate Obstruction Material to Areas Outside the Footprint of the Rockpile

Implementation of Alternative 3 would result in similar adverse and beneficial impacts on socioeconomics as described under Alternative 2. Under Alternative 3, the rock pile would be modified to a depth of 57 feet +2 feet at MLW; however, the material would be disposed of outside of the rock pile footprint. Relocation of materials to a state-designated artificial reef site would likely create additional fisheries habitat. Since these artificial reef sites are existing permitted facilities, placement of the material from High Spot C could provide environmental benefits to the overall mission of the reef program and the commercial and recreational users of these programs. Alternative 3 would not result in significant impacts on socioeconomics.

If local contractors are selected to perform the proposed construction under Alternative 3, beneficial effects on the local and regional economy would result from increased employment and purchase of supplies. Local labor, equipment, and supplies would be needed to implement Alternative 3. Due to the transport of material outside of the rock pile footprint, Alternative 3 would likely cost more than the activities under Alternative 2. In addition, modifying the rock pile to a depth of 57 feet +2 feet at MLW would remove the hazard to navigation and would (1) ensure a safer route for larger and heavier ships and (2) allow vessels to fully utilize the benefits of the 50 foot HDP.

6.4 Cultural Resources

6.4.1 Evaluation Criteria

The analysis of the potential impacts associated with the Proposed Action considered both direct and indirect impacts on cultural resources. Adverse impacts might include physically altering, damaging, or destroying a cultural resource. These also could include altering a characteristic that contributes to a resource's eligibility for the National Register of Historic Places (NRHP) or introducing visual or audible elements out of character with or affecting the original setting of the resource. An adverse effect might also result from intentional or benign neglect that results in full or partial destruction of a cultural resource. Adverse impacts associated with indirect impacts could include the cumulative impacts of construction or project-related improvement of an area in which a cultural resource occurs. Such impacts include improvements to transportation corridors that facilitate increased access to the area.

Potential impacts were assessed by (1) identifying the nature and importance of cultural resources in potentially affected areas and (2) identifying activities that could directly or indirectly affect cultural resources classified as historic properties.

6.4.2 Environmental Consequences

Alternative 1 – No Action

As determined by the Remote Sensing Survey Report, there are no historic properties or historically significant structures within the APE at High Spot C (USACE–NYD 2009a). Therefore, no direct or indirect impacts on cultural resources would be expected.

Alternative 2 - Relocate Obstruction Materials to Areas Inside the Footprint of the Rockpile

As determined by the Remote Sensing Survey Report, there are no historic properties or historically significant structures within the APE at High Spot C (USACE–NYD 2009a). Therefore, no direct or indirect impacts on cultural resources from implementation of Alternative 2 would be expected.

Alternative 3 - Relocate Obstruction Material to Areas Outside the Footprint of the Rockpile

As determined by the Remote Sensing Survey Report, there are no historic properties or historically significant structures within the APE at High Spot C (USACE–NYD 2009a). Therefore, no direct or indirect impacts on cultural resources from implementation of Alternative 3 would be expected.

6.5 Hydrodynamics, Geology, and Water Quality

6.5.1 Evaluation Criteria

Impacts on hydrodynamics would occur if the Proposed Action were to cause a change to currents, waves, or tides in the project area.

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating the potential impacts of a proposed action on geological resources. Impacts on geology would occur if the Proposed Action destroys unique geological features; increases erosion potential; prevents recovery of mineral resources; increases potential for geological hazards, such as seismicity; or alters the soil composition, structure, or function within the environment.

Impacts on water quality would occur if the Proposed Action violates a Federal, state, local, or federally recognized international water quality criterion or waste discharge requirement; causes irreparable harm to human health, aquatic life, or beneficial uses of aquatic ecosystems; degrades marine, coastal, or terrestrial (e.g., lakes, rivers, wetlands, and tidal environments) water quality; or contributes to the further degradation of an impaired waterbody.

6.5.2 Environmental Consequences

The numerical models STWAVE and CMS-Wave were used to evaluate possible amplification effects of a range of wave conditions (Briggs and Demirbilek 2011). The study also employed the Channel Analysis and Design Evaluation Tool (CADET), empirical formulas and the net under-keel clearance based on vertical ship motion components to provide a risk-based method of evaluating transits over the rock pile compared to similar transits in the main Ambrose Channel. These results were used to select the minimum dredge depth over the rock pile (57 feet +2 feet at MLW) to insure that inadvertent transits over the rock pile would not incur any significant differences in ship response and potential grounding relative to similar transits in the off-shore reach of Ambrose Channel.

Alternative 1 – No Action

Under Alternative 1 the obstruction to navigation would not be removed; therefore, the existing hydrodynamic, geologic, and water quality conditions would remain as is. No direct or indirect impacts on hydrodynamic, geologic, and water quality conditions would be expected.

Alternative 2 - Relocate Obstruction Materials to Areas Inside the Footprint of the Rockpile

Alternative 2 would alter the bathymetry of the seafloor by removing the irregular peaks of High Spot C that currently create unique hydrodynamic conditions at the obstruction. Bathymetry influences currents, wave heights, and wave intensity. However, because High Spot C is 53 feet deep at MLW, its influence on surface waves is minimal. Alternative 2 would therefore result in long-term, negligible impacts on hydrodynamic conditions.

Modifying the rock pile to a greater depth would require the removal or alteration of the existing geologic formation consisting of rocks and gravel, which would alter the bathymetry of the seafloor. However, the rock pile would be modified to a depth similar or equal to that of the surrounding rock pile environment; therefore, it is not anticipated that erosion or instability would increase. Alternative 2 is more than 5 NMs from the NY Bight fault zone; therefore, no impacts from geologic hazards would be expected. No significant adverse impacts to geology would be expected under Alternative 2.

Short-term, and minor adverse changes to water quality conditions typically associated with reprofiling operations, including the temporary increase of turbidity through the resuspension of sediments in the water column, would occur during Alternative 2. Because the rock pile is a natural geologic formation (USACE-NYD 2009a), there are no known contaminants at High Spot C; therefore, it is not anticipated that contaminants would be reintroduced to the water column during construction. Alternative 2 would therefore result in short-term, and minor adverse impacts on water quality during the construction.

Removing the hazard to navigation would decrease the chances of a large hazardous material release from a vessel grounding in the future.

Alternative 3 - Relocate Obstruction Material to Areas Outside the Footprint of the Rockpile

Alternative 3 would result in similar long-term, negligible impacts on hydrodynamic conditions as Alternative 2.

The Alternative 3 project area is not near the NY Bight fault zone; therefore, no impacts from geologic hazards would be expected. No significant adverse impacts to geology would be expected.

Short-term and minor adverse changes to water quality conditions typically associated with reprofiling operations, including the increase of turbidity through the resuspension of sediments in the water column, would occur during Alternative 3. Alternative 3 would therefore result in short-term and minor adverse impacts on water quality during the construction. Alternative 3, however, would remove the hazard to navigation and decrease the chances of a large hazardous material release from a vessel grounding in the future.

6.6 Noise

6.6.1 Evaluation Criteria

The significance of the effects of the Proposed Action on existing ambient sound levels are based on the duration and magnitude of any change in sound level, often caused by a noise event. Construction activities could result in a temporary increase in noise. Noise has a highly localized effect, which diminishes as the distance from the noise source increases. Therefore, noise impacts would primarily occur close to where construction equipment is operating.

6.6.2 Environmental Consequences

Alternative 1 – No Action

Under Alternative 1 the obstruction to navigation would not be removed and the existing ambient noise environment would likely continue unchanged. No adverse impacts on noise levels would be expected under Alternative 1.

Alternative 2 - Relocate Obstruction Materials to Areas Inside the Footprint of the Rockpile

The operation of dredge and disposal equipment under Alternative 2 would result in a slight increase in the noise environment at High Spot C. However, the increased noise would be temporary (one month) and would not be heard by any people unless they are in the immediate vicinity of the construction at this remote location. Therefore, Alternative 2 would not result in significant, adverse impacts on noise. See **Section 6.1** for information regarding the potential impacts of noise from the Proposed Action on marine animals.

Alternative 3 - Relocate Obstruction Material to Areas Outside the Footprint of the Rockpile

Implementation of Alternative 3 would result in similar adverse impacts on noise as described under Alternative 2. Under Alternative 3, construction activities at High Spot C might be for a shorter duration than under Alternative 2. Therefore, Alternative 3 would not result in significant, adverse impacts on noise.

6.7 Air Quality

6.7.1 Evaluation Criteria

Federal law designates six air pollutants as *criteria pollutants* requiring special measures to limit presence in the nation's air. The six criteria air pollutants are particle pollution (often referred to as particulate matter), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. Based on these measurements of air quality, the USEPA designates attainment areas and nonattainment areas nationwide. Nonattainment areas are designated in areas where air pollution levels persistently exceed the NAAQS.

6.7.2 Environmental Consequences

Alternative 1 – No Action

Under Alternative 1 the obstruction to navigation at High Spot C would not be removed and the existing air quality would likely continue unchanged. There would be no additional emissions to the associated HDP future contracts due to this proposed action. No adverse impacts on air quality levels would be expected under Alternative 1.

Alternative 2 - Relocate Obstruction Materials to Areas Inside the Footprint of the Rockpile

The operation of dredge equipment and supporting vessels under Alternative 2 would result in a slight decrease in air quality at High Spot C. However, these impacts would be temporary (one month) and localized to the offshore location which is outside of the non-attainment area for the NY/NJ Harbor.

Travel to and from High Spot C within the nonattainment area would be reported by the dredging contractor in order to calculate associated air emissions. Air emissions for the project would be recorded and monitored monthly via the associated HDP dredging contract, following the same air emissions specifications as described in the Harbor Air Management Plan (HAMP, USACE-NYD 2009b). Information provided monthly by the dredger to tabulate air emissions include actual hours worked, equipment used, daily runtime per reportable engine, and any emission control methods used.

Alternative 2 would not result in significant adverse impacts on air quality since the offset strategies described in the HAMP would be expected to offset all HDP contract-specific project emissions.

Alternative 3 - Relocate Obstruction Material to Areas Outside the Footprint of the Rockpile

Under Alternative 3, construction activities at High Spot C would result in a slight decrease to air quality at High Spot C and through the transportation of the material to a disposal site. Therefore, Alternative 3 may result in temporary adverse impacts on air quality.

Typically, the States determine the upland disposal location of the dredge material. When the placement of dredged material at an upland destination is not specified by the Corps and is not under the ownership or control of the Corps, the air emissions associated with upland placement no longer falls under the jurisdiction of the HDP, but rather the SIPs.

Air emissions for the project under jurisdiction of the Corps would be recorded and monitored monthly via the associated HDP dredging contract, following the same air emissions specifications as described in the HAMP (USACE-NYD 2009b). Information provided monthly by the dredger to tabulate air emissions include actual hours worked, equipment used, daily runtime per reportable engine, and any emission control methods used.

Alternative 3 would not result in significant adverse impacts on air quality since the offset strategies described in the HAMP would be expected to offset all HDP contract-specific project emissions.

6.8 Cumulative Impacts

CEQ defines cumulative impacts as the "impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR Part 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time by various agencies (Federal, state, and local) or individuals.

There are contracts associated with the 50 foot HDP occurring in the vicinity of High Spot C. Dredging of the Ambrose Channel at Contract Areas 3A and 3B, which are approximately two miles northeast of the obstruction, started in late 2011 and is anticipated to continue until the end of 2012. The Ambrose Channel dredging will primarily consist of the removal of sand using a hydraulic hopper dredge. If the removal of the Ambrose obstruction occurred when the channel was being deepened then minor cumulative impacts would occur to those fish species, such as American shad, Atlantic sturgeon, alewife and blueback herring, migrating in the channels to their spawning grounds within the estuary. However, these impacts would be small to insignificant given the large area surrounding the project area (e.g., approximately 66 square miles of the LB, etc) in which spawning adults of these species can avoid the construction. Minor cumulative impacts to the navigation of vessels entering and transiting the Ambrose Channel would occur for the approximately one month period when both projects were occurring. The minor temporary cumulative impacts to the local fishing community would be far outweighed by the benefits of improved navigation to the regional economy. Because the projects would be approximately two miles apart, no cumulative impacts to hydrodynamics or noise are anticipated.

7. PUBLIC AND AGENCY COORDINATION

Agencies and the public will be afforded time to review and comment on the Draft Environmental Assessment (EA). Coordination efforts have been initiated with the US Fish and Wildlife Service, National Oceanic and Atmospheric Administration, and the NY State Historic Preservation Office.

The public will have the opportunity to comment on the Draft EA during a 15-day public review period. The draft document will be available for review on the USACE-NYD website at: http://www.nan.usace.army.mil/index.php (see "Recent Postings" located on the bottom, right side of the screen).

In addition to notification on the USACE-NYD website, a Notice of Availability Release Letter and associated mailing list can be found in Appendix E.

8. CONCLUSIONS

This EA evaluates the potential environmental impacts of the Proposed Action and associated alternatives. The Ambrose Obstruction project proposes to remove the High Spot C obstruction and modify the rock pile to a depth of 57 feet +2 feet at MLW. The EA formally addresses three alternatives (the No Action Alternative and two project alternatives). The purpose of identifying several alternatives that address both environmental concerns and still meet the underlying purpose and need for the Proposed Action is to ensure that all options are considered and fully examined.

The criteria used to evaluate alternatives for the proposed Ambrose Obstruction project included the following:

Criteria	**Alternative 1** **(No-Action)**	**Alternative 2** **(relocate material within**	**Alternative 3** **(relocate material outside**

		footprint)	**footprint)**
1. Improves navigational safety requirements?	NO	YES	YES
2. Provides maximum use and function of a 50 foot channel as described in the Purpose and Need for the 50 foot HDP?	NO	YES	YES
3. Minimizes potential environmental impacts to the fullest extent?	NO	YES	NO
4. Minimizes potential project costs to the fullest extent?	N/A	YES	NO

The proposed removal of High Spot C under Alternative 2 (Preferred Alternative) is not anticipated to have significant adverse impacts on the environment; therefore, the preparation of a FNSI would be appropriate. Under Alternative 2, modifying the rock pile to a depth of 57 feet +2 feet at MLW would have a beneficial impact on navigation within the NY/NJ Harbor, a need identified by the USCG and stakeholders responsible for safely and efficiently conducting waterborne navigation and commerce in the region (see **Appendix B**). Removal of the hazard to navigation would ensure a safer route for larger and heavier ships (Criteria 1), allow vessels to fully utilize the benefits of the 50 foot HDP, and allow the region to continue reaping the economic benefits of deeper navigation channels (Criteria 2). Under the No Action Alternative 1, High Spot C would continue to pose a hazard to navigation that could potentially cause much larger impacts to the environment and humans (Criteria 3) through vessel groundings on the obstruction, increased vessel maneuvering to avoid the obstruction, and vessel-to-vessel collisions. Each of these potential impacts under the No Action Alternative 1 could in turn potentially negatively impact the regional economy and the Port of NY and NJ, which currently supports an estimated 270,000 direct and indirect jobs and nearly $29 billion in business activity in NY and NJ (Criteria 4). Alternative 3, relocating the obstruction materials to an area outside the rock pile footprint, does not meet all requirements of each of the four criteria; compared to Alternative 2, it would have additional cost and environmental impacts beyond the immediate area of the High Spot C rock pile, including impacts associated with removing the material and transporting it to a disposal site.

Potential short-term, minor impacts on biological resources inhabiting the rock pile could result from the construction activity under Alternative 2, which is expected to take approximately one month to complete. These potential impacts would result from sediment resuspension, habitat disturbance, noise, and possibly crushing and burial of a few individuals of the more non-mobile species, such as benthic invertebrates and epibenthic shellfish. Most importantly, unlike Alternative 3, Alternative 2 would relocate material within the footprint and would limit the impacts to High Spot C by preventing an alteration to the basic substrate type of the rock pile, a habitat component that biological resources would use to begin recovery. Impacts on a few structure-oriented fish species, such as cunner and conger eel, as well as five EFH species (Atlantic cod, black sea bass, monkfish, red hake and scup) could include direct impacts to a few individuals, physical alterations to benthic habitat, and disturbance of benthic and epibenthic forage communities. However, these impacts are expected to be minimal as these mobile species can avoid the construction and temporally relocate to other areas of the rock pile unaffected by the construction or to other similar habitats in the area in and around the Bight. Although construction is likely to occur in the spring or summer because it is the more ideal time of year to work in the Bight, impacts to spawning fish would be limited to those few species, such as black sea bass, cunner and tautog that might spawn in the project area and to those migrating species, such as American shad and Atlantic sturgeon, that are entering the estuary and briefly transiting the project area to spawn in other areas. However, these short-term impacts on spawning and migrating fish species are expected to be negligible because of the large amount of open water in and around the Bight in which these species can easily avoid the short-term construction by simply moving from the area of disturbance to similar habitats located nearby.

The Proposed Action would result in minor, short-term adjustments to vessel approaches during construction, and potential minor but insignificant impacts to local socioeconomics due to a temporary reduction of commercial and recreational fishing in the immediate area of the rock pile. However, this alternative would offer long-term, beneficial impacts on navigation and the regional economy. The Proposed Action would result in minor, short-term impacts on noise, air and water quality as well as long-term but insignificant impacts on hydrodynamics and geology at the obstruction. There would be no impacts on cultural resources. **Table 2** provides a more detailed summary and comparison of potential impacts resulting from the Proposed Action alternatives.

	Alternative 1	**Alternative 2**	**Alternative 3**
Biological Resources	The obstruction would continue to pose a vessel-obstruction collision risk, which could result in adverse impacts on benthic resources, fish and wildlife resources, protected species, and EFH species due to hazardous material spills or releases.	Minor, adverse impacts on benthic resources would result from disturbance and possible crushing and burial of shellfish, and temporary habitat loss and mortality of prey species. Negligible to minor impacts on fish and wildlife resources and protected species due to turbidity, noise, disturbance of species and habitats, crushing and burial, and/or temporary reduction of benthic food resources. In addition, it is possible but unlikely for project vessels to strike marine mammals. Impacts on EFH species could include direct impact to a few individuals and physical alterations to benthic habitat and disturbance of benthic and epibenthic forage communities for Atlantic cod, black sea bass, monkfish, red hake and scup.	Similar to Alternative 2 impacts except material disposal would occur outside the obstruction footprint, which would alter the basic substrate type of the rock pile and would result in some loss of habitat for biological resources. Possible but unlikely potential increase for risk of collisions between vessel and protected species due to increased vessel movements to disposal location compared to Alternative 2.

	Alternative 1	Alternative 2	Alternative 3
Navigation	The obstruction would continue to be a hazard to navigation. Adverse impacts on navigation and vessel traffic would continue to impede the full use of the seaward approach to the Ambrose Channel and the economic benefits of the 50 foot HDP would not be fully realized.	Minor adjustments to vessel approaches during construction resulting in short-term, insignificant adverse impacts. Long-term, beneficial impacts on navigation would remove the existing hazard to navigation, reduce the potential for vessel groundings and allow more efficient use of the surrounding deeper water areas by spreading vessel traffic and reducing the potential for vessel-to-vessel collisions within the Precautionary Area.	Similar adverse and identical beneficial impacts on navigation and vessel traffic as Alternative 2. Dredging equipment may be present within the project area (high vessel traffic area) for a shorter duration while transporting the material to a disposal location.
Socioeconomics	The obstruction would continue to pose a hazard to navigation that could potentially impact the regional economy dependent on the Port. High Spot C and the surrounding waters would continue to be used for commercial and recreational fishing, and other water-based activities.	Insignificant, adverse impacts on local economy due to potential temporary reduction of commercial and recreational fishing in the area. Beneficial impacts on the local economy would result from increased employment and purchase of local equipment and supplies during work activities. Alternative would ensure a safer route for larger and heavier ships, allow vessels to fully utilize the benefits of the 50 foot HDP, and allow the NY/NJ area to continue reaping the economic benefits of deeper navigation channels.	Similar to Alternative 2 impacts for the proposed action area.
Cultural Resources	No impacts.	No impacts.	No impacts.

	Alternative 1	Alternative 2	Alternative 3
Hydrodynamics, Geology, and Water Quality	No impacts.	Altering the bathymetry of the seafloor at High Spot C by removing the irregular peaks would result in negligible, long-term impacts on bottom hydrodynamics. Minor, adverse impacts on geologic conditions would result due to alteration of the existing geologic formation. Minor, adverse impacts on water quality would result due to short-term increases in turbidity during construction. Removing the hazard to navigation would decrease the chances of a large hazardous material release from a vessel grounding in the future.	Similar to Alternative 2 impacts.
Noise	No impacts.	No significant impacts to noise beyond short-term increases during construction at High Spot C, which is in a remote location.	Similar to Alternative 2, except noise duration may be reduced if construction activities cease at the project site during transport of material to a disposal location.
Air Quality	No impacts	No significant impacts to air quality beyond short-term impacts during construction at High Spot C, which is an offshore location outside of the non-attainment area. Air emissions associated with Alternative 2 would be offset through the HDP HAMP.	Additional impacts to air quality through the transportation of the material to a disposal site. Air emissions associated with Alternative 3 would be offset through the HDP HAMP.

Table 2. Comparison of the Proposed Action Alternatives.

9. REFERENCES

Auster 1989	Auster, P.J. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (north Atlantic and mid-Atlantic): tautog and cunner. U.S. Fish and Wildlife Service Biological Report 82(11.105).
Bain 1997	Bain, M.B. 1997. Atlantic and shortnose sturgeon of the Hudson River: common and divergent life history attributes. *Environmental Biology of Fishes* 48:347-358.
Bigelow and Schroeder 1953	Bigelow, H. B., and W.C. Schroeder. 1953. Fishes of the Gulf of Maine. U.S. Fish Wildl. Serv. Fish. Bull. 74. 557 pp.
Briggs and Demirbilek 2011	Briggs, M. J. and Z. Demirbilek. 2011. Vertical Ship Motion Study for Ambrose Entrance Channel, NY. Draft Final Report. ERDC/CHL TR-11-X. September 7, 2011.
Brooks *et al.* 2006	Brooks, R.A., C.N. Purdy, S.S. Bell And K.J. Sulak. 2006. The Benthic Community Of The Eastern US Continental Shelf: A Literature Synopsis Of Benthic Faunal Resources. Continental Shelf Research 26 (2006) 804-818.
Byrnes *et al.* 2004	Byrnes, M.R., R.M. Hammer, S.W. Kelley, J.L. Baker, D.B. Snyder, T.D., Thibaut, S.A Zichichi, L.M. Lagera, Jr., S.T. Viada, B.A. Vittor, J.S. Ramsey, and J.D. Germano. 2004. Environmental Surveys of Potential Borrow Areas Offshore Northern New Jersey and Southern New York and the Environmental Implications of Sand Removal for Coastal and Beach Restoration. November 2004. Prepared for U.S. Department of the Interior, Minerals Management Service, Leasing Division, Marine Minerals Branch. OCS Report MMS 2004-044, Volume I.
Cerrato 2006	Cerrato, R.M. 2006. Long-term and large-scale patterns in the benthic communities of New York Harbor. The Hudson River Estuary. Cambridge University Press.
Collette and MacPhee 2002	Collette, B.B. and G. Klein MacPhee. 2002. Fishes of the Gulf of Maine. Smithsonian Press. Washington, DC.
Dovel and Berggren 1983	Dovel, W.L. and T.J. Berggren. 1983. Atlantic sturgeon of the Hudson estuary, New York. New York Fish and Game Journal 30(2):140-172.
Drohan *et al.* 2007	Drohan, A.F., J.P. Manderson, and D.B. Packer. 2007. Essential Fish Habitat Source Document: Black sea bass, Centropristis striata, Life History and Habitat Characteristics, 2nd edition. February 2007. NOAA Technical Memorandum NMFS-NE-200.
Gilbert 1989	Gilbert, C.R. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (mid-Atlantic bight): Atlantic and shortnose sturgeons. U.S. Fish and Wildlife Service Biological Report 82(11.122).
Haley 1998	Haley, N. 1998. A gastric lavage technique for characterizing diets of sturgeons. North American Journal of Fisheries Management 18:978-981.

Hutchinson and Grow 1985	Hutchinson, D.R., and J.A. Grow. 1985. "New York Bight Fault." Abstract. Geological Society of America Bulletin. August 1985.
Johnson *et al. 1997*	Johnson, J.H., D.S. Dropkin, B.E. Warkentine, J.W. Rachlin, and W.D. Andrews. 1997. Food habits of Atlantic sturgeon off the central New Jersey coast. Transactions of the American Fisheries Society 126:166-170.
Levy *et al.* 1988	Levy, A., K.W. Able, C.B. Grimes, and P. Hood. 1988. Biology of the conger eel Conger oceanicus in the Mid-Atlantic Bight. Part II. Foods and feeding ecology. Marine Biology 98: 597-600.
MacKenzie *et al.* 1985	MacKenzie, C., L.S. Weiss-Glanz, and J.R. Moring. 1985. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (mid-Atlantic): American shad. U.S. Fish and Wildlife Service Biological Report 82(11.37).
MANEM 2006	Mid-Atlantic/New England/Maritimes Region (MANEM). 2006. "Mid-Atlantic/New England/Maritimes Region (MANEM) Waterbird Conservation Plan." In Preparation. Available online: <http://www.waterbirdconservation.org/manem.html>. Accessed June 2009.
Morreale and Standora 2005	Morreale, S.J. and E.A. Standora. 2005. "Western North Atlantic Waters: Crucial Developmental Habitat for Ridley and Loggerhead Sea Turtles." Chelonian Conservation and Biology 4 (4):872-882.
Murawski and Pacheco 1977	Murawski, S. A. and A. L. Pacheco. 1977. Biological and fisheries data on Atlantic Sturgeon, Acipenser oxyrhynchus (Mitchill). National Marine Fisheries Service Technical Series Report 10: 1-69.
NJDEP 2011	New Jersey Department of Environmental Protection (NJDEP), Division of Fish and Wildlife. 2011. "Locations of New Jersey Artificial Reefs." Last updated May 31, 2011. Available online: <http://www.state.nj.us/dep/fgw/refloc00.htm#sites>. Accessed June 14, 2011.
NJScuba.net 2009	NJScuba.net. 2009. "Scuba Diving – New Jersey and Long Island New York. Dive Sites – New Jersey – Sandy Hook." April 28, 2009. Available online: <http://njscuba.net/sites/chart_nj-1_sandy_hook.html>. Accessed June 21, 2011.
NMFS 1999a	National Marine Fisheries Service (NMFS). 1999. Essential Fish Habitat Source Document: Butterfish, Peprilus triacanthus, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-145.
NMFS 1999b	NMFS. 1999. Essential Fish Habitat Source Document: Scup, Stenotomus chrysops, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-149.
NMFS 2000	NMFS. 2000. Biological Opinion on the New York and New Jersey Harbor Navigation Project. October 13, 2000.

NMFS 2011 — NMFS. 2011. Letter from Mary A. Colligan, Assistant Regional Administrator for Protected Resources, in response to the Threatened and Endangered Species Information Request. March 1, 2011.

NOAA 2011 — National Oceanic and Atmospheric Administration (NOAA). 2011. Essential Fish Habitat Mapper. Available online: <http://sharpfin.nmfs.noaa.gov/website/EFH_Mapper/map.aspx>. Accessed January-June 2011.

NYDEC 2011 — New York Department of Environmental Conservation (NYDEC). 2011. "Artificial Reef Locations." Available online: <http://www.dec.ny.gov/outdoor/71702.html>. Accessed June 14, 2011.

Palma *et al.* 1998 — Palma A.T., R.A. Wahle, Steneckl R.S. 1998. Different early post-settlement strategies between American lobsters *Homarus americanus* and rock crabs *Cancer irroratus* in the Gulf of Maine. Marine Ecology Progress Press. 162:215-225.

Pearce 2000 — Pearce, J.B. 2000. "The New York Bight." Marine Pollution Bulletin 41(1-6): 44-55 (2000).

Pereira *et al.* 1999 — Pereira, J.J., R. Goldberg, J.J. Ziskowski, P.L. Berrien, W.W. Morse, and D.L. Johnson. 1999. Essential Fish Habitat Source Document: Winter Flounder, Pseudopleuronectes americanus, Life History and Habitat Characteristics. NOAA Technical Memorandum NMFS-NE-138. September 1999.

PANYNJ 2011 — Port Authority of New York and New Jersey (PANYNJ). 2011. Port Authority Reports Encouraging Growth in Cargo Volumes at Port of New York and New Jersey. Press Release #: 13-2011 dated March 7, 2011. Available online: <http://www.panynj.gov/press-room/press-item.cfm?headLine_id=1364>. Accessed October 2011.

Rebach and Ristvey 1999 — Rebach, S. and A. Ristvey. 1999. Enhancement of the response of Rock crabs, Cancer irroratus, to prey odors following feeding experience. Biological Bulletin 197: 361–366.

Schwab *et al.* 2000 — Schwab, W.C., J.F. Denny, B. Butman, W.W. Danforth, D.S. Foster, B.A. Swift, L.L. Lotto, M.A. Allison, E.R. Thieler, and J.C. Hill. 2000. Seafloor Characterization Offshore of the New York-New Jersey Metropolitan Area using Sidescan-Sonar. Derived from U.S. Geological Survey Open-File Report 00-295. Available online: <http://pubs.usgs.gov/of/2000/of00-295/>. Accessed June 29, 2011.

Schwab *et al.* 2002 — Schwab, W.C., J.F. Denny, D.S. Foster, L.L. Lotto, M.A. Allison, E. Uchupi, W.W. Danforth, B.A. Swift, E.R. Thieler, and B. Butman. 2002. High-Resolution Quaternary Seismic Stratigraphy of the New York Bight Continental Shelf. USGS Open-File Report 02-152. Available online: <http://pubs.usgs.gov/of/2002/of02-152/index.htm>. Accessed June 29, 2011.

Sherman *et al.* 1996	Sherman, K., M. Grosslein, D. Mountain, D. Busch, J. O'Reilly, and R. Theroux. 1996. "The Northeast Shelf Ecosystem: An Initial Perspective." Pages 103-126 in K. Sherman, N.A. Jaworski, and T.J. Smayda, eds. The Northeast Shelf Ecosystem: Assessment, Sustainability, and Managements. Cambridge, MA: Blackwell Science.
Smith 1985b	Smith, T.I.J. 1985b. The fishery, biology, and management of Atlantic sturgeon, Acipenser oxyrhynchus, in North America. Environmental Biology of Fishers 14(1):61-72.
Steimle and Zetlin 2000	Steimle, F.W. and C. Zetlin. 2000. Reef habitats in the middle Atlantic Bight: abundance, distribution, associated biological communities, and fishery resource use. Marine Fisheries Review 62: 24-41.
USACE–NYD 1999a	U.S. Army Corps of Engineers – New York District (USACE–NYD). 1999. Feasibility Report for New York and Jersey Harbor Navigation Study. Final Environmental Impact Statement. December 1999.
USACE-NYD 1999b	U.S. Army Corps of Engineers (USACE), New York District. 1999b. Draft Biological Assessment for Sea Turtles New York and New Jersey Harbor Complex.
USACE-NYD 2003	USACE-NYD. 2003. Harbor Air Management Plan for the New York and New Jersey Harbor Deepening Project. December 2003.
USACE–NYD 2004	USACE–NYD. 2004. Environmental Assessment on Consolidated Implementation of the New York and New Jersey Harbor Deepening Project. January 2004.
USACE–NYD 2007	USACE–NYD. 2007. New York and New Jersey Harbor Navigation Project. Draft Migratory Finfish Survey Report 2006.
USACE–NYD 2009a	USACE–NYD. 2009. Final Report - Remote Sensing Survey of Portions of Ambrose Channel and Sandy Hook Pilot Area in Connection with the New York and New Jersey Harbor Navigation Study, King and Richmond Counties, New York. Authored by: Andrew D.W. Lydecker and Stephen R. James, Jr. Prepared by Panamerican Consultants, Inc. Under Subcontract to TetraTech, Inc. June 2009.
USACE-NYD 2009b	USACE-NYD. 2009. Harbor Air Management Plan for the New York and New Jersey Harbor Deepening Project, 2008 Update. October 2009.
USACE–NYD 2010a	USACE–NYD. 2010. Correspondence between Ms. Ann Marie DiLorenzo (USACE) and Ms. Julie Crocker (NMFS) regarding File Search Request for Threatened and Endangered Marine Species or their Habitat for the Ambrose Obstruction Removal Project. November 5, 2010.
USACE–NYD 2010b	USACE–NYD. 2010. Correspondence between Ms. Ann Marie DiLorenzo (USACE) and Mr. Ron Popowski (USFWS) regarding File Search Request for Threatened and Endangered Species or their Habitat for the Ambrose Obstruction Removal Project. November 5, 2010.
USACE–NYD 2010c	USACE–NYD. 2010. Ambrose Obstruction Biological Sampling Report. April 2010.

USACE–NYD 2010d — USACE–NYD. 2010. New York and New Jersey Harbor Navigation Project. Aquatic Biological Survey Report 2009.

USEPA 2010 — U.S. Environmental Protection Agency (USEPA). 2010. “Dredged Material Management Program.” USEPA Region 2. Last updated October 5, 2010. Available online: <http://www.epa.gov/region2/water/dredge/intro.htm#Management>. Accessed June 14, 2011.

USFWS 1997 — U.S. Fish and Wildlife Service (USFWS). 1997. Significant Habitats and Habitat Complexes of the New York Bight Watershed. Southern New England-New York Bight, Coastal Ecosystems Program. Charlestown, RI. November 1997.

USFWS 2011 — USFWS. 2011. Letter from Ron Popowski, Assistant Supervisor, in response to the Threatened and Endangered Species Information Request. March 16, 2011.

Van den Avyle 1984 — van den Avyle, M. J. 1984. Species profile: life histories and environmental requirements of coastal fishes and invertebrates (south Atlantic)—Atlantic sturgeon. U.S. Fish Wildl. Serv. Biol. Rep. 81(11.25). U.S. Army Corps of Engineers, TR EL-82-4. 17 pp.

Van Eenennaam *et al.* 1996 — Van Eenennaam, J.P., S.I. Doroshov, G.P. Moberg, J.G. Watson, D.S. Moore, and J. Linares. 1996. Reproductive Conditions of the Atlantic sturgeon (Acipenser oxyrinchus) in the Hudson River. Estuaries 19(4):769-777.

Vladykov and J.R. Greely 1963 — Vladykov, V.D., and J.R. Greely. 1963. Fishes of the Western North Atlantic 1:24-60.

Wilber and Clarke 2007 — Wilber, D.A. and D.G. Clarke. 2007. Defining and assessing benthic recovery following dredging and dredged material disposal**.** Presented at Western Dredging Association WODCON XVIII Convention, Lake Buena Vista, Florida.

10. LIST OF PREPARERS AND REVIEWERS

USACE-NYD Team:

Ann Marie DiLorenzo (preparer and reviewer)
Lead Biologist/NEPA POC

Jenine Gallo (reviewer)
Marine Ecologist/Regional Technical Specialist

Lynn Rakos (reviewer)
Archaeologist/Estuary Section Chief

Hibba Wahbeh (preparer and reviewer)
Environmental Engineer

Tom Shea (reviewer)
Project Manager, Harbor Programs Branch US Army Engineer District

Ellen Simon (reviewer)
Assistant District Counsel

Consultant:

Henningson, Durham and Richardson Engineering, Inc (preparer, reviewer, and QA/QC for portions of the document)

APPENDIX A

ESSENTIAL FISH HABITAT ASSESSMENT – ELIMINATION OF AN OBSTRUCTION TO NAVIGATION NEAR AMBROSE CHANNEL (HIGH SPOT C)

ESSENTIAL FISH HABITAT ASSESSMENT

ELIMINATION OF AN OBSTRUCTION TO NAVIGATION IN AMBROSE CHANNEL (HIGH SPOT C)

Prepared for:

U.S. Army Corps of Engineers – New York District

Planning Division
Estuary Section
26 Federal Plaza
New York, New York 10278

December 2011

TABLE OF CONTENTS

1.0 INTRODUCTION

In compliance with Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCA), as amended by the Sustainable Fisheries Act (SFA) of 1996 (Public Law 104-267), the U.S. Army Corps of Engineers – New York District (USACE-NYD) developed this assessment to evaluate the potential impacts on essential fish habitat (EFH) from the proposed elimination of an obstruction to navigation (High Spot C) near the entrance to Ambrose Channel (Figure 1) by removing and/or shifting some rock and gravel material to a depth of 57 feet mean low water + 2 feet. Impacts may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Impacts to EFH may result from actions occurring within or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

This assessment includes an evaluation of the direct, indirect, and cumulative impacts of the proposed project on those species and life stages for which EFH has been designated in the project area. The potential physical and biological impacts of re-profiling away the obstruction on EFH and forage species were evaluated using information collected during site-specific sampling in September of 2009. Short-term and long-term impacts to the benthic habitat in this area were assessed in terms of the seasonal distribution, relative abundance, and habitat requirements of the designated species within the project area relative to the proposed action.

2.0 PROJECT DESCRIPTION

2.1 Existing Conditions

There is a rock pile located at the apex of the New York Bight in a critical approach area for deep draft commercial vessel traffic near the entrance to Ambrose Channel (Figure 1). The rock pile contains high spots, which have collectively been identified as an obstruction (High Spot C) to navigation. Although much of the Ambrose Channel is naturally deep, a channeled passage through an area of shoals located between Sandy Hook, New Jersey and Rockaway Point, New York has been dredged since the early 1900s (USACE 2009).

The rock pile represents the affected environment. The entire footprint of the rock pile measures approximately 700 feet north to south and 1,300 feet east to west. A remote sensing survey of the rock pile indicated an irregular rocky bottom with no articulated vessel structure or debris piles

(Figure 2) (USACE 2009), and represents a structured geologic formation consisting of rocks and gravel at a higher elevation (up to 21 feet) than the surrounding sand and/or mud seafloor.

The rock pile is a hazard to navigation because the high spots reduce mean low water depth to 53 feet and is shallower than the proposed channel depths of 57 feet + 2 feet at mean low water (MLW). Water depths surrounding the obstruction range from 72 to 80 feet (USACE 2010).
Bottom water quality from the project area (Table 1) was measured during the fall 2009 sampling (USACE 2010) along with previous USACE-NYD surveys of the nearby waters (USACE 2007, USACE 2010a). All parameters were within an expected range for coastal marine waters and were adequate for aquatic life. These water quality ranges are presented in Table 1.

Table 1. Existing Water Quality Conditions

Ambrose Area Water Quality Data				
Season	**Temperature (C°)**	**Dissolved Oxygen (mg/l)**	**Conductivity (SPC@25°C)**	**Salinity (ppt)**
Winter	3.8 – 9.4	8.0 – 11.0	48,030 – 48,965	28.7 – 31.5
Spring	5.5 – 13.4	9.4 – 13.0	42,810 – 46,965	29.5 – 30.5
Summer	20.5 – 22.6	4.4 – 5.3	39,810 – 43,030	25.4 – 27.9
Fall	17.3 – 19.8	5.1 – 6.4	47,830 – 49,420	31.2 – 32.4

Source - USACE Draft 2007, USACE 2010, USACE 2010a

The rock pile may be considered to have value as marine habitat in that its rocky substrate and elevation above the surrounding bottom provides alternative habitat to the surrounding sand and mud bottom. The area may be used by recreational fisherman as previous surveys have noted the presence of lobster buoys in the area (USACE 2009).

2.2 Proposed Actions

Three proposed actions are under consideration for this project:

1. *Alternative 1: No Action*: The No Action Alternative represents what would occur if the agency were not to carry out the Proposed Action. Under this alternative, physical modifications would not be made to the existing obstruction. By not taking action, the high spot would continue to pose a risk to humans and the environment through vessel-obstruction strikes, increased vessel maneuvering, and potential hazardous material releases. Moreover, the economic benefits of the Harbor Deepening Project (HDP) would

also not be maximized because efficient use of the Ambrose navigation channel would not occur.

2. *Alternative 2*: *Preferred:* This alternative would entail re-profiling away the obstruction to a depth of 57 feet mean low water (MLW) + 2 feet (59 feet) within the existing footprint of the rock pile. The total area within the footprint that needs to be lowered is approximately 65,000 ft^2. To re-profile the substrate to 57 feet + 2 feet MLW would require moving approximately 6,000 yd^3 of rocky debris from the total area of 910,000 ft^2. Elimination of the obstruction would be accomplished using a variety of methods including: 1) an I-beam dragged along the bottom by a tugboat; 2) a clamshell dredge or backhoe to pick up and move material above 59 feet directly to a nearby deeper location within the footprint of the rock pile; and/or 3) a clamshell or backhoe would be used to pick up and transfer material with the use of a scow, and excavated material would be placed at lower elevations within the footprint of the rock pile. The duration of the action would be about one month without adverse weather conditions and/or equipment failure/maintenance, and is considered short-term. This action would remove the obstruction to navigation, but the remaining rock pile would remain elevated above the surrounding ocean bottom. The material placed at lower elevations would cover existing substrate, but would create areas of slightly raised profile and irregular bottom habitat similar to what was removed at a higher elevation. Transferring the material from above the 59-foot elevation within the footprint would not alter the substrate type, and would therefore keep the habitat feature. Because the footprint of the obstruction would remain higher than the surrounding bottom local hydrodynamics would not change significantly.

3. *Alternative 3*: This alternative would entail re-profiling away the obstruction to a depth of 57 feet MLW + 2 feet (59 feet) by dredging and transporting the material outside the footprint of the rock pile. This action would entail the use of a clamshell dredge or backhoe and transportation of excavated material to a State designated artificial reef site, an upland disposal site, or the Historic Area Remediation Site (HARS). This action would result in the removal of potential habitat, but is expected to have less temporary disturbance at the rock pile than Alternative 2 because the excavated material would not be placed on potential existing habitat at a lower elevation in the footprint of the rock pile. However, if the excavated material were placed at another marine site (existing artificial reef or HARS), there could be temporary disturbance at these locations because the excavated material could potentially cover existing habitat. Artificial reef sites are selected so that the addition of rocky material enhances habitat at the site and HARS is being remediated to reduce the impact of unsuitable dredged material placement, thus rock from High Spot C could enhance habitat at these two locations. However, the incremental differences in habitat value of the relatively small amount of rocky material

from High Spot C among the two marine placement locations would be very small and would not justify the cost of transporting the material away from the project area. Upland disposal would not involve any additional temporary marine impacts.

2.3 Project Impacts

The potential direct, indirect and cumulative impacts resulting from both short-term and long-term changes to local habitats were evaluated. These impacts were considered for periods both during and after construction activities and were evaluated for those species and life stages in the project area for which EFH has been designated. Impacts were assessed in terms of the seasonal distribution, relative abundance, and habitat requirements using information collected during on-going and past biological surveys of the area and other recent studies in the project vicinity.

2.3.1 Direct Impacts

Direct impacts are defined as those impacts that directly affect EFH or cause mortality. These impacts include physical alterations to benthic habitat of a particular EFH species. Potential direct impacts to EFH species within the project area include the following:

- the collection of demersal eggs and larvae in dredging/re-profiling equipment
- changes to and/or removal of EFH habitat in the project areas
- localized changes in water column depth, bathymetry, hydrodynamics, and sedimentation rates
- the temporary and localized impacts associated with the proposed activities (i.e., water disturbance, noise and vibrations)
- short-term changes to water quality conditions typically associated with re-profiling operations including the re-suspension of sediments in the water column.

2.3.2 Indirect Impacts

Indirect impacts considered under EFH are defined as those impacts that indirectly affect the well-being of a particular species including the loss of forage species. The primary indirect impact to EFH species during construction of the proposed project would be the disturbance of benthic and epibenthic forage communities. Several of the EFH species are demersal, or benthic feeders (i.e. red hake and black sea bass), that may experience a short-term, temporary change in feeding efficiency during and immediately following the proposed activities. Elimination of the obstruction would potentially disturb areas above 59 feet and those areas below 60 feet that receive the relocated substrate material. The area to be modified is approximately 7% of the overall footprint of the rock pile and the depositional area is expected to occupy a similar percentage of the entire rock pile. These areas would have reduced food resources for benthic fishes until they are re-colonized over a period of a few months up to approximately several years for sand and gravel substrate (Brooks *et. al.* 2006; Wilber & Clarke 2007).

2.3.3 Cumulative Impacts

Cumulative impacts are defined as those impacts to EFH resulting from the ongoing activities of a particular project and/or from the activities of multiple, related projects in an area. These impacts represent the cumulative effects that can result from individually minor but collectively significant actions taking place over a period of time in a particular habitat. Short-term cumulative impacts would be related to re-profiling associated with the project and/or other permitted projects that are ongoing or recently constructed within the area. These short-term cumulative impacts to EFH would be a combination of disturbances associated with each project. Long-term cumulative impacts would be limited to localized changes in water column depth, bathymetric contours, hydrodynamics, and sedimentation rates. Harbor Deepening Project dredging of the Ambrose Channel (Contract Areas 3A & 3B located at least two miles to the northeast) is scheduled for 2012-2013, although no other related construction activities are ongoing in the immediate vicinity of the project area; therefore no cumulative impacts on any of the species mentioned in this report are anticipated.

3.0 ESSENTIAL FISH HABITAT DESIGNATIONS

Essential fish habitat is defined under section 305(b)(2) of the MSFCMA (Public Law 94-265), as amended by the SFA of 1996 (Public Law 104-267), as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity."

EFH designations emphasize the importance of habitat protection to healthy fisheries and serve to protect and conserve the habitats of marine, estuarine, and anadromous finfish, mollusks, and crustaceans. EFH embodies the physical, chemical, and biological growth properties of both the water column and the underlying substrate, including sediment, hard bottom, and other submerged structures. Under the EFH definition, necessary habitat is that which is required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. EFH may be designated for the complete life cycle of a species, including spawning, feeding, and growth to maturity, or may be specific for each life stage (eggs, larvae, juvenile, adult, and spawning adult). EFH designations are defined for specific life stages based on occurrence in tidal freshwater, estuarine (brackish salinity zone), and marine (seawater salinity zone) water.

EFH that is identified as particularly important to the long-term productivity of populations of one or more managed species, or EFH determined to be particularly vulnerable to degradation, may also be identified by Fishery Management Councils (FMCs) and National Marine Fisheries Service (NMFS) as habitat areas of particular concern (HAPC). There are no designated habitat areas of particular concern (HAPC) for any EFH designated fish species for the area of High Spot C (NMFS 2007).

4.0 ESSENTIAL FISH HABITAT ASSESSMENT

Essential fish habitat has been designated for 30 federally managed species in the vicinity of the project area. Among the 30 designated species the utilization of the rock pile for life history activity varies widely. The potential impact of the preferred alternative, however, is limited to a small number of species in which preferred habitat may be available in the project area. These 30 species have been grouped by life history needs to distinguish the relative importance of the rock pile for each species and to provide a basis for characterizing potential impact. This initial assessment shows that only five species could experience adverse impacts as a result of the proposed action. The magnitude of the potential impact is discussed in Section 4.2 and Section 5.0.

Table 2 provides a summary of those species for which EFH has been designated in the project area, and is based on the National Oceanic and Atmospheric Administration (NOAA) EFH Designation Tables (NMFS 2007) and EFH Mapper for the project area (NOAA 2011). Of these 30, 10 have designated EFH for eggs and larvae in the project area, indicating that the area may be used for spawning. There are also 24 species that have designated EFH for the juvenile life stage and 22 that have designated EFH for adult life stage.

Table 2: EFH Designated Species of High Spot C and Surrounding Waters.

EFH Species of Ambrose Channel					
Species	**Eggs**	**Larvae**	**Neonate**	**Juveniles**	**Adults**
Atlantic cod (*Gadus morhua*)					X
Atlantic herring (*Clupea harengus*)				X	X
Black sea bass(*Centropristis striata*)				X	X
Bluefish (*Pomatomus saltatrix*)	X	X		X	X
Butterfish (*Peprilus triacanthus*)				X	
Cobia (*Rachycentron canadum*)	X	X		X	X
King mackerel (*Scomberomorus cavalla*)	X	X		X	X
Monkfish (*Lophius americanus*)	X	X			
Red hake (*Urophycis chuss*)	X			X	
Scup (*Stenotomus chrysops*)				X	X
Silver hake (*Merluccius bilinearis*)	X	X		X	
Spanish mackerel (*Scomberomorus maculatus*)	X	X		X	X
Summer flounder (*Paralicthys dentatus*)				X	X
Windowpane flounder (*Scophthalmus aquosus*)	X	X		X	X
Winter flounder (*Pseudopleuronectes americanus*)	X	X		X	X
Witch flounder (*Gylptocephalus cynoglossus*)		X			
Yellowtail flounder (*Limanda ferrunginea*)	X	X		X	X
Clearnose skate (*Raja eglanteria*)				X	X
Little skate (*Leucoraja erinacea*)				X	X
Winter skate (*Leucoraja ocellata*)				X	X
Atlantic bluefin tuna (*Thunnus thynnus*)				X	
Skipjack tuna (*Katsuwonus pelamis*)					X
Common thresher shark (*Alopias vulpinus*)			X	X	X
Dusky shark (*Carcharhinus obscurus*)			X	X	X
Sand tiger shark (*Carcharias taurus*)			X		
Sandbar shark (*Carcharhinus plumbeus*)				X	X
Shortfin mako shark (*Isurus oxyrinchus*)			X		
Smooth dogfish (*Mustelus canis*)			X	X	X
Tiger shark (*Galeocerdo cuvieri*)				X	X
White shark (*Carcharodon carcharias*)			X	X	X

Table 3 groups the 30 designated species by life history needs in relation to the physical conditions at the rock pile and the potential for interaction between the proposed project and these groups. A major life history distinction is a pelagic life history versus a benthic life history that depends on contact with the substrate. Among the species that utilize the substrate during their life, benthic habitat preference is an important factor in assessing potential impact. Table 3 uses these basic life history needs and habitat preferences to group the species for assessment and to evaluate the potential for adverse effects.

Table 3. Potential for Project Impact Based on Life History and Habitat Preferences.

Group/Species	Pelagic or Benthic Life History[1]	Habitat Preference for Benthic Life History	Relationship to Preferred Alternative
Group 1 – Species with Habitat in Project Area			
Atlantic cod	Benthic	Various substrate types (adults)	Could occur in area, but species uses various habitat types; potential impact is low
Black sea bass	Benthic	Structural habitat such as rock piles (juveniles and adults)	Some potential impacts during construction to a few individuals; re-colonization after construction
Monkfish	Benthic	Juveniles and adults occur over gravel substrate	Potential impact is low, preferred depths are greater than 60 ft.
Red hake	Benthic	Juveniles seek bottom shelter; scallop beds preferred	Some potential impacts during construction to a few individuals; re-colonization after construction
Scup	Benthic	Sand, mud, mussel beds, submerged aquatic vegetation, macroalgae (juveniles); submerged structures (adults)	Potential impact to adults is low, adult habitat for a few individuals could be disturbed during construction but re-colonization after construction

Group/Species	Pelagic or Benthic Life History[1]	Habitat Preference for Benthic Life History	Relationship to Preferred Alternative
Group 2 – Benthic Species without Habitat in Project Area			
Summer Flounder Windowpane Flounder Winter Flounder Witch Flounder Yellowtail Flounder Clearnose Skate Little Skate Winter Skate	Benthic	Preferred habitat is sand, mud and various combinations of these substrates	Potential impact very low; preferred habitats do not occur in project area
Group 3 – Pelagic Species Throughout Life History			
Atlantic herring Bluefish Butterfish Cobia King mackerel Silver hake Spanish mackerel Atlantic bluefin tuna Skipjack tuna Common thresher shark Dusky shark Sand tiger shark Sandbar shark Shortfin mako shark Smooth dogfish Tiger Shark White Shark	Pelagic	- - - - - - - - - - - - - - - - -	Potential impact unlikely; contact with substrate is incidental and without regard to substrate type; species are transient

[1] Some species include both benthic and pelagic depending on life stage

Section 4.2 below provides an expanded discussion of the life history needs of the five species in Group 1 of Table 3 in relation to the proposed action. There is also an evaluation of forage fish, which may be available as prey for EFH and other species at the rock pile, as well as other NOAA-trust resources including shellfish and crustaceans, and their habitats. Section 5.0 discusses general spatial and temporal factors in relation to the timing and duration of construction work, which applies to all designated species. This section also addresses re-colonization because of its importance to potential long-term impacts. Potential cumulative effects are also addressed in Section 5.0.

4.1 Data Source-Ambrose Obstruction Biological Sampling

The United States Army Corps of Engineers – New York District (USACE-NYD) conducted a sampling study in and around the rock pile in September of 2009 to survey the biological communities utilizing the structure and the surrounding areas. This study consisted of benthic sampling efforts using a 0.1 m^2 Smith-McIntyre Grab along with a fish, crab, and lobster pot survey (USACE 2010). These findings provide site specific data on which species are more abundant in the rocky/gravel habitat of the rock pile compared to the benthic habitat that surrounds the area. Benthic macro-invertebrates are an important component of the forage base for the species that have designated EFH in and around the rock pile.

4.2 Relationship of Life History to Potential Impact

4.2.1 Atlantic Cod (*Gadus morhua*)

Atlantic cod has designated EFH for the adult life stage only within the project area. Cod occur in various substrate types and have a high capability of surviving on a variety of food resources (Fahay 1999). Cod are widely distributed along the north Atlantic coast, but were not collected during the biological sampling at the obstruction during September 2009. The adults of this species grow to large sizes and would not be susceptible to injury by the equipment used to recontour the rock pile. The cod's extensive distribution in relation to the small project area and its diverse diet ensure that direct and indirect effects would be minimal.

4.2.2 Black Sea Bass (*Centropristis striata*)

EFH is designated for juvenile and adult black sea bass within the project area (NMFS 2007, NOAA 2011). Structures such as reefs, wrecks, and rock piles along the Atlantic coast in estuaries and on the continental shelf are common habitats for juvenile and adult life stages of black sea bass (Able and Fahay 2010). Juvenile black sea bass are diurnal visual predators that feed primarily on benthic and epibenthic crustaceans, including isopods, amphipods, small crabs, sand shrimp, copepods, and mysids. Adult black sea bass are carnivores that prey upon a variety of crustaceans (including small lobsters, crabs, and shrimp), small fish and squid (Drohan *et al.* 2007). Annelids (*Polygordius* sp.) and arthropods (*Unciola* sp. and *Ampelisca abdita*) dominated the recent benthic collections at the rock pile (USACE 2010) and would represent an important component of juvenile and adult black sea bass diets.

Black sea bass (n=29) accounted for approximately 14% of all the fish (n=208) that were collected during the September 2009 sampling program within the project area (USACE 2010). Direct impacts resulting from the elimination of the obstruction may include a temporary loss of habitat in the area of physical disturbance, and a temporary and potential displacement of some adult and juvenile fish to undisturbed areas of the rock pile as well as other nearby areas with similar substrate and structure. Adult and juvenile fish of this species would avoid a tug-dragged I-beam or a clamshell bucket so that direct mortality is unlikely to occur. In addition, the re-profiling may cause some short-term indirect impacts to a few individuals with the loss of some benthic and epibenthic organisms that black sea bass forage on. However, no long term indirect impacts are expected, because the habitat and organisms within the rock pile are expected to begin recovering within a few months of the construction (Brooks *et. al.* 2006) and because this species can utilize other areas within the rock pile to forage for food.

4.2.3 Monkfish a.k.a Goosefish (*Lophius americanus*)

EFH is designated for monkfish eggs and larvae within the project area (NMFS 2007, NOAA 2011). Monkfish are pelagic during the egg and larvae life stages before shifting to benthic habitats as juveniles and adults (Steimle *et al.* 1999a). This species is sometimes structure oriented in the juvenile and adult stages, living in habitats with pebbly-gravel sediment, although they are typically not found at depths of less that 60 feet (Steimle *et al.* 1999a) and would, therefore, not be expected to occur within the project area. Monkfish were not collected during the biological sampling at the obstruction during September 2009 (USACE 2010), but small numbers of larvae (typically less than 10 annually) have been collected during ABS surveys in the Lower Bay (USACE 2010a). No direct impacts to eggs and larvae are expected from the project because the substrate at the rock pile would generate very little resuspended sediment during construction.

4.2.4 Red Hake (*Urophycis chuss*)

EFH is designated for red hake eggs and juveniles within the project area (NMFS 2007, NOAA 2011). Red hake eggs are buoyant and float near the surface of the water column on the Continental Shelf (Steimle *et al.* 1999b). Therefore, no direct impacts are expected for red hake egg EFH. Juvenile red hake become demersal at approximately 25 mm total length typically seeking shelter in benthic habitat (Steimle *et al.* 1999b). This includes shelter in sea scallops (*Placopectin magellanicus)* (Able & Fahay 2010). No red hake or sea scallops were collected during the 2009 sampling survey of the project area (USACE 2010). Because juvenile red hake are known to associate with structure including debris and artificial reefs (Steimle *et al.* 1999b), potential direct impacts to juvenile EFH would be limited to the short-term disturbance of bottom habitat and the temporary shift in availability of shelter during construction activities. Alternative benthic habitat would be available in the undisturbed area of the obstruction, and new sheltering habitat is expected to develop in the rocky material placed below the 59-foot depth level.

Because juvenile red hake tend to feed on small benthic and pelagic crustaceans (Steimle *et al.* 1999b), potential indirect impacts to red hake EFH might also include a temporary decrease in the availability of these benthic food sources.

4.2.5 Scup (*Stenotomus chrysops*)

EFH is designated for juveniles and adult scup within the project area (NMFS 2007, NOAA 2011). Juveniles inhabit a variety of substrates including sand, mud, mussel beds, and submerged aquatic vegetation/macroalgae while adults are generally demersal, and use submerged structures for feeding and shelter (Steimle *et al.* 1999c). No scup were collected during the September 2009 sampling at the rock pile (USACE 2010), however, there is potential for occurrence in the area. Adult scup may experience a temporary shift in benthic habitat during construction, but habitat would continue to be available after construction. Potential indirect impacts to adult and juvenile scup would be short-term and limited to the temporary disturbance and possible burial of some benthic forage species included in their diets. However, scup would be able to forage for prey in areas within the rock pile that are not subject to re-profiling activities or in nearby areas outside of the rock pile where similar habitat exists.

4.2.6 Forage Fish Species Assessment

A number of seasonally abundant potential forage fish species occur in the New York Bight. Alewife (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*), Atlantic menhaden (*Brevoortia tyrannus*), Bay anchovy (*Anchoa mitchilli*), Blueback herring (*Alosa aestivalis*), and Atlantic silverside (*Menidia menidia*) are among these species (Able & Fahay 2010). However, none of these fish are typically associated with bottom habitats and, therefore, direct impacts are expected to be minimal. Migratory adults of these species would be capable of avoiding the project area during construction. None of these species were collected during the September 2009 sampling at the rock pile. All of these species are pelagic and migratory or transient, thus their importance as forage to fish species using the benthic habitat at the rock pile would be very low.

5.0 ASSESSMENT CONCLUSIONS

Potential impacts attributable to the elimination of the obstruction would occur during construction that would reduce the high spots to an elevation of 59 feet MLW. Under the preferred Alternative 2, the construction would move rocky material from above a depth of 59 feet to surrounding areas where the new material placed on top of the existing substrate would remain below 59 feet in depth. The total impact area would be the combination of the area above

59 feet and the area receiving this material. The temporary impact is approximately 15% of the total area of the rock pile footprint.

The duration of the impact would include the time required to remove the obstruction, estimated to be approximately 30 days without equipment failure/maintenance and poor weather conditions, and the time required for the total impact area to be re-colonized by aquatic life. The disturbed area would progressively recover its aquatic community starting within weeks of the end of construction and reaching nearly full recovery in approximately one year.

Seventeen of the 30 designated species are either migratory visitors to the Harbor estuary and/or have a pelagic life history that would include only incidental contact with benthic substrates (Group 3). These species would only be in the vicinity of High Spot C for short periods during a particular season and/or would not focus their behavior on the specific benthic habitat type at the obstruction. Therefore, the potential for adverse impacts on these species is unlikely. A group of eight species can be characterized as having a benthic life history in which they are in contact with the substrate for their juvenile and adult life (Group 2). However, the species in this group have a preference for sandy/muddy substrate, a habitat type which does not occur at the rock pile. Therefore, the potential for adverse impact on these species is very low because the proposed action is confined to rocky substrate on the obstruction.

There is a potential for the remaining group of five species (Group 1) to utilize habitat on the rock pile, which could expose them to the construction activity. Among these species only black sea bass were collected during the September 2009 sampling program. A few individuals of this species could experience a short-term impact by being displaced from the area of construction. The undisturbed rocky habitat within the rock pile and other nearby rocky areas shown in the remote sensing survey (USACE 2009), however, could provide temporary habitat for black sea bass. If any black sea bass were displaced as a result of the construction, it is expected that they would utilize the disturbed area as soon as food resources recovered. This species would likely re-establish a stable population across the rock pile in the near future. The other species in this group (Atlantic cod, monkfish, red hake and scup) would experience a low level of impact if they were using High Spot C for habitat at the time of construction. In all cases, impacts would be temporary and minimal with regard to coastwide populations of these species because the project area is extremely small in relation to the extensive distribution of these species.

There is no potential for cumulative effects from the proposed action because this is a short-term effect at an isolated location within the ranges of the EFH designated species. Beyond Harbor

Deepening Project dredging, which will occur at least two miles away in the Ambrose Channel, there are no known plans for any activity that could impact the EFH of these species in the immediate area of the project.

6.0 LITERATURE CITED

Able, K.W. & M.P. Fahay. 2010. Ecology of Estuarine Fishes: Temperate Waters of the Western North Atlantic. Johns Hopkins University Press. Baltimore, MD.

Brooks, R.A., C.N. Purdy, S.S. Bell and K.J. Sulak. 2006. The benthic community of the eastern US continental shelf: A literature synopsis of benthic faunal resources. Continental Shelf Research 26 (2006) 804-818.

Drohan, A.F., J.P. Manderson, and D.B. Packer. 2007. Essential Fish Habitat Source Document: Black Sea Bass, *Centropristis striata*, Life History and Habitat Characteristics. NOAA TM NMFS-NE-200.

Fahay, M.P., P.L. Berrien, D.L. Johnson, W.W. Morse. 1999. Essential Fish Habitat Source Document: Atlantic Cod, *Gadus morhua*, Life History and Habitat Characteristics. NOAA TM NMFS-NE-124.

MacKenzie, C., and J.R. Moring. 1985. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North Atlantic)--American lobster. U.S. Fish Wildl. Serv. Biol. Rep. 82(11.33). U.S. Army Corps o f Engineers, TREL-82-4. 19 PP.

National Marine Fisheries Service (NMFS). 2007. Guide to Essential Fish Habitat Designations in the Northeastern United States. Accessed January-June 2011. Referenced on the internet at http://www.nero.noaa.gov/hcd/webintro.html.

National Oceanic and Atmospheric Administration (NOAA). 2011. Essential Fish Habitat Mapper. Accessed January-June 2011. Referenced on the internet at http://sharpfin.nmfs.noaa.gov/website/EFH_Mapper/map.aspx.

Palma A.T., R.A. Wahle, Steneckl R.S. 1998. Different early post-settlement strategies between American lobsters *Homarus americanus* and rock crabs *Cancer irroratus* in the Gulf of Maine. Marine Ecology Progress Press. 162:215-225.

Steimle, F.W., W.W. Morse, D.L. Johnson. 1999a. Essential Fish Habitat Source Document: Goosefish, *Lophius americanus*, Life History and Habitat Characteristics. NOAA TM NMFS-NE-127.

Steimle, F.W., W.W. Morse, P.L. Berrien, and D.L. Johnson. 1999b. Essential Fish Habitat Source Document: Red Hake, *Urophycis chuss*, Life History and Habitat Characteristics. NOAA TM NMFS-NE-133.

Steimle, F.W., C.A. Zetlin, P.L. Berrien, D.L. Johnson, and S. Chang. 1999c. Essential Fish Habitat Source Document: Scup, *Stenotomus chrysops*, Life History and Habitat Characteristics. NOAA TM NMFS-NE-149.

U.S. Army Corps of Engineers (USACE). 2007. New York and New Jersey Harbor Navigation Project. Draft Migratory Finfish Survey Report 2006. USACE – New York District.

U.S. Army Corps of Engineers (USACE). 2009. Remote sensing survey of portions of Ambrose Channel and Sandy Hook Pilot Area in connection with the New York and New Jersey Harbor Navigation Study, King and Richmond Counties, New York. Final Report. June 2009. USACE – New York District.

U.S. Army Corps of Engineers (USACE). 2010. Ambrose Obstruction Biological Sampling Report. Final Report April 2010. USACE – New York District.

U.S. Army Corps of Engineers (USACE). 2010a. New York and New Jersey Harbor Navigation Project. Aquatic Biological Survey Report 2009. USACE – New York District.

Wilber, D.A. & D.G. Clarke. 2007. Defining and assessing benthic recovery following dredging and dredged material disposal**.** Presented at Western Dredging Association WODCON XVIII Convention, Lake Buena Vista, Florida.

7.0 FIGURES

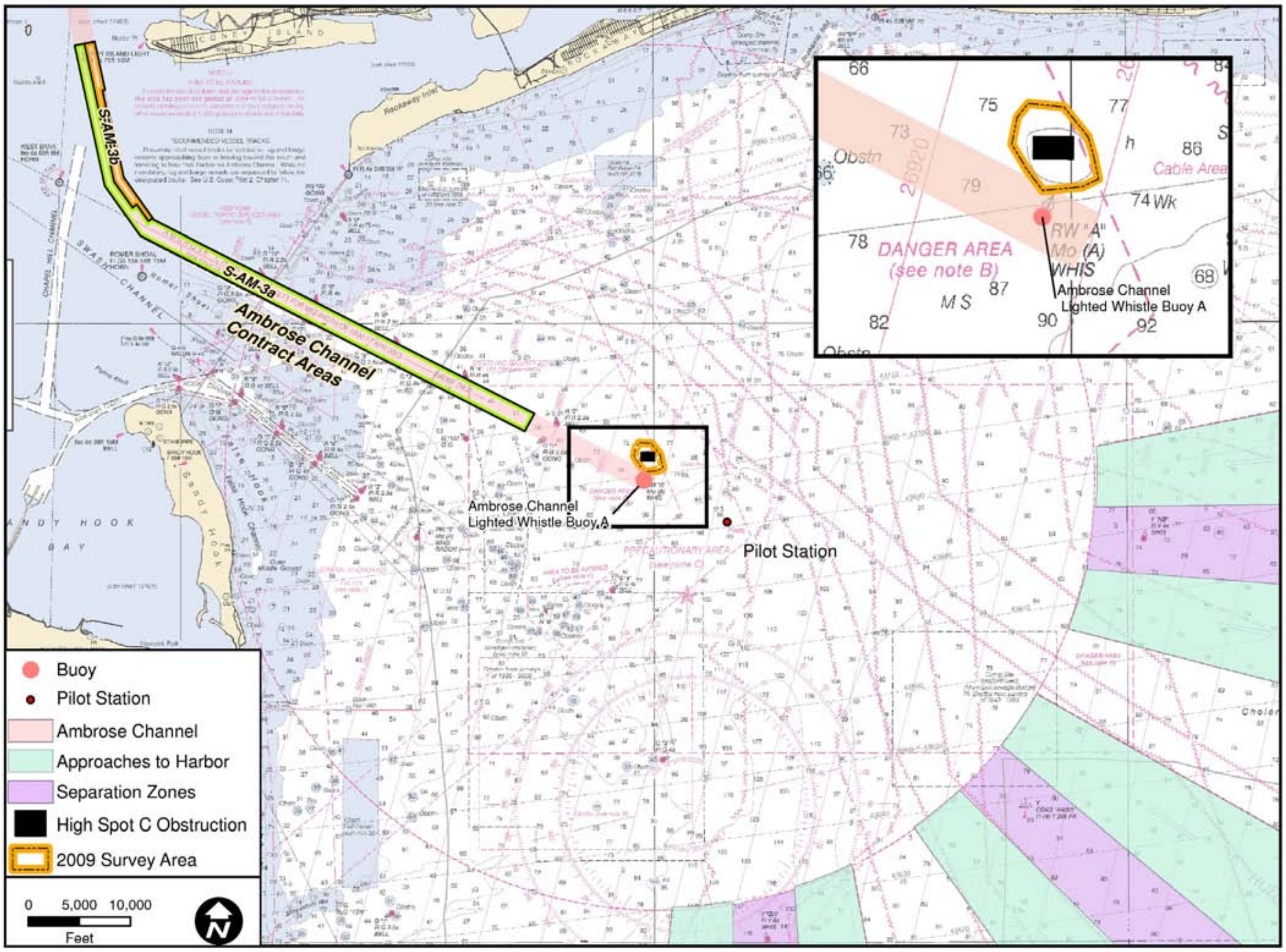


Figure 1. Rock pile with obstruction to navigation centered at 40° 27' 50.4" N by 73° 50' 7.5" W and located just north of the mid-channel Whistle Buoy RW "A" with 2009 survey area in relation to Ambrose Channel HDP contract areas and navigational approaches to the NY/NJ Harbor.

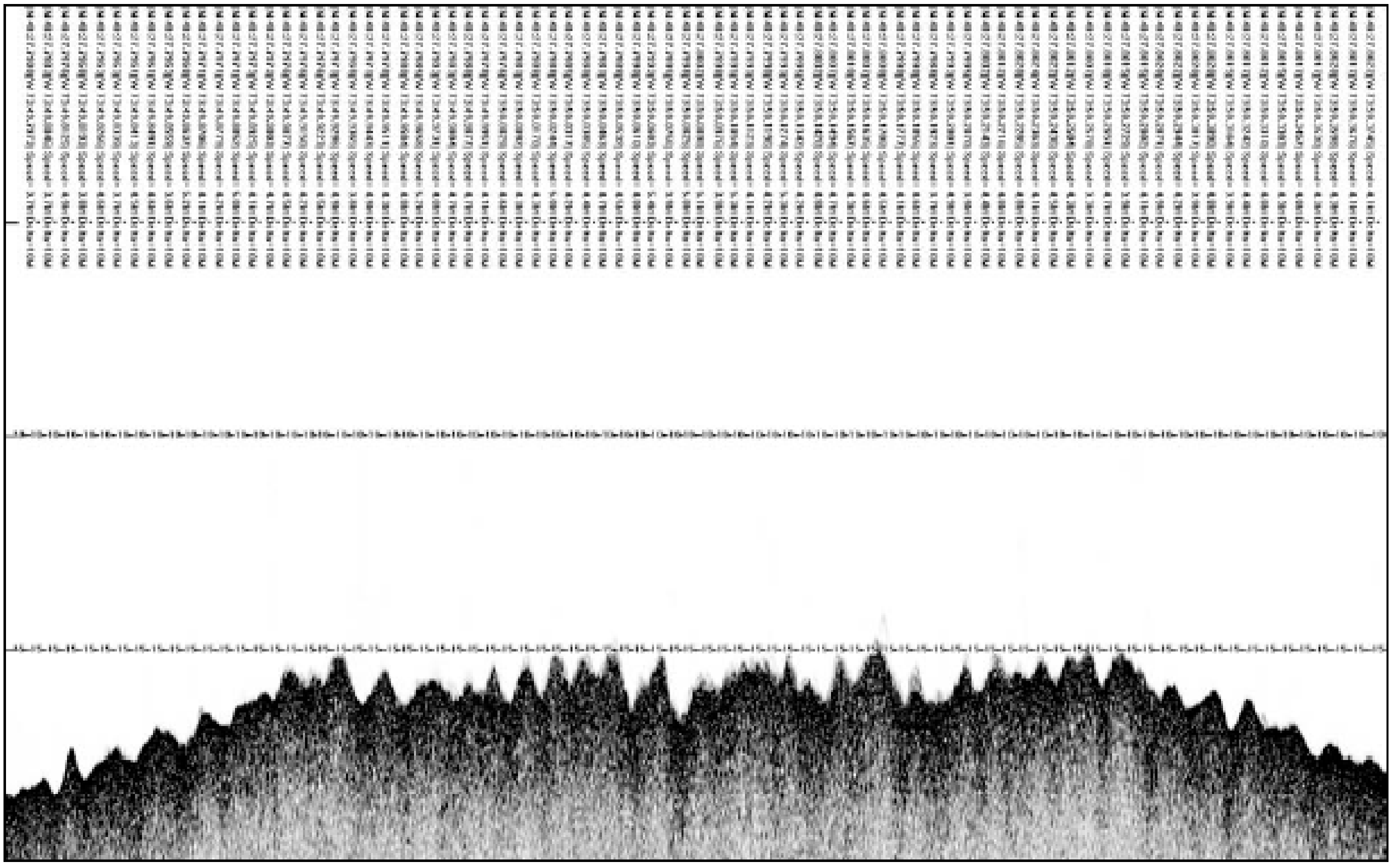


Figure 2. Sub-bottom image of rock pile (USACE 2009).

APPENDIX B

PUBLIC AND AGENCY COORDINATION

U.S. Department of Homeland Security
United States Coast Guard

Commander
Sector New York
U.S. Coast Guard

212 Coast Guard Drive
Staten Island, NY 10305
Staff Symbol: co
Phone: (718) 354-4003
Fax: (718) 354-4190

16500
22 Feb 08

MEMORANDUM

From:	*R. R. O'BRIEN, JR., CAPT* *CG Sector New York*	*Reply to* *Attn of:*	*LCDR McBrady* *(wwm) x2353*
To:	*A. L. TORTORA, COL* *Commander, USACE New York District*		
Subj:	*EXTENSION OF AMBROSE CHANNEL*		

1. The t/v AXEL SPIRIT's November 2007 allision with Ambrose Tower prompted extensive discussions with numerous Port of New York and New Jersey (PONYNJ) stakeholders concerning potential improvements to the Aids to Navigation (AtoN) within New York Harbor. Input was provided by the Harbor Safety, Operations, and Navigation Committee, several pilot groups, the Maritime Association of the Port of New York (MAPONY) Tug and Barge Committee, and others. Based on this information, the USCG decided not to rebuild Ambrose Tower as a new tower was deemed unnecessary for navigational purposes. However, an outgrowth of those discussions centered on the idea of extending Ambrose Channel seaward and enacting several other AtoN relocations to address current navigational risks in the offshore approaches to the PONYNJ (enclosure 1).

2. To ensure overall navigation safety and accommodate the ever increasing size of foreign vessels calling on the PONYNJ, a seaward extension of Ambrose Channel along with several other minor AtoN changes is required. This proposal was developed jointly by the Sandy Hook Pilots (SHP), NOAA, and CG Sector New York and involves a channel extension, redesign of the pilot area and several other AtoN relocations to address many of the navigation hazards in the current Precautionary Area (PA) without relocating the entire PA and the accompanying Traffic Separation Scheme (TSS). This approach is highly desired because any changes to the PA or TSS would requiring vetting through the International Maritime Organization (IMO) and would take several years to complete. Ideally the USCG will pursue, with ACOE's concurrence, implementation of the changes discussed herein immediately following the demolition and removal of Ambrose Tower, currently scheduled to begin in the late spring, early summer of 2008.

3. An extension of Ambrose Channel (being dredged to 53' + 3' over depth) seaward to the 60 ft curve ensures that the channel begins in deep enough water to minimize the potential for grounding of large container and tank vessels. This change is necessary due to numerous shoals (i.e. < 56 feet) seaward of the current channel entrance and will add approximately 4.5 nm (and 4 additional buoys) to the channel, placing the "new" entrance buoy about 2.3nm from the current location of Ambrose Light. When adopted, these changes will also prompt a reconfiguration of the current pilot station dimensions as depicted in enclosure 1 to better support vessel traffic management operations being handled by the Sandy Hook Pilots.

3. Unfortunately, extending the channel past the 60 foot curve to "cover" the three 52-53 foot obstructions (highlighted in yellow on enclosure 1) as you suggested is not possible due to the limited

maneuvering area in the seaward portion of the PA. Moving the pilot area any further out in the precautionary area than indicated in enclosure 1 would not leave enough room to safely embark or disembark pilots, place the pilot area (and the pilot boat) too close to the terminus of the traffic lanes, and lead to numerous other traffic density problems that would significantly decrease navigation safety in an already congested and unpredictable area. NOAA's initial research on the composition of the three obstructions indicates the outer two are "construction debris", with the innermost one - which is right next to the proposed location of the entrance buoys – being vessel debris. The consensus opinion is that these three obstructions will all have to be removed down to greater than 60 feet in order to ensure vessel safety.

4. As previously indicated NOAA, USCG, and SHP all agree that once Ambrose Light is removed (OOA 1 Jul 08) the buoys could be established and moved as necessary, and the pilot area reconfigured on the chart fairly quickly, most likely in the latter part of summer 2008. For this portion of the project, the key will be public notification and advertising which we would start well in advance of implementing the changes. It is our desire (absent ACOE concerns) to implement the reconfiguration ahead of the actual completion of the dredging project, to give the SHP additional time to "work out the kinks" in anticipation of much larger ship arrivals as the Harbor Deepening Project nears completion. Discussions with the Port Authority and various shipping lines have indicated there is strong interest for 8200-12,000 TEU container ships with drafts of 47-49 ft to begin calling on the PONYNJ as early as the summer of 2009.

5. My staff and I look forward to working closely with you as we move forward on this important initiative as well as the Bayonne Bridge Navigation Study and the Harbor Deepening Project. The professionalism, expertise, and teamwork displayed by your staff has contributed greatly to the safety, security, and impressive economic performance of the maritime transportation system in our nation's third largest port. Please address questions or comments to LCDR Mike McBrady at the number above.

#

Copy: COMDT (CG-432, CG-541, CG-7413)
CGD ONE (dp)
CEU Providence
CGC Katherine Walker
CGC Juniper
CG ANT New York

Encl: (1) Ambrose Channel Extension Chartlet

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK, NY 10278-0090

REPLY TO
ATTENTION OF

July 31, 2008

Environmental Assessment Section
Environmental Analysis Branch

Ms. Ruth L. Pierpont
New York State Office of Parks,
Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Dear Ms. Pierpont:

The U.S. Army Corps of Engineers, New York District, (Corps), is constructing navigation improvements in New York and New Jersey Harbor (Harbor). The Corps has conducted remote sensing surveys, diving evaluations, recordation of vessels and salvage of maritime artifacts as part of the Section 106 compliance for this project. The Programmatic Agreement signed in 2000 and amended in 2003 was developed with the assumption that all relevant harbor channels under study have been maintained through periodic dredging and no historic vessels would be present in these channels. Since construction in Ambrose Channel began one wreck (which was surveyed and coordinated with the New Jersey Historic Preservation Office) and one possible wreck were encountered. Ambrose Channel, the main entrance channel to the Port of New York and New Jersey, is naturally deep and in fact much of it has not been dredged historically due to it natural depth. Portions of the channel have been mined for sand and gravel.

As potentially significant wrecks were being encountered in the deeper portions of Ambrose Channel during construction the Corps contracted Panamerican Consultants, Inc to conduct a remote sensing survey of areas not previously dredged or mined. The scope of work called for the potential wreck encountered during construction to also be surveyed. Additional work was included in the Sandy Hook Pilots area where three high spots are located that are proposed to be removed. These high spots were not part of the original harbor study. The draft report, entitled, "Remote Sensing Survey of portions of Ambrose Channel and Sandy Hook Pilot Area in Connection with the New York and New Jersey Harbor Navigation Study, Kings and Richmond Counties, New York" by Panamerican Consultants, Inc. is submitted for your review (Enclosure 1). Figures 1.01 – 1.03 depict the survey locations.

A total of 16 magnetic anomalies and 51 side scan sonar targets were encountered in the Ambrose Channel. Just one of the acoustic targets was determined a possible resource (a wooden barge) but it is located in 90 feet of water well beyond the areas to be dredged as dredging is to a depth of 53 feet. Two of the high spots (High Spots A and B), or obstructions, in the Sandy Hook Pilot area appear to be potentially significant cultural resources. High spot A represents what might be the remains of the *Daghestan*, an iron hulled vessel sunk in 1908. The other is likely a debris field. The survey of the previously encountered potential wreck site (Shoals C and D) indicates that this site is also potentially significant. Avoidance of these targets was recommended. Due to the nature of this project, however, avoidance is not feasible as the navigation channels cannot be relocated.

The Corps will investigate the targets determined to be potential cultural resources. This will be accomplished through relocating the target, diving on each target by an experienced maritime archaeologist and an evaluation of any remains encountered. Recommendations for further work, if required, will be developed.

Please review the enclosed document and provide Section 106 comments, pursuant to 36 CFR 800.5. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629.

Sincerely,

Leonard Houston
Chief, Environmental Analysis Branch

Enclosures

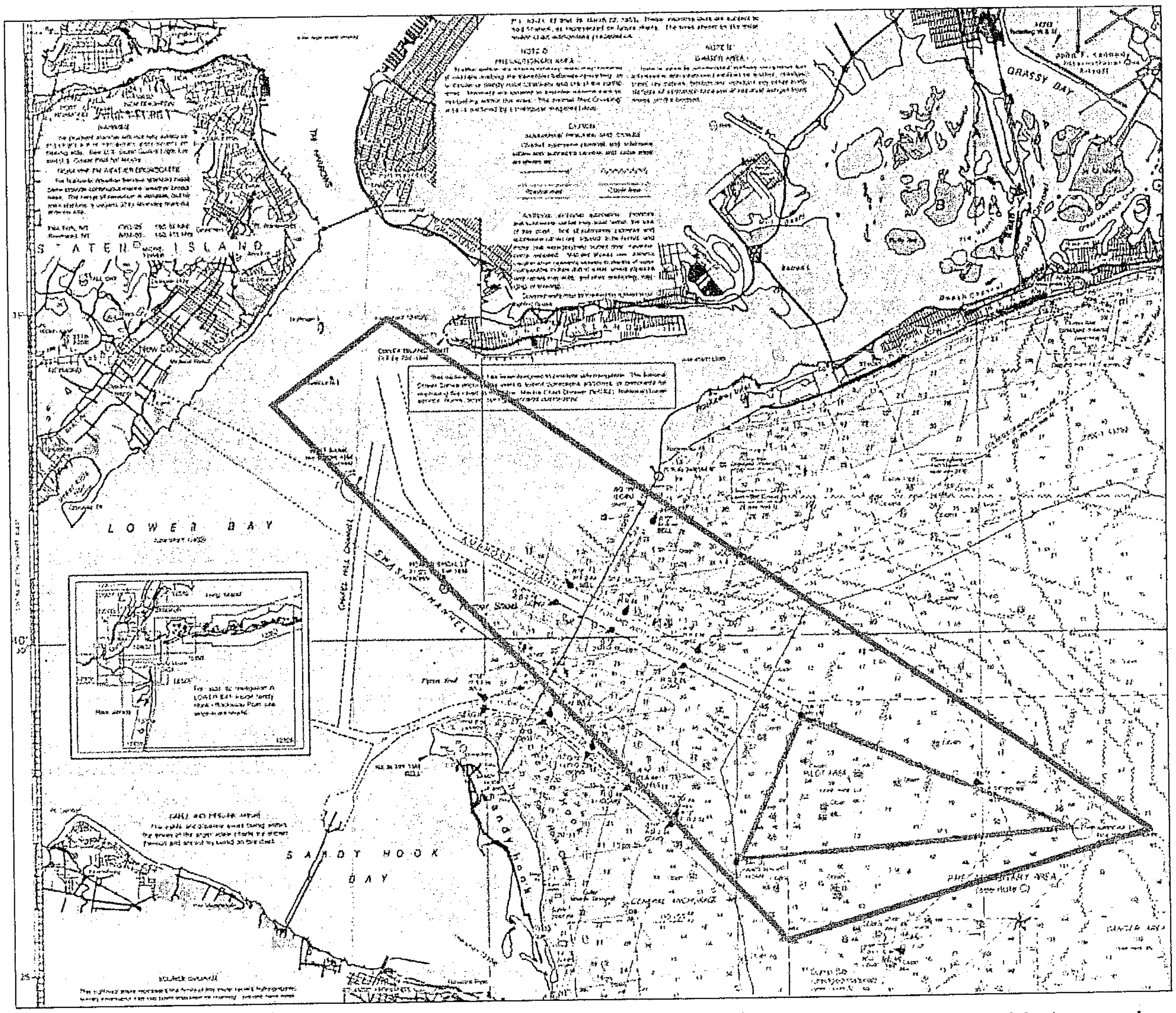


Figure 1-01. General project area location map (base map: NOAA navigation chart no. 12326: Approaches to New York Fire Island Light to Sea Girt).

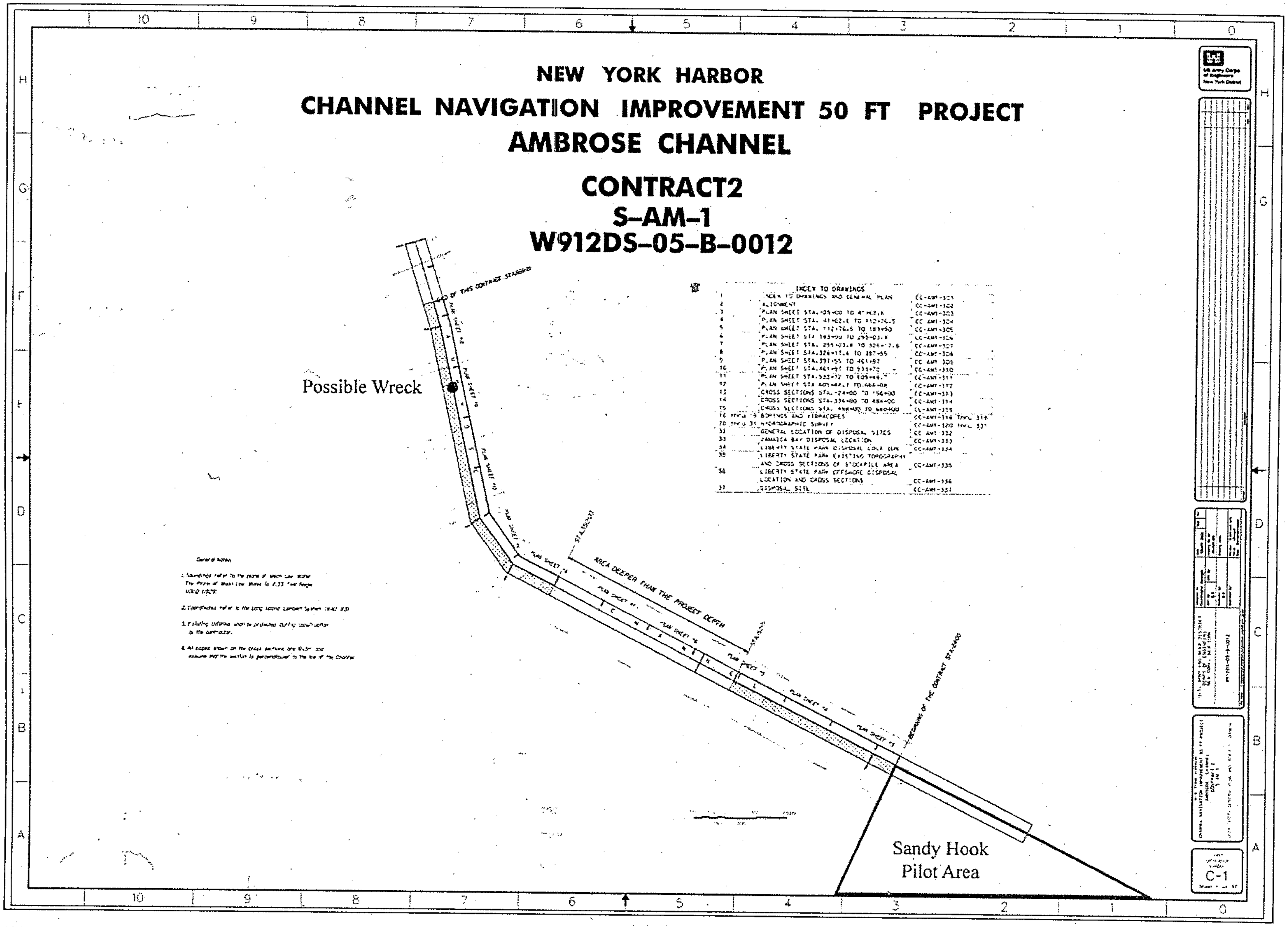


Figure 1-02. Ambrose Channel survey area in red. Potential wreck location is in blue (base map courtesy of the U.S. Army Corps of Engineers, New York District).

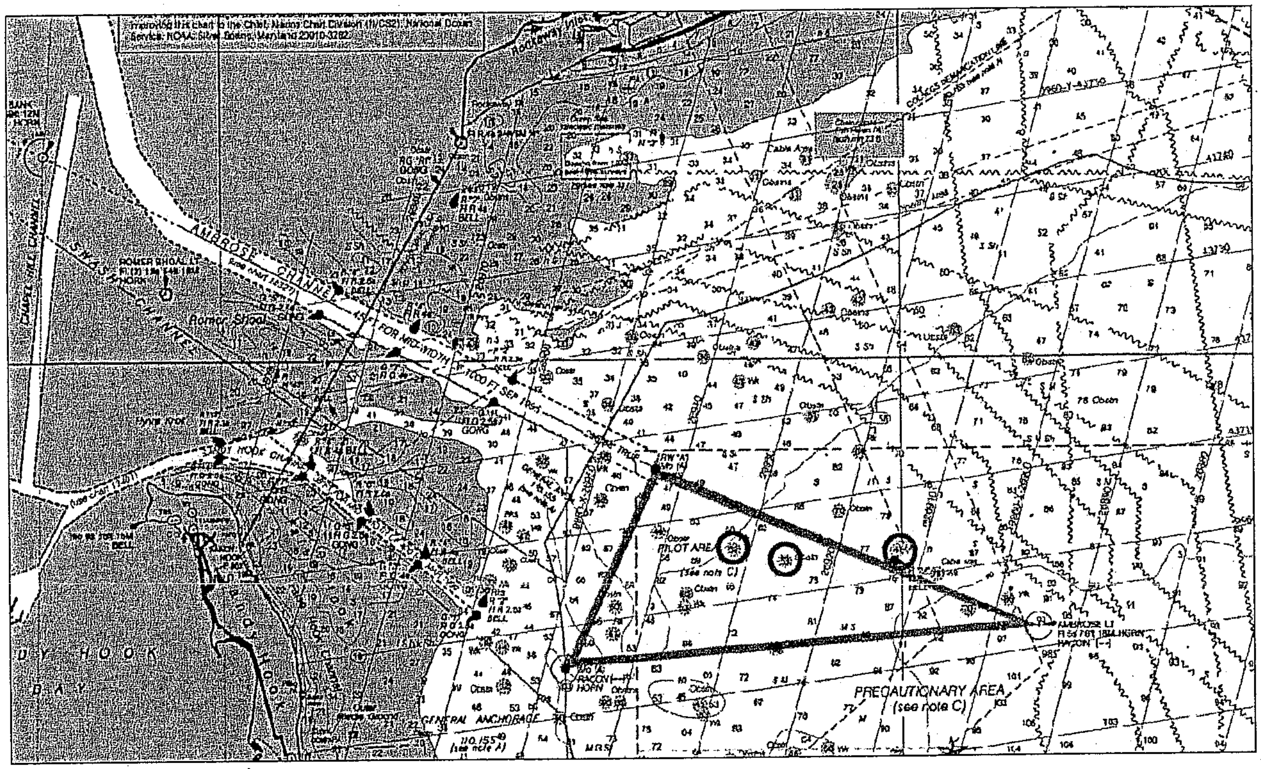


Figure 1-03. Sandy Hook Pilot Area survey locations in red (base map: NOAA navigation chart no. 12326: Approaches to New York Fire Island Light to Sea Girt).

NEW YORK STATE · OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION

New York State Office of Parks, Recreation and Historic Preservation

Historic Preservation Field Services Bureau • Peebles Island, PO Box 189, Waterford, New York 12188-0189
518-237-8643
www.nysparks.com

David A. Paterson
Governor

Carol Ash
Commissioner

September 4, 2008

Lynn Rakos
Project Achaeologist
Environmental Analysis Bureau
Army Corps of Engineers, New York District
Jacob K. Javits Federal Building
New York, NY 10278-0090

Re: CORPS
Remote Sensing Survey
Ambrose Channel and Sand Hook
Pilot Area
Queens Co. and vic., NY
07PR00965

Dear Ms. Rakos:

Thank you for providing us with a copy of Panamerican's draft report on the results of the remote sensing survey of portions of the Ambrose Channel and the Sand Hook Pilot Area. The State Historic Preservation Office has reviewed this report and offers the following recommendations:

Maps of the survey areas and sites should be augmented with accurately drawn state and county lines. Based on your research and my interpolation of county boundaries, shoals C and D appear to be in Queens Co., NY and high spots A, B and C appear to be in federal waters outside of New York State's jurisdiction. These locations should be confirmed, mapped and noted in the report.

Douglas Mackey asks that the final report resolve the discussion of Holocene landforms. The report suggests that sub-bottom profiling and coring could identify such landforms, but there is no indication of whether this was attempted or what results may have been obtained. The report authors noted that a similar site was compromised in a recent dredging project. We also ask that sites discussed in the report in New York State be recorded on the appropriate state archaeological inventory forms (attached).

Based on the information provided, we do not believe further investigation of the potential wreck sites is necessary from a preservation compliance perspective. Barge SSS073 will not be affected by dredging given its substantial depth below the 50-foot clearance depth. Shoals C and D appear to represent the remains of an iron or steel-hulled vessel that has already been partially dredged and which appears in the side scan sonar images to retain poor integrity. High Spot A, WK52, appears to represent the completely disarticulated remains of a steamship tentatively identified as the 1900 English freighter *Daghestan* which sank in 1908. The site appears to have been deliberately demolished as an obstruction to navigation and does not appear to be significant in the context of American maritime history or engineering. High Spot B, Obstruction 53, is described as modern construction debris of no cultural significance. High Spot C, Obstruction 52, appears to be a natural formation.

This State Historic Preservation Office appreciates the opportunity to comment on this report and looks forward to receiving the final report and the attached inventory forms. Please feel free to contact me at 518-237-8643 ext. 3258 if I can be of any assistance with the historic era sites and Douglas Mackey for prehistoric sites at 518-237-8643 ext. 3291.

Sincerely,

Mark L. Peckham
National Register
Program Coordinator

enclosures

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK, NY 10278-0090

REPLY TO
ATTENTION OF

July 6, 2009

Environmental Assessment Section
~~Environmental Analysis Branch~~

Ms. Ruth L. Pierpont
New York State Office of Parks,
Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Dear Ms. Pierpont:

The New York District, U.S. Army Corps of Engineers (Corps), is pleased to furnish you with the final report entitled, "Remote Sensing Survey of Portions of Ambrose Channel and Sandy Hook Pilot Area in Connection with the New York and New Jersey Harbor Navigation Study, Kings and Richmond Counties, New York" by Panamerican Consultants, Inc. (07PR00965, Enclosure 1).

As per comments received from your office the remains of what might be the *Daghestan* are not likely eligible for the National Register of Historic Place and no further work will be conducted (Enclosure 2). No further work will be undertaken on High Spots B and C or Shoals C and D. The final report has been revised to reflect this revised evaluation. New York State archaeological site forms are included in the final report as requested (see Appendix D).

As part of the overall cultural resources work associated with the New York and New Jersey Harbor Project a comprehensive study of the geomorphology and archaeological potential in the harbor was undertaken. Ambrose Channel was considered to have a low potential for encountering Native American archaeological resources. The draft report was coordinated with your office in 2007 (Enclosure 3). The final report and GIS sensitivity model are forthcoming.

Thank you for your assistance in the Section 106 process. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (917) 790-8629.

Sincerely,

L. Houston

Leonard Houston
Chief, Environmental Analysis Branch

Enclosures

APPENDIX C –

REVISED BIOLOGICAL ASSESSMENT FOR: THE POTENTIAL IMPACTS TO FEDERAL ENDANGERED SPECIES FROM ONGOING AND FUTURE CONSTRUCTION OF THE FIFTY FOOT NEW YORK/NEW JERSEY HARBOR DEEPENING PROJECT

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT

REVISED BIOLOGICAL ASSESSMENT FOR: THE POTENTIAL IMPACTS TO FEDERAL ENDANGERED SPECIES FROM ONGOING AND FUTURE CONSTRUCTION OF THE FIFTY FOOT NEW YORK/NEW JERSEY HARBOR DEEPENING PROJECT

May 2012

TABLE OF CONTENTS

PAGE

1.0 INTRODUCTION

1.1 PURPOSE

This Biological Assessment (BA) is submitted to the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) by the U.S. Army Corps of Engineers (USACE)-New York District (NYD) as part of the formal consultation process under Section 7 of the Endangered Species Act (ESA), as amended November 10, 1978. This BA assesses potential impacts to threatened and endangered species from continued construction of the 50 Foot New York/New Jersey (NY/NJ) Harbor Deepening Project (HDP). The HDP is a Congressionally authorized Federal project lead by USACE-NYD and sponsored by Port Authority of NY and NJ (PANYNJ) to deepen navigation channels to 50 feet to accommodate larger commercial vessels.

Section 7 of the ESA requires that a BA be prepared for all major Federal actions when a federally listed or proposed endangered or threatened species may be affected. A BA was completed for the HDP by USACE NYD in 1999, and included an evaluation of listed sea turtles. The purpose of this revision to the 1999 BA is to address potential impacts to the Atlantic sturgeon, which was recently listed under the ESA (Federal Register Vol 77, No. 24, Monday February 6, 2012; 50 CFR Part 224). In addition, this BA will update the original 1999 BA to include minor changes to the project description and equipment being used that would not, on their own, necessitate re-initiation of consultation under Section 7. This BA also acknowledges the change to the listing of Loggerhead sea turtles[1]. A summary of the NYD and NMFS coordination is provided in Appendix A.

1.2 ENDANGERED SPECIES ACT

This BA is submitted as part of the process provided under Section 7 of the ESA. Section 7(a)(4) was added to the Act to provide NMFS and other Federal agencies a mechanism for identifying and resolving potential conflicts between a proposed action and proposed species at an early planning stage. Detailed procedures for the consultation process required under the ESA are defined in 50 CFR 402.

1.3 JEOPARDIZED SPECIES

The primary concern with the Atlantic sturgeon is whether or not potential impacts associated with the HDP "jeopardizes the continued existence" of the species. Federal regulation

---

[1 1] *On March 16, 2010, NOAA published a proposed rule to list two distinct population segments (DPS) of loggerhead sea turtles as threatened and seven distinct population segments of loggerhead sea turtles as endangered (75 FR 12598). On September 16, 2011, a final listing determination was made designating the Northwest Atlantic Ocean DPS, South Atlantic Ocean DPS, Southeast Indo-Pacific Ocean DPS, and the Southwest Indian Ocean DPS as threatened. The Northeast Atlantic Ocean DPS, Mediterranean Sea DPS, North Indian Ocean DPS, North Pacific Ocean DPS, and South Pacific Ocean DPS have been designated as endangered (76 FR 58868). The listing become effective October 24, 2011, at which time, the species of loggerhead likely to be present in the action area went from globally listed threatened loggerhead, to the threatened Northwest Atlantic distinct population segment of loggerhead. Please note the change in status for these sea turtles will not change the effects determinations made in this letter.*

defines this term as "engaging in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the listed species in the wild by reducing the reproduction, numbers, or distribution of that species."

2.0 PROJECT BACKGROUND AND GENERAL DESCRIPTION OF THE PROJECT

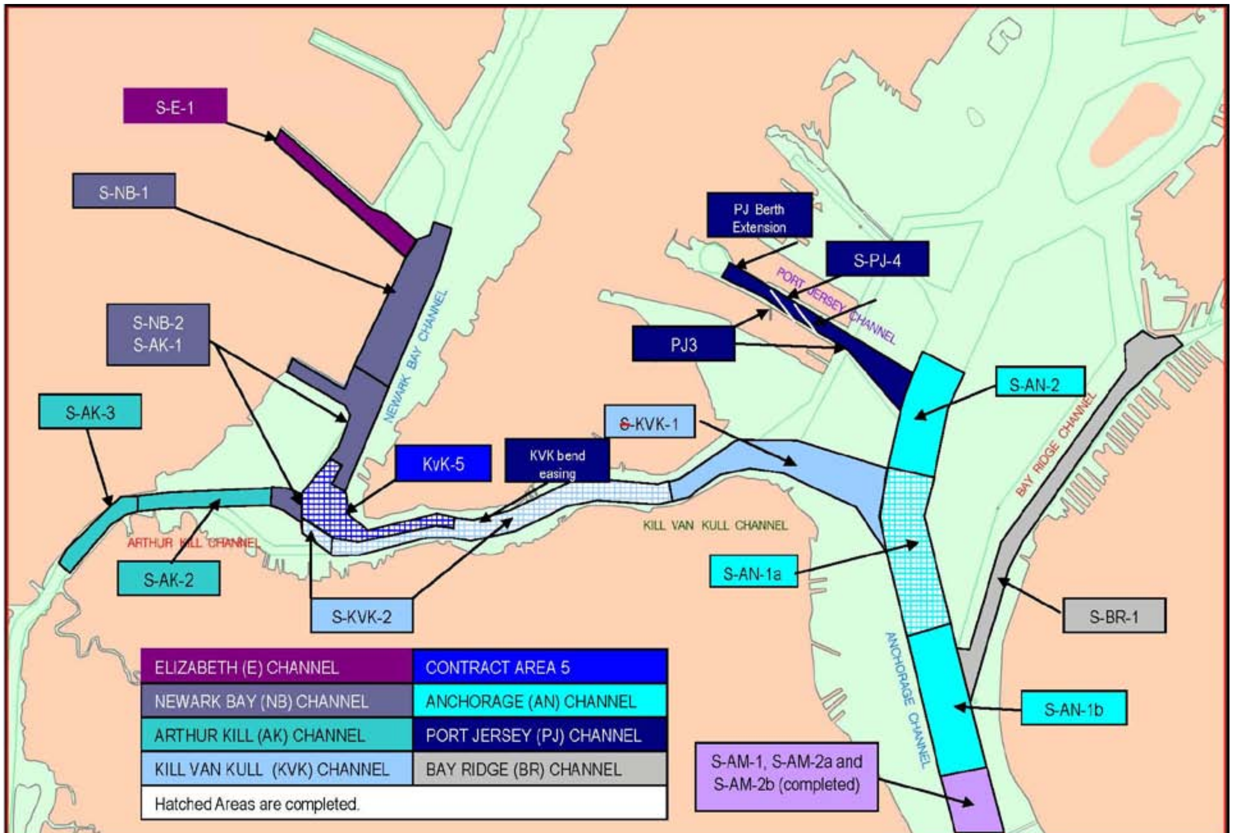
The HDP is an ongoing Federal dredging project that will deepen several channels for navigation in the Port of NY and NJ to a depth of approximately 50 feet below mean low water (MLW). It was authorized for construction under the Water Resources and Development Act of 2000 (Public Law No. 106-541, Dec 11, 2009). The HDP (a.k.a., NY/NJ Harbor Navigation Study) was described in detail in the USACE 1999 BA and an update of the project progress will be described in this chapter.

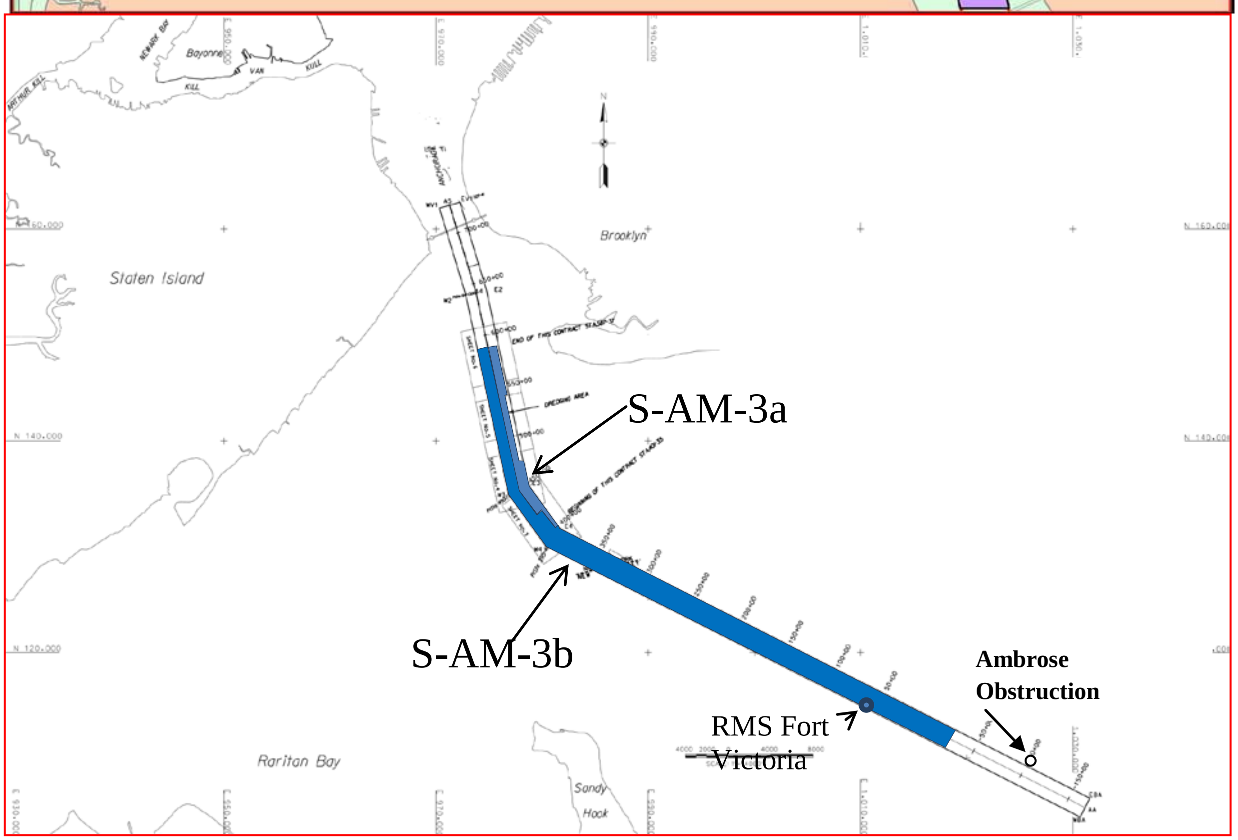
The NY/NJ Harbor is a major shipping port and center of commerce, and key channels have to be dredged to meet the growing demands of the Port. It is the nation's third largest container port, indirectly and directly supporting more than 230,000 jobs in the region (http://www.nan.usace.army.mil/harbor/index.php, accessed August 2011). A primary goal of the HDP is to provide access to accommodate the demand for international cargo through the New York and New Jersey Region. The dredging will improve navigational safety and allow the Port to accommodate larger, deeper-draft vessels.

Construction of the HDP has been ongoing since 2005 and most construction has been completed. It is scheduled to be completed in 2014, except for the Bay Ridge (BR) Channel which is currently deferred. The HDP involves deepening channels and management of the dredged material produced by these operations. The HDP is within the Harbor Complex, located at the apex of the NY Bight. The channels included in the HDP are defined as follows (see Figure 1):

- Upper Bay: Anchorage (AN), Port Jersey (PJ), and BR;
- Lower Bay: Ambrose (AM);
- Newark Bay: Newark Bay (NB), and Arthur Kill (AK); and
- Kill Van Kull (KVK)

Figure 1: Maps of HDP contract areas and proposed work


S-E-1
S-NB-1
S-NB-2
S-AK-1
S-AK-3
S-AK-2
ARTHUR KILL CHANNEL
NEWARK BAY CHANNEL
KvK-5
KVK bend easing
S-KVK-1
S-KVK-2
KILL VAN KULL CHANNEL
PJ Berth Extension
S-PJ-4
PORT JERSEY CHANNEL
PJ3
S-AN-2
BAY RIDGE CHANNEL
S-AN-1a
S-BR-1
ANCHORAGE CHANNEL
S-AN-1b
S-AM-1, S-AM-2a and S-AM-2b (completed)
ELIZABETH (E) CHANNEL
CONTRACT AREA 5
NEWARK BAY (NB) CHANNEL
ANCHORAGE (AN) CHANNEL
ARTHUR KILL (AK) CHANNEL
PORT JERSEY (PJ) CHANNEL
KILL VAN KULL (KVK) CHANNEL
BAY RIDGE (BR) CHANNEL
Hatched Areas are completed.


Bayonne
Brooklyn
Staten Island
Raritan Bay
Sandy Hook
S-AM-3a
S-AM-3b
Ambrose Obstruction
RMS Fort Victoria

Initial dredging will excavate the rock or soil to attain the designed channel depths, while later maintenance dredging will remove the material that has been re-deposited since the last dredging operation.

Table 1 outlines the remaining amount of material to be dredged for the HDP project as of May 2012. Several different placement options for the dredged material are utilized: upland sites; the Newark Bay Confined Disposal Facility (NBCDF); Historic Area Remediation Site (HARS); reef sites; habitat creation, and other beneficial uses.

Table 1: Details of ongoing and future construction for HDP dredging (updated as of May 8, 2012)

Contract Name	*Contract Award (approx)	**Contract Duration in Calendar Days (approx)	***Time actual dredge in water, 65% effective rate (approx calendar days)	Amount of Dredge Material (approx bid amount) (CY)	Material Type	Equipment Type	Estimated Number of dredge trips/loads per day	Material Disposal Location (approx)	Status
Newark Bay-2 /Arthur Kill-1	Construction ongoing	460	260	3,030,895	NB2= red brown clay, rock & silt. AK1= Rock, sandstone, pleistocene and silt.	Mechanical dredge; blasting	3-5 dredge trips per day when not dredging for beneficial use of material. If using the cutterhead, usually averages 3-4 trips per day. If dredging or blasting usually fewer trips per day.	NB2= 2,110,300 CY HARS, 71,100 CY artificial reefs, 174,600 CY upland. S-AK-1= 13,500 CY HARS, 509,600 CY artificial reefs, 174,600 CY upland	Contract is on schedule to complete Dec 2012. Blasting began first week of July.
Ambrose-3a	September 2011	300	156	2,024,000 As of April 30, 2012, 235,736 CY of material has been dredged.	Sand	Hopper dredge	Historically: Averages 3-4 trips per day to the HARS and 3 trips per day to Jamaica Bay.	TBD: 2,000,000 CY to HARS, but portions will go to the NBCDF	Contract awarded. Dredging underway as of April 2012, with an end date expected in early Oct 2012.
Arthur Kill-2	September 2011	500	286	1,625,000	Primarily shale rock, bit of pleistocene, glacial till & recent silts.	Possibly Mechanical dredge and blasting - TBD	Historically: Averages 3-4 trips per day if use cutterhead; less if blasting used.	467,800 CY HARS, 874,400 CY rock, 283,100 CY non-HARS upland	Dredging underway; contract end date 31 Dec 2012 (estimate)
Ambrose-3b	September 2011	373	198.25	2,044,000 CY (base and options) As of April 30, 2012, 884.405 CY of material has been	Sand	Hopper dredge	Historically: Averages 3-4 trips per day to the HARS and 3 trips per day to Jamaica Bay.	TBD: 346,595 CY to HARS, 250,000 CY to Rulers Bar Hassock, and Black Wall 127,00 CY to Plumb	Contract awarded. Dredging started early Feb 2012. Dredging stopped early April 2012 and will resume again in

Contract Name	*Contract Award (approx)	**Contract Duration in Calendar Days (approx)	***Time actual dredge in water, 65% effective rate (approx calendar days)	Amount of Dredge Material (approx bid amount) (CY)	Material Type	Equipment Type	Estimated Number of dredge trips/loads per day	Material Disposal Location (approx)	Status
				dredged.				Beach; 375,000 CY to Yellow Bar.	late Aug 2012. Projected end date is 31 Dec 2012.
Arthur Kill-3	September/ October 2013	365	198.25	990,000	Primarily shale rock, bit of pleistocene, glacial till & recent silts.	Possibly Mechanical dredge and blasting - TBD	Historically: Averages 3-4 trips per day if use cutterhead; less if blasting used.	To be determined upon contract award	On schedule for award in fall/winter 2012.

**Mobilization of dredge equipment for construction on water to begin approximately 45-60 days after contract award*
***Estimated contract duration includes date of contract award until competent contract completion, which accounts for any restrictions due to Essential Fish Habitat (winter flounder) dredge windows, USACE surveys to confirm new channel depth, and sparse intermittent dredging of any remaining high spots.*
****Estimated days is the number from column 3, subtracted by 60 days for mobilization, and then assumes 65% dredge effectiveness rate. Remaining 35% of the time is downtime for maintenance and weather related issues. Although the estimate is based on 65% effective time, it is unlikely that these calendar days would be consecutive as there is often routine maintenance and some poor weather days during any dredging that takes place.*

The seven major channels in the Harbor provide access to three main existing container terminals: Port Newark/Elizabeth Marine Terminal, Global Marine Terminal on the Port Jersey Peninsula, and New York Container Terminal. The Bay Ridge channel to the South Brooklyn Marine Terminal is presently deferred. Dredging of the channels described in the USACE 1999 BA were broken down into contract areas for actual construction and have since been revised to capture economic efficiencies, as documented in the 2004 HDP Environmental Assessment (USACE 2004). Several of the contracts have been completed to date and are depicted in Figure 1. The following paragraphs provide a description of remaining construction for each channel.

<u>Ambrose (AM) Channel</u> - The channel is 10.6 nautical miles and extends from the deep water of the Atlantic Ocean to the Narrows (Figure 1). The channel will be excavated and maintained at a depth of 53 feet deep at MLW and a bottom width of 2,000 feet. Maintenance dredging can occur for this channel as well as sand mining to remove shoaling sediments. A hydraulic (hopper) dredge will be used to excavate the remaining sand in this channel. S-AM-3a and S-AM-3b are the remaining contract areas for deepening in this channel. Table 1 outlines the schedule and details of the remaining contracts. Three dredges are expected to operate per day in S-AM-3a and S-AM-3b, but there can be more or fewer depending on equipment availability and compliance with the Clean Air Act and other environmental regulations. The dredges will vary from medium sized (e.g., the Padre Island and Dodge Island) to a larger sized dredge operating with two drag arms (e.g., The Terrapin Island). Although the majority of the contract area is relatively flat, there are some high spots/peaks throughout the channel. If a hopper dredge is not effective or unable to dredge these peaks, then the contractor may use a leveling technique to redistribute the sediment before dredging the material with a hopper. The equipment is a type of dragbar, such as an I-beam or similar piece of mechanical equipment that is dragged along the bottom of the channel to knock down high spots.

The sand material excavated from S-AM-3a will primarily go to the HARS, although portions of it will be used to remediate (cap) the NBCDF. Material from the S-AM-3b contract will go to the HARS, with options in the contract for the sand to be used for: the NBCDF; beneficial use in restoring Yellow Bar, Black Wall and Rulers Bar Hassock Islands; and for storm damage reduction of Plumb Beach to protect critical infrastructure. In addition to the dredging of material, the Fort Victoria shipwreck is in a section of the channel (Figure 1). A portion of the wreck impedes the channel and will be removed via mechanical dredging to be consistent with the navigable depth of 53 feet.

Based on dredging and test dredging, unexploded ordnance (UXO) has been found in nearby dredging locations. Because of the danger presented by these objects if taken directly into a hopper dredge, dredging equipment utilizing suction heads (i.e., draghead of a hopper dredge) are equipped with UXO screens, which are longitudinal bar screens that typically have an opening of 1.25 - 1.5” x 6”. The dimensions of the screen bars will be designed and constructed in a manner to maximize the total open area of the suction head through which channel sediments can be dredged and maximize the hydraulic transport efficiency of the draghead.

Historically, the approximate and typical speed during dredging operations in Ambrose have been: 7 mph between the contract area to a beneficial use site in Jamaica Bay; 10 mph from the contract area to the HARS; 11 mph from the HARS to the contract area; and 2.5 mph while dredging. When complete, the total number of acres that will be affected from dredging S-AM-3a (304 acres) and S-AM-3b (679 acres) will be approximately 983 acres. This total is approximately 1.4%, a small percentage compared to the entire acreage of Lower and Raritan Bays, which is approximately 69,188 acres.

Recently it has been determined that there is a need to eliminate an obstruction to navigation in federal waters near the entrance of the Ambrose Channel in the Lower Bay of the NY/NJ Harbor (Figure 1, centered at 40° 27′ 50.4″ N by 73° 50′ 7.5″ W.).

A remote sensing survey conducted in 2008 identified a rock pile that measures approximately 700 feet north to south and 1,300 feet east to west (USACE–NYD 2009). The survey indicated that the rock pile is a natural geologic formation and has a uniform, rocky bottom with no articulated vessel structure or debris piles (USACE–NYD 2009). The rock pile contains high spots that include multiple, variable-sized obstructions of gravel- to boulder-size material that reduce the mean low water (MLW) depth to 53 feet. The combined footprint of the multiple obstructions within the rock pile is approximately 65,000 square feet (USACE 2009b), or approximately 1.5 acres.

Based on the remote sensing survey, and a wave modeling analysis conducted by the USACE Engineer Research and Development Center in 2010, it was determined that the high spots on the rock pile be considered a navigational hazard to full use of the seaward approach to the Ambrose Channel. The hazard is three-fold.

- The area in which the obstruction is located cannot be avoided by ships approaching the first gated buoys of the Ambrose Channel.

- The depth of the obstruction at 53 feet at MLW is shallower than the depth of the seaward approach to the channel (60 feet), and therefore poses a hazard to navigation because the larger vessels entering the Port have a deeper draft than the highest point of the obstruction.
- The obstruction poses a risk to humans and the environment through vessel-obstruction strikes, increased vessel maneuvering, and potential hazardous materials releases from a grounded container ship or tank vessel.

An Environmental Assessment is currently being developed to assess any environmental impacts of the proposed removal of the Ambrose obstruction. Several alternatives are being considered to eliminate the obstruction, including a "no action" alternative (Alternative 1).

Alternative 2 (Preferred Alternative): The high spots would be moved within the existing footprint of the rock pile and the depth of the rock pile would be lowered to 57 feet +2 feet at MLW. The material would be repositioned to low points within the footprint of the rock pile using a variety of methods, including but not limited to: (1) a tugboat dragging an I-beam at a depth of 57 feet +2 feet at MLW to push the material to deeper locations; (2) a clamshell dredge or backhoe to remove and relocate the material directly to nearby deeper locations within the footprint of the rock pile; and (3) a clamshell dredge or backhoe and a scow to remove, transport, and relocate material to deeper locations within the rock pile (approximately 1 to 3 scows would be filled). The material would be spread out so as not to create additional high spots; therefore, the area to be re-profiled plus the relocation area would be approximately 130,000 ft^2 (or approximately 15 percent of the total footprint of the rock pile).

Alternative 3: The high spots would be moved outside the existing footprint of the rock pile and the depth of the rock pile would be lowered to 57 feet +2 feet at MLW. The material would be removed using a variety of methods, including but not limited to: a clamshell dredge or backhoe and scow to remove, transport, and relocate the materials to an offsite disposal area. Under this alternative, the total area within the footprint of the rock pile that would be re-profiled is 65,000 ft^2 and would require moving approximately 6,000 yd^3 of rocky debris to an area outside of the rock pile footprint. The offsite disposal area is not yet known, but could include a state-designated artificial reef site, an upland disposal site, or the Historic Area Remediation Site (HARS). There are 11 artificial reef sites in New York and 15 artificial reef sites in New Jersey (NYDEC 2011, NJDEP 2011). The closest reef sites to the rock pile are Rockaway Reef in New York, which is approximately 4.6 nautical miles (NMs) to the north, and Sandy Hook Reef Site in New Jersey, which is approximately 8.2 NMs to the southwest. It is assumed that the upland disposal site would be up to 50 NMs from the rock pile in a designated disposal site in New Jersey or New York. The HARS is an approximately 15.7-square-NM area, which is up to 6.7 NMs south of High Spot C (USEPA 2010).

If the proposed Ambrose obstruction removal occurs, the speed of the tug/scow speeds that would be used to access the obstruction would likely be 10 mph. The transit route that would likely be used to access the obstruction would be through the Ambrose channel southward to the sea buoy and onward to the obstruction.

Anchorage (AN) - The AN Channel was dredged for 19,000 feet from the Narrows to the point 1,000 feet north of the junction with the Port Jersey Channel (Figure 1). The channel was deepened at a depth of 50 feet at MLW (52 feet in rock or otherwise hard material), with a bottom width of 2,000 feet. Dredging of this channel was broken up into 3 contract areas (see Figure 1) and the surficial silt, clay, and sands found in this channel were dredged using mechanical dredges. This channel deepening has been completed to the authorized depth. Maintenance dredging may occur as needed.

Kill Van Kull (KVK) - The KVK extends from its juncture with the Anchorage channel to its juncture with the Newark Bay channel (Figure 1), with 5.3 nautical miles to be cut with a channel bottom width of 800 feet. The channel was deepened to 52 feet and will be maintained at 50 feet, allowing 2 feet of the naturally-hard bottom to fill with soft sediments. During the development of this Biological Assessment, construction of the S-KVK-1 (see Figure 1) contract area was completed (September 2011, prior to the final ruling on the Atlantic sturgeon listing). The USACE 1999 BA reported that bedrock would be removed via blasting and dredging in KVK; however, most of S-KVK-1 bedrock (serpentine material) was fractured using a cutterhead dredge, and a mechanical dredge was used to dredge the fractured rock. Maintenance dredging is anticipated and will occur as needed.

This channel deepening has been completed, except for the recently determined need to straighten a bend in the KVK channel to facilitate safer vessel movement through a narrow area of the KVK (Figure 1). Straightening the KVK channel near Buoy 10 would result in removal of approximately 24,000 CY of Pleistocene and Holocene sand and clay material and 11,000 CY of diabase rock along the north slope of the KVK channel. The shallowest portion to dredge is along the steepest part of the slope at approximately 38 feet deep. The material would be dredged to 52 feet + 1.5 feet. Removal of this material would likely be via drilling and blasting or hydrohammer to break the rock, and a mechanical dredge, such as a clamshell or backhoe, to remove the rock fractures and other material, but the exact method is unknown until the project moves forward for construction award. Disposal of the rock material would likely be at a reef site and disposal of the mixed sediments would be at an upland site or the Historic Area Remediation Site (HARS). Removal of all material would take approximately 1.5 - 3 months depending on the equipment type used, and would include clean up and post-construction surveys.

Newark Bay (NB) - The NB channels consist of the main NB channel, South Elizabeth Channel and Port Elizabeth Channel (Figure 1), with each channel dredged to a depth of 52 feet and maintained at 50 feet. The entire NB channel will be dredged from its juncture with the KVK near Bergen Point to a point located 1,500 feet north of the Elizabeth Channel. The channel length of 14,000 feet will have a bottom width varying from 800 to 2,200 feet. The S-NB-2 is the remaining contract area to be dredged in NB and is currently under construction (Table 1). Material type and disposal varies for the S-NB-2 contract area and is described in Table 1. Completion of this contract is scheduled for December 2012. Maintenance dredging is anticipated and will occur as needed, after it is deepened.

Arthur Kill (AK) - The AK Channel will be deepened from its juncture with the KVK near Bergen Point to the New York Container Terminal, formerly known as the Howland Hook Marine Terminal (Figure 1). The AK will be dredged over 2.4 nautical miles to a depth of 52 feet and maintained at 50 feet and will be widened to 800 feet. The channel contains a variety of material types to dredge. Remaining surficial silt, clay, and sands will likely be dredged by a clamshell bucket dredge or a backhoe dredge and placed at the HARS, when suitable. An environmental bucket dredge (sealed clamshell bucket) may be used to excavate the soft surficial material unsuitable for placement at the HARS, and will be placed at upland sites. The AK also contains bedrock and the USACE 1999 BA reported that bedrock would be removed via blasting and dredging; however, it may be possible to use a cutterhead to fracture the rock. There are 3 contract areas in AK that are ongoing or scheduled for future construction (Table 1). In S-AK-1, dredging of the top layer of silt has been completed; drilling and blasting began the first week of August 2011; completion of this contract is scheduled for December 2012. The construction contract for S-AK-2 was awarded in September 2011. The final contract to complete the Arthur Kill path to NY Container Terminal (S-AK-3) is scheduled to be awarded in the fourth quarter of 2012. Maintenance dredging is anticipated and will occur as needed, once deepening has been completed.

Bay Ridge (BR) - Construction may not occur: The BR channel is 3 nautical miles and extends from its juncture with AN Channel to the proposed South Brooklyn Marine Terminal (Figure 1). The entire channel was proposed for dredging and maintenance at 50 feet with a bottom width reduced to 600 feet from the current 1,200 - 1,750 feet width. Dredging of the BR channel is subject to a commitment to rehabilitate the South Brooklyn Marine Terminal and transportation infrastructure needed to realize the project benefits. There has been no progress to date to initiate dredging in the BR channel; however, if dredging does occur, the estimated amount of material to be removed is 4,813,000 CY. Maintenance dredging will occur as needed.

Fifty years of maintenance dredging is planned as part of the HDP to maintain the channels and will occur as needed and as funding permits. This BA does not assess the impacts associated with Operation and Management of the HDP as a feature authorized under the Civil Works program. Any maintenance of the Federal channels would be conducted under separate authority and coordinated with NMFS as such.

2.1 History of Hopper Dredging Projects in the NYD with Sea Turtle Observers

In addition to the 50 foot HDP, a number of hopper dredging projects have been completed by the NYD, including deepening and maintenance dredging for navigation, and sand borrowing for beach renourishment. Table 2 shows a list of NYD completed hopper dredging projects that had a certified sea turtle observer onboard, as well as recent dredging projects from the New England District. These regions were included since turtles are less common compared to other USACE Districts south of NY/NJ. The quantities are based on dredging that occurred May 1through November 15, which is the turtle season identified in the 2000 Sea Turtle BO. In the cases were monthly quantities were not available, an average monthly quantity was calculated over the life of the project and multiplied by the number of months that dredging occurred during the turtle season to determine the total dredged quantity. It is important to note that for the 13 projects monitored, only **one** take of a threatened turtle has ever been recorded for a total of approximately 18.7 million cubic yards dredged from 1993 – 2010.

Table 2: Hopper Dredging Projects with sea turtle observers in the NY, NJ and New England region.

Project Name	Year(s) of	Project Type	Dredged Quantity	Turtle	UXO

	Operation		during turtle season (cubic yards)	Take?	Screen?
S-AM-1, Ambrose Channel	2006 - 2008	Deepening	2,449,038	No	Yes
S-AM-2b, S-AN-1B, Ambrose and Anchorage Channels	2009 - 2010	Deepening	827,615	No	Yes
Buttermilk Channel, NY	2000	Maintenance Dredging	95,000	No	Unknown
Buttermilk Channel, NY	2005	Maintenance Dredging	78,000	No	Unknown
Westhampton, NY	1993	Beachfill	1,455,071	No	No
Westhampton, NY	1996	Beachfill	2,518,592	No	No
Westhampton, NY	1997	Beachfill	884,571	No	No
East Rockaway, NY	1995	Deepening/Maintenance	412,000	No	No
East Rockaway, NY	1996	Beachfill	2,685,000	No	No
East Rockaway, NY	2002	Deepening/Maintenance	140,000	No	No
Sea Bright, NJ	1996	Beachfill	2,058,333	No	Yes
Asbury, NJ	1999 – 2000	Beachfill	1,268,182	No	Yes
Kennebeck River, New England	2003	Maintenance	57,469	No	No
Kennebeck River, New England	2003	Emergency Dredging	22,310	No	No
Asbury Park, NJ	1997	Beachfill	3,758,333	1 Loggerhead	Yes

3.0 SPECIES OF CONCERN: ATLANTIC STURGEON (*Acipenser oxyrinchus oxyrinchus*)

As indicated in the introduction, the driving force necessitating a revision to the 1999 BA is the listing of the Atlantic sturgeon.

3.1 GENERAL ATLANTIC STURGEON INFORMATION

NMFS has determined that Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) is comprised of five distinct population segments (DPSs) that qualify as species under the ESA:

Gulf of Maine (GOM), NY Bight (NYB), Chesapeake Bay (CB), Carolina, and South Atlantic. The Northeast Region of NMFS has listed the GOM DPS as threatened, and the NYB and CB DPSs as endangered. The HDP falls within the boundaries of the NYB population.

Since the 1970s, Atlantic sturgeon have been studied intensely but many important aspects of the species life history are still unknown (Murawski and Pacheco 1977, Van den Avyle 1983, Smith and Dingley 1984, Smith and Clugston 1997, Bain 1997, Bemis and Kynard 1997, and Kynard and Horgan 2002, as cited by ASSRT 2007 and USACE 2011; Gilbert 1989).

The historic geographic range of the Atlantic sturgeon extends from the coast of Labrador in Canada, south to the St. Johns River in Florida (Gruchy and Parker 1980b, and Wooley 1985, as cited by Gilbert 1989), and included estuarine and riverine systems (reviewed in Murawski and Pacheco 1997, and Smith and Clugston 1997, as cited by ASSRT 2007). The species was historically present in 38 rivers in the United States from St. Croix, ME to Saint Johns River, FL, most of which supported historical spawning populations. Currently, Atlantic sturgeon are known to be present in 35 rivers, and spawning occurs in at least 20 of these rivers (ASSRT, 2007, as cited by USACE 2011).

Atlantic sturgeon spawn in fresh water but move to coastal waters as subadults (ASSRT, 2007, as cited by USACE 2011). Coastal regions where migratory Atlantic sturgeon are commonly found include the Bay of Fundy, Massachusetts Bay, Rhode Island, NJ, Delaware, Delaware Bay, Chesapeake Bay and North Carolina (Dovel and Berggren 1983, Johnson et al. 1997, Rochard et al. 1997, Kynard et al. 2000, Eyler et al., 2004, Stein et al., 2004, and Dadswell 2006; as cited in ASSRT, 2007 and USACE 2011).

Atlantic sturgeon can attain lengths of up to 14 feet (425 cm) and weights of more than 800 pounds (363 kg). Atlantic sturgeon have been known to live up to 60 years (Mangin 1964, as cited by Grunwald et al. 2007 and USACE 2011), although age validation studies show a variation of ±5 years (Stevenson and Secor 1999, as cited by USACE 2011).

Sexual maturity occurs from 7-28 years, depending on geographic location and gender (Collins et al. 2000, as cited by USACE 2011). Atlantic sturgeon show latitudinal variation in growth and maturation (Vladykov and Greeley 1963; Huff 1975, as cited by Gilbert 1989), exhibiting faster growth and earlier age at maturation in more southern areas (Gilbert 1989). In the Hudson River, the age at first spawning for females has been recorded at age 18 (Dovel and Berggren 1983, as cited by Bain 1997), although Van Eenennaam et al. (1996, as cited by Bain 1997) reported age 15. Spawning males are 12 years or older (Van Eenennaam et al. 1996).

Atlantic sturgeon are anadromous, spending the majority of their adult phase in marine waters, migrating up rivers to spawn in fresh water and migrating to brackish waters in the juvenile growth phases (Bain 1997). Atlantic sturgeon undertake long-distance migrations along the Atlantic Coast (Bain 1997) and do not appear to spawn annually (Gilbert 1989); periods between spawning can range from 2-6 years (Vladykov and Greeley 1963, Van Eenennaam et al. 1996, and Stevenson and Secor 1999, as cited by USACE 2011). There is little information on the behavior of the species in marine waters (Bain 1997).

Adults return to their natal fresh water rivers to spawn (Dovel and Berggren 1983;

Collins et al. 2000, and Grunwald et al. 2007, as cited by USACE 2011). They migrate prior to the spawning season, and the males arrive before the females by one week or longer (Smith 1985a, as cited by Gilbert, 1989). Southern populations typically spawn earlier (February-March) than mid-Atlantic region Atlantic sturgeon (April-May), and fish occupying the northernmost rivers spawn primarily from May-July (Murawski and Pacheco 1977, Smith 1985, Bain 1997, Smith and Clugston 1997, Caron et at. 2002, as cited by ASSRT 2007). In the Hudson River, movement by spawning adults into and out of the river appears to be related to temperature (Dovel and Berrgren 1983, and Smith 1985a, as cited by Gilbert 1989; Sweka et al. 2007).

Atlantic sturgeon eggs are highly adhesive and are deposited primarily on gravel, rocky hard-bottom substrates and fertilized externally (Borodin 1925, Smith et al. 1980, as cited by USACE 2011) and eggs, embryos and larvae are reported to have limited salt tolerance (Van Eenennaam et al. 1996, as cited by Bain 1997).

Spawning is believed to occur in water temperatures up to 24.3^{o} C (Dovel and Berggren 1983, as cited by USACE 2011) and egg incubation periods vary with water temperature. Larval Atlantic sturgeon emerge from the egg in roughly 4-6 days (based on hatching temperatures of approximately 18^{o} C-20^{o} C). Newly hatched larvae exhibit negative phototactic behavior to avoid predation (Kynard and Horgan 2002, as cited by USACE 2011) and show a preference to migrate downstream towards more brackish waters (Smith et al. 1980, and Kynard and Horgan 2002, as cited by USACE 2011). Yolk sac absorption occurs within 8-12 days. At the end of their first summer, the majority of young-of-the-year (YOY) Atlantic sturgeon remain in their natal river while older subadults begin to migrate offshore (Dovel and Berggren 1983, as cited by USACE 2011).

The following spring returning subadults, as well as the overwintering river Young-of-Year (YOY), are thought to gradually move into summer foraging areas where they remain until the fall (Dovel and Berggren 1983, Kieffer and Kynard 1993, Shirey et al. 1997, and Savoy and Pacileo 2003, as cited in USACE 2011). In the Hudson River, juvenile males migrate to marine waters in year 2, whereas juvenile females remain in the river longer, until year 5 or 6 (Dovel and Berggren 1983, as cited by Bain 1997). Older subadult Atlantic sturgeon are known to undertake extensive marine migrations and occupy non-natal estuaries during the late spring, summer, and early fall months (Dovel and Berggren 1983, as cited by USACE 2011), presumably for feeding (Dadswell 1979, as cited by USACE 2011) or perhaps for thermal or salinity refuge (Savoy and Pacileo 2003, as cited by USACE 2011).

3.2 GENERAL DISTRIBUTION WITHIN THE NEW YORK BIGHT DISTINCT POPULATION SEGMENT

The NYB DPS includes all Atlantic sturgeon whose range occurs in watersheds that drain into coastal waters, including Long Island Sound, the NYB, and Delaware Bay, from Chatham, MA to the Delaware-Maryland border on Fenwick Island. Within this range, Atlantic sturgeon have been documented from the Hudson and Delaware Rivers as well as at the mouth of the Connecticut and Taunton Rivers, and throughout Long Island Sound, with evidence to support that spawning occurs in the Hudson and Delaware Rivers (ASSRT 2007, as cited by USACE 2011).

More recently, attention is being focused on understanding how oceanic habitat is used by migrant Atlantic sturgeon (Dunton et al. 2010, Erickson et al. 2011). By examining five fishery-independent surveys of Atlantic sturgeon, Dunton et al. (2010) determined potential coastal migration pathways for northerly summer and southerly winter migrations. They also report that large aggregations of immature Atlantic sturgeon tend to congregate at the mouths of estuaries, including the Hudson River estuary in the spring and fall. The highest catches occurred in the NYB at depths of 10 to 15 m. Dovel and Berggren's (1983) tagging data revealed a southerly movement during the winter, which is consistent with a finding that 43.5% of the Atlantic sturgeon overwintering in North Carolina originated in the Hudson River (Laney et al. 2007). Dunton et al. (2010) concluded that depth was the primary environmental characteristic influencing Atlantic sturgeon distributions with juvenile migrants concentrated in coastal waters < 20 m deep in areas adjacent to the mouths of estuaries, such as the Hudson River. The authors suggest that depth restricts movements and that aggregations are related to food availability and movement is triggered by temperature cues. Erickson et al. (2011) conducted a pop-up satellite tagging study to track the movements of adult Atlantic sturgeon after they left the Hudson River, which is the most significant spawning system within the NYB Distinct Population Segment (DPS). Of the 23 fish that were tagged, 15 returned to the ocean and 13 of those remained within the Mid-Atlantic Bight, one migrated as far north as Nova Scotia and one as far south as Georgia. These results are consistent with mitochondrial DNA analysis that showed that 97% of subadult Atlantic sturgeon caught in the Mid-Atlantic Bight were of Hudson River origin (Waldman et al. 1996). Atlantic sturgeon left the Hudson River and entered the ocean in the fall as water temperatures fell.

Habitat selection by subadult Atlantic sturgeon is likely driven by a combination of factors, including water temperature, salinity, dissolved oxygen, depth, substrate type, and available prey resources. Subadult Atlantic sturgeon are thought to occupy specific concentration zones within estuaries due to the presence of prey resources which, in part, are dependent on the aforementioned specific physiochemical characteristics (ECS 1993, as reported in Simpson 2008, and as cited by USACE 2011). A number of studies on subadult Atlantic sturgeon in different riverine systems identify preferred habitat as oligohaline. In the Hudson River low salinity areas serve as nursery habitat (Dovel and Berggren 1983, and Bain et al. 2000, as cited by USACE 2011). In the Chesapeake Estuary, hatchery-raised telemetered Atlantic sturgeon YOY, within one week after release, relocated (>90%) in oligohaline waters (Secor et al. 2000, as cited by USACE 2011). In the Merrimack River sub-adults occupied oligo-mesohaline habitats (Kiefer and Kynard 1993, Moser and Ross 1995, as cited by USACE 2011). Likewise within the Delaware River, concentration zones are typically found in the oligohaline and mesohaline reaches (Shirey et al. 1997, as cited by USACE 2011).

3.3 DISTRIBUTION IN PROJECT AREA

The first observations of sturgeon in the Hudson River date back to accounts of human settlement in the area. Fishery landings were recorded starting in 1880 and the large gear size in the fishery indicates that most of the harvest was Atlantic sturgeon (Bain et al. 2000). Scientific observations of the Hudson River population were first recorded in the 1930s and include documentation of sturgeon distributions by size and age (Bain 1997). Approximately 40 years elapsed before concern over potential impacts from electrical power plants initiated long-term monitoring programs in the 1970s that resulted in reports of sturgeon distributions and life history characteristics (Young et al. 1988). Due to a collapse in the fishery, the Atlantic sturgeon attracted little commercial interest in the Hudson River from 1900 through 1979 (Bain et al. 2000), however, the population exhibited a recovery in the 1980s and fishing for Atlantic sturgeon became a significant activity in the system in the 1990s, attracting the attention of fishery management agencies (Bain et al. 2000).

The Hudson River and estuary system is oriented in a north-south direction from NY/NJ Harbor (southern tip of Manhattan Island = km 0) with Atlantic sturgeon distributed within the tidal portion ranging as far north as the Troy Dam (km 246). Adult Atlantic sturgeon ($\geq$ 150 cm TL) marked in the Hudson River have been recaptured in coastal areas from North Carolina to Massachusetts (Bain 1997). Adult females migrate to spawning grounds, which are deep, channel or off-channel habitats within the Hudson River Estuary starting in mid-May (Dovel and Berggren 1983), spawn from May through July or possibly August, and return to marine habitat the following fall (Dovel and Berggren 1983, Van Eenennaam et al. 1996). Mature males are present in the Hudson River for a longer time period than mature females, extending from April to November (Dovel and Berggren 1983) and appear at spawning sites in association with females, suggesting they search for females while moving about in the river (Van Eenennaam et al. 1996). In the Hudson River, spawning occurs near the salt wedge (km 55) in late May, moving upstream to km 136 by early July (Dovel and Berggren 1983). Van Eenennaam et al. (1996) collected spawning Atlantic sturgeon near Hyde Park (km 130) and Catskill (km 182) and suggested that because sturgeon eggs, embryos and larvae are intolerant of brackish conditions, spawning occurs in freshwater habitat considerably upstream from brackish conditions. The Hyde Park site was also cited as a productive spawning area at river km 134, which was a major fishing location in the 1880s (Bain et al. 1998, Bain et al. 2000). In the Hudson River, Atlantic sturgeon embryos have been collected from km 60 through 148 (Dovel and Berggren 1983). Juvenile Atlantic sturgeon occur throughout the Hudson River from July through September (Bain 1997) and are most concentrated from km 63 to 140 moving between km 19 and 74 as water temperature drops below 20^{o} C in the fall (Dovel and Berggren 1983). It appears that juveniles stay in this portion of the river, moving little, between October and June (Bain 1997). Juvenile male Atlantic sturgeon migrate to marine habitat in year 2 and juvenile females in year 5 or 6. Juveniles grow rapidly, exceeding 70 cm TL by 3 years of age (Stevenson 1997). After about 10 years at sea, adult size (150 cm TL, Table 3 both sexes pooled) is reached (Bain 1997).

Table 3. Ages and sizes of life history stages of Atlantic sturgeon in the Hudson River (from Bain 1997)

Life History Stage	Age range (yr)	Fork length (cm)	Total length (cm)
Larva	<0.08		$\leq$3
Early juveniles	0.08-2	2-44	3-49
Intermediate juveniles	3-6	45-63	50-70
Late juveniles	6-11	>63-134	>70-149
Non-spawning adults	$\geq$12	>135	$\geq$150
Female spawners	$\geq$15	>180	$\geq$200
Male spawners	12-20	>135-190	$\geq$150-210

Mitochondrial DNA analyses indicate that Hudson River Atlantic sturgeon are genetically distinct from other populations on the US Atlantic coast and this population overwhelmingly supports the fishery in the NYB (Waldman et al. 1996). The Newburgh and Haverstraw Bays in the Hudson River are areas where juvenile Atlantic sturgeon congregate, with highest catches occurring in deep (>9 m), soft-bottom areas of Haverstraw Bay in the spring (Sweka et al. 2007). In this study, hard substrate consisted of compacted sand, rock, gravel and oyster shell beds, whereas soft substrate was silt and mud. Seasonal movements occur down river when water temperatures drop below 20^{o}C (Dovel and Berggren 1983) and up river in the spring when temperatures rise above 4^{o}C (Sweka et al. 2007). Sweka et al. (2007) sampled from March through April and from October through November and report that these time periods bracketed the time periods when the sturgeon were moving up and down the river. The summer congregation of one-year-old Atlantic sturgeon in south Newburgh Bay provides a good opportunity to monitor population recovery because this group of fish is at the largest size observed before there is evidence of emigration from the Hudson River (Bain 2001). The distributions of juvenile Atlantic sturgeon collected in gill nets from June to mid-September 1995 (Haley et al. 1996) were higher than expected in the Highlands Gorge (km 68 -90) area and less than expected in the Narrow River (km 108-138) area. The Highland Gorge area is characterized as deep, mesohaline habitat dominated by silty substrate, whereas the Narrow River area is a freshwater zone. The distributions of stocked and wild juvenile sturgeon differed, with stocked sturgeon occurring more than expected in the Narrow River area. The stocked Atlantic sturgeon were significantly smaller than wild juveniles, which may account for the difference in their distributions. The Hudson River population of Atlantic sturgeon is one of two U.S. populations for which there is an abundance estimate (approximately 870 spawning adults/year, 600 males and 270 females; Kahnle et al. 2007) and it is considered one of the healthiest populations in the U.S. (ASSRT 2007).

The NY Department of Environmental Conservation is conducting a tagging study in collaboration with the Hudson River Estuary Program, US Fish and Wildlife Service, Pew Institute, Hudson River Foundation, and National Fish and Wildlife Foundation. In this study, Atlantic sturgeon are captured in the lower river and tagged with sonic tags that will remain active until 2013. Preliminary results indicate that adults are attracted to muddy substrates, followed by sand, with lowest observances over gravel (http://www.dec.ny.gov/animals/37121.html).

As part of project specific biological monitoring conducted by the NYD, there have been several sightings of sturgeon in Upper, Lower and Raritan Bays. From 1998 through 2010, bottom trawl surveys were conducted as part of the HDP. A primary goal of the Aquatic Biological Survey (ABS) is to collect data on finfish, shellfish, macroinvertebrates, and water quality, with a focus on fish community structure, distribution and seasonal patterns of habitat use in NY/NJ Harbor. ABS sampling occurred from December to June throughout the Harbor, with stations in Newark Bay, Arthur Kill, Upper Bay and Lower Bay. These station locations include channel stations and stations in close proximity to past and future dredging sites. Throughout the 12-year sampling period, two Atlantic sturgeon were captured in bottom trawls (Table 4). The first Atlantic sturgeon was captured in June 2005 at a non-channel station in the Upper Bay. It measured 790 mm total length and presumably was a late juvenile (Table 3). The other Atlantic sturgeon captured in the ABS surveys was 638 mm total length (an intermediate juvenile, Table 3) and was captured in December of 2009 at a channel station in the Lower Bay.

Bottom trawl surveys were also conducted in the fall of 2008 for a few days in Lower

Bay as part of investigations of navigational hazards. Two Atlantic sturgeon were captured in October 2008 (Table 4). The first Atlantic sturgeon measured 1,220 mm and the second measured 1,180 mm.

Additional sightings and captures of sturgeon occurred during other monitoring activities by the NYD, and are summarized below in Table 4. Although the NYD conducted migratory finfish surveys in the HDP area in 2006 (USACE 2007), and has reinitiated the study in 2011, no Atlantic or shortnose sturgeon observations were reported. The majority of the observations described in Table 4 were collected as part of long term and rigorous data collection efforts in the NY/NJ Harbor. Excluding the 1995 observation, only 13 sturgeon were observed over 14 years (1998-2011).

Table 4: Sturgeon observations in and around the HDP area

Species	Date	Location	Length	Data Source/Comments
Atlantic sturgeon	June 2005	Port Jersey (east of Liberty Golf Course)	790 mm	HDP ABS program
Atlantic sturgeon	October 2008	Lower Bay near approach to Ambrose Channel (between 40.457833, -73.89633 and 40.46117, -73.90267	1220 mm	Investigations near navigational obstructions
Atlantic sturgeon	October 2008	Lower Bay near approach to Ambrose Channel (between 40.457833, -73.89633 and 40.46117, -73.90267	1180 mm	Investigations near navigational obstructions
Atlantic sturgeon	December 2009	Lower Bay(chapel hill south channel)	638 mm	HDP ABS program
Shortnose Sturgeon	June 2003	Upper Bay (near Statue of Liberty)	780 mm	HDP ABS program
Shortnose Sturgeon	June 2003	Upper Bay (near Statue of Liberty)	690 mm	HDP ABS program
Shortnose Sturgeon	June 2005	Port Jersey (east of Liberty Golf Course)	1250 mm	HDP ABS program
Shortnose Sturgeon	June 2005	Port Jersey (east of Liberty Golf Course)	840 mm	HDP ABS program
Shortnose Sturgeon	May 2008	Port Jersey (east of Liberty Golf Course)	900 mm	HDP ABS program
Shortnose Sturgeon	May 2009	Port Jersey (east of Liberty Golf Course)	910 mm	HDP ABS program
Sturgeon (species not identified)	October 1998	Port Jersey (adjacent and east of Global Marine Terminal)	not recorded	HDP ABS program

Species	Date	Location	Length	Data Source/Comments
Sturgeon (species not identified)	October 2008	East of Sandy Hook between coordinates: 40.41087, -73.88474 to 40.41080, -73.88464	not recorded	Found in turtle cage during dredged material inspection. Noted on disposal log sheets from Dredged Material Inspectors, who accompany all vessels disposing dredged material at the HARS)
Sturgeon (species not identified)	September 2010	1 1/2 miles south of the Verrazano Bridge and 1/2 mile east of Hoffman Island near coordinate 40.57917, -74.04017	42"- 48" long (estimate)	Injured sturgeon (head injury) spotted by USACE vessel while conducting routine drift patrol
Atlantic sturgeon	1995	borrow area (BBA-5), between Belmar and Manasquan	Not recorded	Biological Monitoring program, Atlantic Coast of NJ: Asbury Park to Manasquan

3.4 FOOD RESOURCES

Overall, sturgeon appear to feed indiscriminately throughout their lives (Bigelow and Schroeder 1953, Vladykov and Greeley 1963, Murawski and Pacheco 1977, van den Avyle 1984, as cited by Gilbert 1989) and are generally characterized as bottom feeding carnivores (Bain 1997). As sturgeon search for food, their protrusible mouth is used to “vacuum” along the bottom (Gilbert 1989). Adult Atlantic sturgeon feed on polychaetes, oligochaetes, amphipods, isopods, mollusks, shrimp, gastropods, and fish (Johnson et al. 1997, Haley 1998, Bigelow and Schroeder 1953, Vladykov and Greeley 1963, Smith 1985b, as cited in Gilbert 1989). Smith (1985b, as cited by Bain 1997) reported that: “Female sturgeon do not appear to feed on the spawning run in freshwater”.

Although sturgeons generally occupy North American waters where temperatures range to 30^{o} C, activity and growth are more optimal in cooler (<25^{o} C) waters (Cech and Doroshov 2004, as cited by USACE 2011). Atlantic sturgeon are believed to seek thermal refuge in deepwater habitat and exhibit limited movement during periods of elevated temperatures (>25^{o} C). As water temperatures peak during the summer months the ability of water to hold dissolved oxygen decreases, which may potentially drive subadult Atlantic sturgeon to cooler, deepwater habitat where dissolved oxygen levels are generally higher (Dovel and Berggren 1983, Moser and Ross 1995, Cech and Doroshov 2004, Niklitschek and Secor 2005, as cited by USACE 2011). These physiochemical parameters also determine the availability of prey resources, possibly driving subadult Atlantic sturgeon estuarine habitat occupation (Dadswell, 1979, as cited by USACE 2011).

Dadswell (1979) and Marchette and Smiley (1982) studied feeding habits of shortnose sturgeon. They reported that freshwater feeding occurs during portions of the year when water temperature is greater than 10^{o} C. Feeding during colder months occurs at a depth of 15-25 m (49-82 feet). Feeding activity in saline water occurs year-round, although an analysis of stomach contents suggests that feeding is less frequent during the winter. Substrate types associated with important prey items for subadult Atlantic sturgeon include clay and silt in the Hudson River (Bain et al. 2000, as cited by USACE 2011), organic mud substrates in Albemarle Sound (Armstrong 1999, as cited by USACE 2011), and sandy mud and clay mud in the Savannah River (Hall et al. 1991, as cited by USACE 2011).

4.0 FACTORS AFFECTING THE NEW YORK BIGHT DISTINCT POPULATION SEGMENT OF ATLANTIC STURGEON

Like all anadromous fish, Atlantic sturgeon are vulnerable to many habitat impacts because of their varied use of rivers, estuaries, bays, and the ocean throughout the phases of their life. Habitat alterations that may affect Atlantic sturgeon include: dam construction and operation; dredging and disposal; and water quality modifications such as changes in levels of DO, water temperature and contaminants (ASSRT, 2007, as cited by USACE 2011). Atlantic sturgeon also exhibit unique life history characteristics that make them particularly vulnerable to population collapse from overfishing (Boreman 1997, as cited by Bain 1997), including: "advanced age and large size at maturity, eggs that are numerous and small in relation to body size, and spawning that is episodic and seasonal" (Winemiller and Rose 1992, as cited by Bain 1997). Other threats to the species include vessel strikes.

Dredging in riverine, nearshore and offshore areas has the potential to impact aquatic ecosystems by removal/burial of benthic organisms, increased turbidity, alterations to the hydrodynamic regime and the loss of shallow water or riparian habitat. According to Smith and Clugston (1997, as cited by USACE 2011), dredging may impact important habitat features of Atlantic sturgeon if these actions disturb benthic fauna, or alter rock substrates. Indirect impacts to sturgeon from either mechanical or hydraulic dredging include the potential disturbance of benthic feeding areas, disruption of spawning migration, or detrimental physiological effects of resuspension of sediments in spawning areas. In addition, hydraulic dredges can directly impact sturgeon and other fish by entrainment in the dredge (ASSRT 2007, as cited by USACE 2011).

Atlantic sturgeon have been directly harvested for years. Many authors have cited commercial over-harvesting as the single greatest cause of the decline in abundance of Atlantic sturgeon (Ryder 1890, Vladykov and Greely 1963, Hoff 1980, ASMFC 1990, and Smith and Clugston 1997, as cited in ASSRT 2007 and USACE 2011). Harvest records indicate that sturgeon fisheries were established in every major coastal river along the Atlantic Coast at one time and were concentrated during the spawning migration (Smith 1985b, as cited by USACE 2011). Despite the fact that the fishery has been closed coast-wide since 1995, poaching of Atlantic sturgeon continues and is a potentially significant threat to the species, but the magnitude of the impact is unknown (ASSRT 2007, as cited by USACE 2011). Impacts to sturgeon through bycatch is also a significant concern, but one that is hard to quantify due to limited available data (USACE 2011).

According to ASSRT (2007, as cited by USACE 2011), "The recovery of Atlantic sturgeon along the Atlantic Coast, especially in areas where habitat and water quality is severely degraded, will require improvements in the following areas: 1) elimination of barriers to spawning habitat either through dam removal, breaching, or installation of successful fish passage options; 2) operation of water control structures to provide flows compatible with Atlantic sturgeon use in the lower portion of the river (especially during spawning season); 3) imposition of restrictions on dredging, including seasonal restrictions and avoidance of spawning/nursery habitat; and 4) mitigation of water quality parameters that are restricting sturgeon use of a river (i.e., DO). Additional data regarding sturgeon use of riverine and estuarine environments is needed."

Although little is known about natural predators of Atlantic sturgeon, there are several documented fish and mammal predators, such as sea lampreys, gar, striped bass, common carp, northern pike, minnow, channel catfish, smallmouth bass, walleye, grey seal, fallfish and sea lion (ASSRT 2007). There are some concerns that predation may adversely affect sturgeon recovery efforts in fish conservation and restoration programs, and by fishery management agencies (Brown et al. 2005, and Gadomski and Parsley 2005, as cited by ASSRT 2007; ASSRT 2007). However, further research is needed.

Atlantic sturgeon may compete with other bottom feeding species for food, although there is "no evidence of abnormally elevated interspecific competition" (ASSRT 2007), and it has been suggested by van den Avyle (1984, as cited by Gilbert 1989) that "non-selective feeding of juvenile and adult sturgeons may reduce the potential for competition with other fish species". Also, since both shortnose and Atlantic sturgeon occur in many rivers along the Atlantic Coast, and have many shared life history attributes, they are suspected of competing for food and space during certain life stages (Pottle and Dadswell 1979, and Bain 1997, as cited in ASSRT 2007), and the species may be spatially segregated in connection with salinity (Dadswell et al., Dovel et al. 1992, Kieffer & Kynard 1993, as cited in Bain 1997). However, this is not the case in the Hudson River. Bain (1997) reports that: "Juvenile shortnose sturgeon and early juvenile Atlantic sturgeon have almost the same distributions in the Hudson River estuary during all seasons. During this period of co-occurence, both species are very similar in size, grow at about the same rate, feed on similar foods, and share deep channel habitats. Adult shortnose sturgeon distribution overlaps with the distribution of juvenile Atlantic sturgeon, and the latter commence river emigration at a size comparable to co-occurring adult shortnose sturgeon". However, no evidence has been published that either sturgeon species is food limited.

4.1 FACTORS AFFECTING THE HUDSON RIVER POPULATION OF THE ATLANTIC STURGEON

In the Hudson River estuary, spawning, rearing, and overwintering habitats were reported to be intact by Bain (1997), supporting the largest remaining Atlantic sturgeon stock in the U.S., however, a population decline from overfishing has also been observed for this area (Bain 1997, Bain 2001, Peterson et al. 2000). Several life history characteristics make Atlantic sturgeon susceptible to overfishing, including their delayed age at maturity, vulnerability to capture, and long periods of non-spawning (Boreman 1997). Commercial landings of Atlantic sturgeon are available for NY State from 1880 through 1995. Until about 1980, most of the landings came from the Hudson River and highest annual landings occurred in 1898. Landings dropped through the early 1980's and in 1990, when the Atlantic States Marine Fisheries Commission (ASMFC) adopted an interstate fishery management plan for Atlantic sturgeon. States with open fisheries began to monitor harvest and population modeling was conducted to determine acceptable levels of harvest from the Hudson River stock. In 1993 through 1995, NY regulated the Atlantic sturgeon fishery with size limits, seasons, and area closures, determining that the Hudson River stock was being overfished. A harvest moratorium was implemented in 1996 and NJ followed with a zero quota in the same year.

Conservation of the Atlantic sturgeon population in the Hudson River has benefitted from an intensive research program in the mid-1990s funded by the Hudson River Foundation for Science and Environmental Research, which covered reproductive physiology, genetics, age structure, habitat use, behavior, and fishery attributes (Bain et al. 2000). Peterson et al. (2000) conducted a mark-recapture study to estimate the age-1 juvenile cohort size in the Hudson River and found an 80% decline in cohort size had occurred since a similarly conducted population estimate was made in 1976. Dovel and Berggren (1983) marked immature fish from 1976-1978 and calculated a year class age-1 cohort as approximately 25,000 fish, whereas the estimate by Peterson et al. (2000) from their 1994 study indicated 4,314 fish were in the age-1 cohort for that year.

Although the Hudson River subpopulation is believed to be the largest remaining Atlantic sturgeon subpopulation (NRDC 2009), bycatch mortality exceeds those levels needed to provide for a stable population (ASMFC 1990). Haley et al. (1996) cites Hoff et al. (1988) and Geoghegan et al. (1992) as reporting collections of Atlantic sturgeon as bycatch in trawl surveys conducted in the Hudson River by utility companies (April through December) between the Tappan Zee Bridge and Coxsackie.

Sediment contamination in NY/NJ Harbor includes synthetic compounds used in herbicide and pesticide production, metals, and petroleum hydrocarbons. Sources of contamination include combined sewer discharges, urban runoff, stormwater runoff, industrial discharges, and maritime and industrial accidents. Sediment contamination and silt/clay content are negatively correlated with the density and diversity of benthic organisms throughout the Harbor (Cerrato and Bokuniewicz 1986), which may in turn affect prey availability for Atlantic sturgeon.

Atlantic sturgeon are exposed to variations in dissolved oxygen because of their life history characteristics of benthic feeding and bottom dwelling and because they occur in areas with industrial pollution and temperature changes. Kieffer et al. (2011) found that Atlantic sturgeon were relatively tolerant of exposure to short-term severe hypoxia and that their biological responses may be influenced by temperature.

5.0 POTENTIAL IMPACTS OF THE HARBOR DEEPENING PROJECT

Examination of the potential impacts of destruction, modification or curtailment of habitat on Atlantic sturgeon is presented in this section. If information was not available specific to Atlantic sturgeon, information relevant to other sturgeon species (particularly the shortnose sturgeon, as it is the only other sturgeon species that inhabits the Hudson River Estuary), is presented. Similarities in sturgeon life history and physiology make these data and analyses applicable, with qualification, to Atlantic sturgeon. Different aspects of the HDP have the potential to diversely impact Atlantic sturgeon. This section discusses the potential impacts to

Atlantic sturgeon both during construction and after, including both physical effects on the fish and their food sources, as well as their spawning and overwintering habitat (USACE 2011).

5.1 PHYSICAL INJURY DURING CONSTRUCTION

Potential impacts linked to physical injury of Atlantic sturgeon during dredging and blasting activities may include: direct removal (entrainment); noise disturbance; re-suspension of sediments in spawning areas, and disruption of spawning migrations (ASSRT 2007).

Although the ASSRT (2007) reports that dredging activities indirectly impact sturgeon by disrupting spawning migrations, it does not clearly state what the cause and rationale are for this threat. In the case of the Upper and Lower Bays, dredging and blasting activities have been ongoing for at least 100 years, and still the Hudson River population of Atlantic sturgeon is considered one of the healthiest populations in the U.S. (ASSRT 2007). Therefore, it would appear that despite regular dredging activities, Atlantic sturgeon are still finding and utilizing pathways through the NY/NJ Harbor to reach spawning grounds in the Hudson River. This is likely because the waterways available for migration extending from the mouth of the Hudson River to the marine environment are sufficiently deep enough and wide enough to permit Atlantic sturgeon to avoid potential dredging-related disturbances, including active dredges, and that long-term impacts to their habitat and food source are not typical.

It is possible for Atlantic sturgeon to be entrained in a dredge. Dickerson (2006, as cited by USACE 2011) summarized sturgeon takes from Atlantic and Gulf Coast dredging activities conducted by the USACE between 1990 and 2005, which documented takes of 24 sturgeons (2 – Gulf, 11- Shortnose, and 11-Atlantic). The majority of the interactions were with a hopper dredge: sixteen takes with a Hopper dredge; five takes with a cutterhead dredge; and three takes with a mechanical dredge. Fifteen of the sturgeons were reported as mortalities, eight as alive, and one as unknown. These documented takes occurred during dredging operations in rivers and harbors, mainly in waterways along the Eastern coast that, from the map in the report, appear to be more narrow than the pathways available to Atlantic sturgeon in the NY/NJ Harbor (i.e., Delaware River, Savannah Harbor, etc) . However, the risk still exists for Atlantic sturgeon to become entrained in dredges during HDP construction. The bulk of the remaining HDP construction that will occur along the Atlantic sturgeon migratory pathway in the NY/NJ Harbor will be via hopper dredging in the Lower Bay (Ambrose Channel); thus the highest risk of interaction with a dredge, and potentially entrainment, for current and future HDP contracts, would occur in the Ambrose Channel, which occupies only about 1.4% of the open water habitat in the Lower and Raritan Bays. This risk is then further reduced due to the project conditions and minimization measures outlined in Section 6.

Physical contact with a hopper dredge's drag-arm and impeller pumps via entrainment may also pose a threat to sturgeon. A minimum of 0.6 sturgeon per year were estimated to be entrained by hopper dredges alone (ASSRT 2007).

Several studies have demonstrated that underwater blasting can cause fish mortality. Weight of the charge and distance from detonation are the most important factors affecting extent of injury and mortality, although depth of water, substrate type, and size and species of fish are also important (Keevin and Hempen 1997, Wiley et al 1981, Teleki and Chamberlain

1978, as cited by USACE 2004a). Teleki and Chamberlain (1978, as cited by USACE 2011) monitored fish mortality of 13 species in blasting experiments in Nanticoke, Lake Erie and found that fish were killed in radii ranging from 65.6 to 164 feet (20-50 m) for 50 lbs (22.7 kg) per charge and from 147.6 to 360.9 feet (45-110 m) for 600.5 lbs (272.4 kg) per charge. Mortality differed by species at identical pressure. No sturgeon were tested. Common blast-induced injuries included swimbladder rupturing and hemorrhaging in the coelomic and pericardial cavities.

In 2004, USACE conducted a blast monitoring study in KVK. The type of blasting activity for the 2004 study in KVK is similar to that anticipated for NB/AK contracts, if blasting is used instead of cutterhead dredges. A ***theoretical*** estimate of the pressure and impact of the "average" blast event monitored during the study would result in a pressure of about 90 psi with a kill radius of approximately 375 feet. The data also implies that the charges used in the KVK Blasting Program, which were confined, appeared to have less of an impact on fish than would equivalent open water charges. Using the results of the two referenced studies in this paragraph, it is reasonable to conclude that any potential blasting impacts in NB/AK would not reach areas in which Atlantic sturgeon are known or expected to migrate through the NY/NJ Harbor (see section 6 and Table 4).

5.2 PHYSICAL INJURY POST CONSTRUCTION

Dredging provides safe passage for commercial shipping and recreational boat traffic. NY/NJ Harbor is historically one of the busiest ports in the United States. The long distance that vessels transit through the HDP area through the narrowing upriver reaches allows for the possibility of ship encounters with migratory sturgeon. A study conducted in the Delaware estuary, which is narrower and shallower than the HDP area, concluded that vessel strikes accounted for 50% of Atlantic sturgeon mortalities (Brown and Murphy 2010, as cited by USACE 2011). Although Atlantic sturgeon mortalities from encounters with commercial vessels could occur in the Harbor, the HDP will not increase the frequency of ship strikes since an increase in the number of ships traversing the Harbor is not anticipated and actually a reduction in transiting ships is likely due to their increased size (i.e. fewer ship calls due to increased efficiency). Another potential benefit of the deeper (and wider) channels will result from a reduction in strikes due to increased clearance below/beside the keel of deep-draft vessels currently using the harbor.

5.3 HABITAT IMPACTS

The potential impacts of dredging to Atlantic sturgeon habitat may include loss of habitat and sedimentation.

Dredging may pose an adverse impact on egg survival through a temporary localized increase in suspended sediments in the water column, which may suffocate demersal sturgeon eggs (Simpson 2008, as cited by USACE 2011). Additionally, contaminant loads have been known to alter development, growth and reproductive performance (Cooper 1989, and Sinderman 1994, as cited by ASSRT 2007 and USACE 2011). In the Hudson River, Atlantic sturgeon embryos have been collected from km 60 through 148 (Dovel and Berggren 1983). There is a substantial spatial buffer between the NY/NJ Harbor locations where dredging is currently scheduled to occur and the freshwater spawning sites located upriver, therefore, no adverse impacts to eggs and larvae will occur from the HDP.

Suspended sediments may potentially affect adult and juveniles as well. Sediment plumes typically begin from the dredge site and decrease in concentration as sediment falls out of the water column as distance increases from the dredge. The size of the plume is influenced by the particular dredge used, the dredge operator, sediment type, strength of current and tidal stage. The remaining contract areas in the HDP that could impact migrating Atlantic sturgeon are in Ambrose Channel, and Anchorage Channel if the BR contracts are constructed.

USACE has conducted several Total Suspended Solids (TSS) studies in NY/NJ Harbor; however, none were conducted in Ambrose Channel since there is no measurable resuspension associated with hydraulic dredging of sand. Given that Hopper dredges will be used in Ambrose, and that the sediment type is of a larger, coarser material (sand), this combination is expected to keep the plume relatively negligible. A TSS event was completed for the S-AN-2 contract in January 2011, which is geographically close to the BR channel (see Figure 1), and consists mainly of sand and silt (USACE 2011a). In general, the suspended sediment plume was confined to the lower half of the water column and did not extend outside of the navigation channel. Suspended sediment concentrations were typically 200 mg/L or less within 500 meters of the dredge platform and dissipated to background conditions within 1,000 meters of the dredge. The suspended sediment concentrations found in S-AN-2 are below those shown to have an adverse effect on fish (Breitburg 1988, as cited by Burton 1993; Summerfelt and Moiser 1976, and Combs 1979, as cited in Burton 1993) and benthic communities at 390.0 mg/L (EPA 1986). Also, since Atlantic sturgeon are highly mobile, they are likely capable of avoiding a plume by moving outside the channel. Even if Atlantic sturgeon movement is altered, it is unlikely that this temporary and localized suspended sediment effect would have a long term and adverse impact on Atlantic sturgeon migration to/from spawning grounds, or in the ability to find other food resources outside of the small sediment plume in comparison to the entire area available in the Upper Bay of NY/NJ Harbor. Also, since Atlantic sturgeon are indiscriminate feeders, turbidity would likely have little or no effect on feeding.

Dredging and blasting also has the potential to eliminate deep holes and alter rock substrates. Dovel and Berrgren (1983) reported that immature Atlantic sturgeon find and remain in channel holes or pockets during the winter between km 19 and 74 in the Hudson River Estuary. Dredging and blasting for the HDP will occur at distances greater than 19 km from the juvenile overwintering sites, therefore, these activities are not expected to impact overwintering sites in the Hudson River. It is unclear from the literature whether Atlantic sturgeon utilize this type of habitat throughout their range and life history stages, including migrating juveniles and adults into or through the NY/NJ Harbor. If deep holes are used in the HDP project area, and substrates are altered during dredging activities, it is unlikely that these changes would have a long term and adverse impact on Atlantic sturgeon given their transient behavior through the Harbor.

5.4 IMPACTS TO FOOD RESOURCES

Atlantic sturgeon are primarily benthic feeders and changes in bottom habitat that alter the benthic faunal community would result in a subsequent reduction in prey resources and thereby potentially impacting feeding adults and to a much greater extent, young and subadult Atlantic sturgeon. Sturgeon generally feed when the water temperature is greater than 10^{o}C (Dadswell 1979, and Marchette and Smiley 1982, as cited by USACE 2011) and in general, feeding is heavy immediately after spawning in the spring and during the summer and fall, and lighter in the winter. Subadult Atlantic sturgeon are thought to occupy specific salinity concentration zones within estuaries due to the presence of prey resources (ECS 1993 as reported in Simpson 2008, and as cited by USACE 2011). The diets of Atlantic and shortnose sturgeon in the Hudson River were found to be different. Using gastric lavage to sample stomach contents, Haley and Bain (1997, as cited in ASSRT 2007) retrieved primarily polychaetes and isopods from Atlantic sturgeon and amphipods from shortnose sturgeon.

The impacts of navigation channel dredging on benthic macro-invertebrates were determined through pre- and post-dredging sampling at three HDP areas (S-AM-1 Ambrose Channel, S-AN-1a Anchorage Channel, and S-KVK-2 Kill Van Kull Channel) by the USACE-NYD. These surveys identified the benthic invertebrate community that is potentially available as a prey resource to Atlantic sturgeon within the NY/NJ Harbor and in areas where dredging projects will be conducted in the coming years. In the Ambrose Channel prior to HDP dredging, the benthos was dominated by annelids, arthropods, and molluscs, with a prevalence of the blue mussel (Mytilus edulis). Benthic taxa deemed to be pollution tolerant were more common than pollution intolerant taxa. In 2009, following dredging, the benthic community was dominated by annelids Magelona sp. and no blue mussels were collected. The percentage of pollution tolerant taxa increased from 2% before dredging to 5% after dredging.

Baseline benthic sampling in Anchorage Channel in 2005 revealed a similar community composition to that of Ambrose Channel prior to dredging with blue mussels also being dominant. Amphipods (Ampeliscidae), northern dwarf tellin (Tellina agilis), and the annelid species (Spio setosa) comprised dominant taxa in the benthic assemblage in this area. A much higher percentage of pollution tolerant taxa (29%) was present following dredging in 2009 compared to pre-dredging (10%) and blue mussels were absent post-dredging. The pre-dredging benthic community in the Kill Van Kull was dominated by nematodes, blue mussels, and polychaetes. Following dredging, annelids dominated the benthos, primarily due to high densities of Sabellaria vulgaris. The abundance of pollution tolerant species doubled between the pre- and post-dredging sampling events.

In general, the changes in the benthic community observed between pre- and post-dredging time periods in all three areas described above is typical of benthic responses to disturbance in which larger, longer-lived species are replaced by smaller, opportunistic taxa. In soft bottom communities, benthic recovery times from dredging disturbances tend to be limited to within two years of the dredging event (Wilber and Clarke 2007). The short-term loss of larger bivalves, such as blue mussels, may present the most significant impact on prey resources for foraging juvenile Atlantic sturgeon, although the presence of this particular species in their diet is not well documented.

Investigations at the entrance of Ambrose Channel (i.e., apex of NYB) were also conducted September 2009 (USACE 2010). Water depth at the obstruction is approximately 53 feet at MLW while nearby water depths range from 72 to 80 feet. Benthic prey resources in this area are similar to that described in previous investigations by Cerrato (2006) and are dominated by the annelid *Polygordius* sp. and *Polydora ligni* with nematodes, the arthropods *Unciola* sp. and *Ampelisca abdita*, the blue mussel (*Mytilus edulis*) and two gastropod species as well.

6.0 OTHER SPECIES OF CONCERN

The biological information contained in the USACE 1999 BA on the impacts of sea turtles on the HDP is still relevant and applicable as reported. Although this BA was revised in response to the listing of Atlantic sturgeon, we have taken the opportunity to identify (in Section 2) minor and routine changes that typically occur during dredging projects even though they are not anticipated to change the initial BA conclusions for sea turtles. These minor changes include: removal of the Ambrose Obstruction and KVK bend easing projects; and the potential use of a dragbar to level sediment in Ambrose Channel. None of these items will change the impacts assessment to sea turtles from that described in the 1999 BA, and in the absence of this revised BA, would not have been sees as warranting any reinitiation of consultation pursuant to Section 7 of the ESA. However, in the interests of completeness, we have included the rationale for arriving at that conclusion.

6.1 KVK BEND EASING – Sea Turtles

Based on the following conclusions from the 2000 BO, and discussions with NMFS (see Appendix A) impacts to sea turtles are expected to be negligible from the proposed KVK bend easing: “Based on the knowledge of sea turtle life history, the project methodology, the magnitude of the project impacts, and the minimal evidence of sea turtles in the Harbor Complex, the NMFS believes that the proposed project is not likely to appreciably reduce sea turtles’ likelihood of survival and recovery in the wild. Most of the channels proposed for dredging (Bay Ridge, Port Jersey, Kill Van Kull, Arthur Kill and Newark Bay Channels) are located within the Upper New York Bay. It is unlikely that turtles are found in the Harbor Complex, especially in the Upper New York Bay and the highly congested and trafficked channels of the inner harbor. Additionally, the physical habitat characteristics in the project area do not suggest that it would represent a concentration area of sea turtles, especially in the Port Jersey. Kill Van Kull, Arthur Kill and Newark Bay channels. Therefore clamshell bucket/backhoe dredging and blasting in these channels are expected to have minimal impact on sea turtle foraging ability and survival”.

6.2 AMBROSE OBSTRUCTION – Sea Turtles

6.2.1 SEA TURTLE DISTRIBUTION IN THE PROJECT AREA

An assessment of Lower Bay was included in the USACE 1999 BA and is still relevant and applicable to the proposed elimination of the Ambrose Obstruction project.

6.2.2 IMPACTS TO SEA TURTLES IN THE PROJECT AREA

In the 2000 BO, hopper dredging in Ambrose channel was identified as the location and dredging type of concern for entraining sea turtles. The proposed action being considered for the Ambrose obstruction does not include use of a hopper dredge. Instead, mechanical dredges and operations are being proposed such as a clamshell dredge, backhoe dredge, or use of an I-beam.

Sea turtles are not known to be vulnerable to capture in the proposed methods, and they would be expected to avoid this type of equipment, which is either stationary, relatively slow moving or impacts small areas at a given time. In the case of the potential use of mechanical equipment to level sediment in AM-3a and AM-3b, a review of the use of bed-leveling devices in Port Canaveral over a 15 year time period did not show an association between bed-leveling and crushing/impact injuries on stranded sea turtles. Unlike the NY Harbor, Port Canaveral is known to have high concentrations of sea turtles (Rau *et al.* undated).

If sea turtles are not directly harmed by dredging gear, then the main impact would most likely be the indirect effects of dredging activities on their food resources, namely crabs and mollusks (Ruben and Morreale 1999). The Ambrose obstruction proposed action would not be expected to significantly alter the food resources available to sea turtles for several reasons. The obstruction represents a very small area in Ambrose (see Figure 1), and the actual area of impact is approximately 15% of the total area of the rock pile making up the obstruction (USACE 2012). The disturbed area would progressively recover its aquatic community starting within weeks of the end of construction and reaching nearly full recovery in approximately one year (USACE 2012). The proposed action is a one-time modification of the physical substrate which would allow for long term community stability to be re-established at the site (USACE 2012).

6.3 OTHER PROJECT CHANGES

The other change of note is the addition of UXO screens to the draghead of hopper dredges. This represents a small change in equipment and does not affect the dredge type, location, or duration. This change, on its own, would not alter the conclusions in the 1999 BA regarding jeopardy to the species. However, in that it may affect NOAA’s ability to monitor take through use of onboard turtle observes, it will be discussed in Section 7 of this BA.

7.0 DISCUSSION/CONCLUSION

7.1 ATLANTIC STURGEON

From reviewing the best available information on Atlantic sturgeon life history, and their behavior in and around the HDP, it appears that Atlantic sturgeon are present in the vicinity of the HDP contract areas primarily while migrating between spawning grounds in the Hudson River and oceanic environments. Several generic threats to Atlantic sturgeon from dredging and blasting activities have been identified. However, as summarized below, those most closely associated with and given the physical nature and actions associated with the remaining contracts in the HDP, are not deemed to impact the continued existence and recovery of the species.

Ongoing, proposed and future remaining construction for the HDP will occur in the AK, NB, KVK and AM channels. Impacts to Atlantic sturgeon from dredging and blasting activities are not expected to occur in AK, NB, or KVK. In AM channel: the partial removal of both the Fort Victoria shipwreck and obstruction; and potential use of mechanical equipment to level high spots for dredging; are not anticipated to impact Atlantic sturgeon. Impacts from these projects are not anticipated for the following reasons:

1. AK, NB and KVK - any impacts from dredging (mechanical or hydraulic cutterhead) and blasting activities can be eliminated due to a lack of evidence that the species

utilize these pathways. "Atlantic sturgeon are expected to migrate directly through the Lower and Upper Bays of the NY/NJ Harbor and it is unlikely that they would utilize side channels, such as NB, AK and portions of the KVK, to access the Hudson River for spawning, or the ocean for overwintering" (Mark Bain, personal communication, August 22, 2011). Data collected by the NYD (see section 5.1.3), and discussions with NMFS have revealed the same conclusions. Also, based on the theoretical estimate of the kill radius (375 feet) in KVK (USACE 2004), it is unlikely that blasting event impacts in NB/AK or KVK would travel as far as the Anchorage (AN) Channel, a distance of greater than 20,000 feet away, even without accounting for channel bends and other obstructions. Anchorage channel is the closest area to any remaining blasting in which Atlantic sturgeon are expected to be found. Therefore, mitigation measures to reduce impacts to Atlantic sturgeon are not expected to be of value in NB, AK and in the area of the KVK bend easing (i.e., work would be closer to AK than AN) and are not proposed for ongoing, proposed and remaining contracts in these channels.

2. Use of sediment leveling equipment in AM, Ambrose Obstruction, and Fort Victoria Shipwreck - any impacts from: the use of mechanical equipment to level sediment (e.g., dragbar); removing the Fort Victoria shipwreck; or removing high spots to outside the footprint of the rock pile, or moving the high spots to deeper areas within the footprint of the rock pile, would not require use of hopper dredges. As described in Section 5.1, the majority of the documented sturgeon takes from the Atlantic and Gulf Coast dredging activities were from entrainment in a hopper dredge. Since hopper dredges would not be used for these project components, entrainment of Atlantic sturgeon would not occur. The risk of Atlantic sturgeon interactions with the proposed equipment is reduced by the short duration of the project and the small size of the area of impact compared to the surrounding Lower and Raritan Bays, which provides many opportunities for Atlantic sturgeon to avoid active dredges. Therefore, mitigation measures to reduce impacts to Atlantic sturgeon are not expected to be of value in the area of the proposed Ambrose Obstruction project.

As described in Section 5, the potential impacts of dredging and blasting on benthic resources (e.g., Atlantic sturgeon prey) indicate a temporary and short-term loss and/or shift in benthic community within the localized contract areas. Given the nature of the impact, the availability of resources surrounding the area of impact (i.e., majority of the Lower Bay and entire Raritan Bay); and that Atlantic sturgeon are indiscriminate feeders, the impact of dredging on benthic resources is unlikely to have an adverse impact on the species.

Given the information described in this section, the greatest potential risk for indirect or direct impacts to Atlantic sturgeon from the 50 foot HDP is therefore limited to the Ambrose channel. Except for the proposed elimination of the Ambrose obstruction, the remaining work in Ambrose will require use of hopper dredges, and the potential therefore exists for Atlantic sturgeon to become entrained during dredging activities. NYD is committed to minimizing impacts of hopper dredging activities on Atlantic sturgeon. To reiterate, because the area of impact from remaining contract areas in Ambrose is so small compared to the surrounding Lower and Raritan Bays, there are many opportunities available for Atlantic sturgeon to avoid active dredges. Additionally, as part of the conditions outlined in the NMFS 2000 BO, the NYD currently equips hopper dredges in the Ambrose channel with sea turtle deflectors on the draghead between 1 May and 15 November. This measure is meant to reduce the risk of interaction with sea turtles that may be present in the dredge area, and can potentially operate in a similar manner for migrating Atlantic sturgeon.

As part of the Terms and Conditions of the 1999 BA, USACE has been required to use NMFS-approved sea turtle observers to monitor for sea turtle take onboard hopper dredges operating under the HDP in Ambrose Channel. If not for the outfitting of hopper dredges with UXO screens under this project, the NYD would have proposed to expand the roles of sea turtle observers to include Atlantic sturgeon monitoring. However, through discussions with NOAA, USACE Engineer Research Development Center, and other USACE Districts in the North Atlantic Division, the general opinion is that it is unlikely that a sea turtle or Atlantic sturgeon would fit through a UXO screen (1.25 – 1.5" x 6"), and that any parts that make it through would be difficult to find, identify, and confirm as a take. Therefore, observers are not an effective method of monitoring take when a UXO screen is outfitted on a hopper dredge.

A number of alternatives to observers were reviewed, however, none were considered to be a viable solution. The alternatives were either inappropriate to monitor take, ineffective given the conditions of dredging in the Ambrose Channel (e.g., depth, light, turbidity, anthropogenic objects on seafloor; and uneven surface), or the technology is incompatible with the proper identification of a species. Alternatives considered include: camera deployed on the draghead; use of sonar/acoustic system; relocation trawling; shark silhouette fitted underneath the dredge and near the draghead; and inspection of sea turtle deflector for proper installation.

Based on this BA, impacts to Atlantic sturgeon as part of the continued and future proposed construction of the HDP appears to be limited to a temporary and short-term loss and/or shift in benthic community and potential risk of entrainment by hopper dredges in the Ambrose channel. These impacts are not likely to jeopardize the continued existence of Atlantic sturgeon. The NYD will continue to actively work with NMFS to ensure that any potential impacts of the planned activities are minimized, such as the use of a sea turtle deflector on the draghead of a hopper dredge. Given that a sturgeon is unlikely to pass through a UXO screen, the use of observers is not recommended to monitor take. Further, since a viable alternative to monitor take is not currently available, it is the NYD's belief that it is not feasible to implement a method to monitor take when a UXO screen is deployed.

In addition to the limited effects of dredging activities, and as described in Section 4.0, there are a variety of other factors that may contribute to the vulnerability of Atlantic sturgeon to habitat impacts and potential further population collapse, many of which are more likely to impact the Atlantic sturgeon than a dredging project exercising prudent measures to avoid/minimize takes. These include: their unique life history characteristics, vessel strikes, overfishing, dam construction and operation, water quality modifications, bycatch and poaching. In order for recovery efforts to succeed, it is vital to practically address all potential threats to Atlantic sturgeon.

7.2 SEA TURTLES

Through discussion with NMFS during the consultation process, impacts from the remaining HDP contracts, including the minor changes identified from the removal of the

Ambrose Obstruction and KVK bend easing, would be expected to be negligible and result in no added jeopardy to the species.

Sea turtles are not expected to occur in the KVK because it is a highly congested and trafficked channel, and the physical habitat characteristics in the area do not suggest that it would represent a concentration area for sea turtles.

If present at all in the New York Bight, sea turtles are more likely to be present in the Lower Bay, including the area of the Ambrose Obstruction, Fort Victoria shipwreck, and the S-AM-3a and S-AM-3b contracts.

The risk of adversely impacting a sea turtle from the Fort Victoria shipwreck removal, use of mechanical equipment to level sediment, and the proposed Ambrose Obstruction project is unlikely. Even though any loss of an endangered or threatened species is important, the magnitude of the losses of loggerhead, leatherback, green, and Kemp's ridley sea turtles from elimination of the Ambrose obstruction would not be expected to significantly impact the U.S. Atlantic coast populations of these sea turtle species because: the proposed action would not be expected to significantly alter the food resources available to sea turtles, the abundance of food resources available is not necessarily a direct indication of the presence of sea turtles in Lower Bay; and, if present at all in the project area, the proposed dredging activity types have not been documented as a major source of harm to sea turtles (see Section 6.2.2). Therefore, minimization measures are not expected to be of value for the Fort Victoria shipwreck, sediment leveling, and proposed Ambrose Obstruction project and are not recommended.

In the 2000 BO, hopper dredging was identified as a dredging type of concern for entraining sea turtles. Although a hopper dredge will be used to remove material from the S-AM-3a and S-AM-3b contract areas, the likelihood of adversely affecting a sea turtle is rare. based on a variety of factors:

The NYD acknowledges that even though the probability of negatively impacting a sea turtle is rare, the possibility still exists and some level of protection is warranted. Since it is unlikely that a sea turtle would pass through a UXO screen, the use of turtle observers is not recommended to monitor take. Further, since a viable alternative to monitor take is not currently available, it is not feasible to implement a method to monitor take when a UXO screen is deployed. Based on the many years of documented sea turtle observer data (1993-2010), there was only one observed Loggerhead turtle take out of 13 projects in New York, New Jersey and New England; the total dredged quantity during the turtle season was approximately 18.7 million cubic yards of material. The take was considered a freak incidence and occurred during a beach re-nourishment project along the Sandy Hook to Barnegat Inlet in 1997 (Long Branch borrow area), which is along the New Jersey shore and well away from the contract areas in the Ambrose Channel. Also, when compared to other dredging projects along the East Coast (see Sea Turtle Warehouse at: http://el.erdc.usace.army.mil/seaturtles), the overwhelming majority of turtle takes has been in the Gulf (200 takes) and South Atlantic Regions (446 takes) where sea turtles cluster to over winter, not in the North Atlantic (67) or New York District (1) where juveniles migrate to feed. Based on this information, observed take appears to be a rare occurrence within the New York District and should be an indication that sea turtle occurrence is rare in the contract areas for the HDP, and new methods to monitor such an unlikely event are not warranted. Therefore, turtle deflectors will continue to be used, as well as an onboard lookout to determine the deflectors are deployed properly and to identify presence of turtles to vessel operators so they can be avoided.

Based on this BA, impacts to the leatherback, green, Kemp's ridley and Northwest Atlantic Ocean distinct population segment of loggerhead sea turtles as part of the continued and future proposed construction of the HDP appears to be limited to a temporary and short-term loss and/or shift in benthic community and potential, low risk of entrainment by hopper dredges in the Ambrose channel. These impacts are not likely to jeopardize the continued existence of these sea turtle species. The NYD will continue to actively work with NMFS to ensure that any potential impacts of the planned activities are minimized, such as the continued use of sea turtle deflectors on the draghead of hopper dredges.

8.0 REFERENCES

ASMFC (Atlantic States Marine Fisheries Commission). 1990. Interstate fishery 116 management plan for Atlantic sturgeon. Fisheries Management Report No. 17. Atlantic States Marine Fisheries Commission, Washington, D.C. 73 pp.

ASSRT (Atlantic Sturgeon Status Review Team). 2007. Status review of Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus). Report to National Marine Fisheries Service, Northeast Regional Office. 174 pp.

Armstrong, J.L. 1999. Movement, habitat selection and growth of early-subadult Atlantic sturgeon in Albemarle Sound, North Carolina. Master's Thesis, Department of Zoology, North Carolina State University.

Bain, M.B. 1997. Atlantic and shortnose sturgeons of the Hudson River: common and divergent life history attributes. Environmental Biology of Fishes 48:347-358.

Bain, M. B. 2001. Sturgeon of the Hudson River ecology of juveniles. Final Report for The Hudson River Foundation , 40 West 20th St., 9th Floor, New York, NY 10011. 10pp.

Bain, M. B., Arend, K. Haley, N., Hayes, S., Knight, J., Nack, S. Peterson, D., and M. Walsh. 1998. Sturgeon of the Hudson River. Final Report for the Hudson River Foundation. 40 West 20th St., 9th Floor, New York, NY 10011. 83pp.

Bain, M., N. Haley, D. Peterson, J.R. Waldman, and K. Arend. 2000. Harvest and habitats of Atlantic sturgeon Aciperser oxyrinchus Mitchill, 1815 in the Hudson River estuary; lessons for sturgeon conservation. Boletin Instituto Espanol de Oceanografia 16(1-4) 2000:43-53.

Bemis, W.E. and B. Kynard. 1997. Sturgeon rivers: an introduction to *Acipenseriform* biology and life history. Environmental Biology of Fishes. 48: 167-183.

Bigelow, H. B., and W.C. Schroeder. 1953. Fishes of the Gulf of Maine. U.S. Fish Wildl. Serv. Fish. Bull. 74. 557 pp.

Boreman, J. 1997. Sensitivity of North American sturgeons and paddlefish to fishing mortality. Env. Biol. Fish. 48.

Borodin, N.A. 1925. Biological observations on the Atlantic sturgeon (Acipenser sturio).Transactions of the American Fisheries Society 55:184-190.

Brown, J.J., J. Perillo, T.J. Kwak, and R.J. Horwitz. 2005. Implications of *Plyodictis olivaris* (Flathead Catfish) introduction into the Delaware and Susquehanna drainages. Northeastern Naturalist. 12: 473-484.

Brown, J. and G.W. Murphy, 2010. Atlantic sturgeon vessel-strike mortalities in the Delaware Estuary. Fisheries. Vol. 35, no. 2. 83 p.

Burton, W.H. 1994. Assessment of the Effects of Construction of a Natural Gas Pipeline on American Shad and Smallmouth Bass Juveniles in the Delaware River. Prepared by Versar, Inc. for Transcontinental Gas Pipe Line Corporation.

Caron, F., D. Hatin, and R. Fortin. 2002. Biological characteristics of adult Atlantic sturgeon (*Acipenser oxyrinchus)* in the Saint Lawrence River estuary and the effectiveness of management rules. Journal of Applied Ichthyology 18: 580-585.

Cech, J.J., and S.I. Doroshov. 2004. Environmental requirements, preferences, and tolerance limits of North American sturgeons. Pages 73-86 in LeBreton, G.T.O., F.W.H. Beamish and R.S. McKinley, (eds.). Sturgeons and Paddlefish of North America. Kluwer Academic Publishers, Dordrecht, The Netherlands.

Cerrato, R.M. and H.J. Bokuniewicz. 1986. The Benthic Fauna at Four Potential Containment/Wetland Stabilization Areas in the New York Harbor Region. Marine Sciences Research Center, SUNY, Stony Brook, NY. Sponsored by NY Sea Grant Institute through a contract with the USACE. Special Report 73, Reference 86- 10.

Cerrato, R.M. 2006. Long-term and large-scale patterns in the benthic communities of New York Harbor. The Hudson River Estuary. Cambridge University Press. 242-265.

Collins, M.R., T.I.J. Smith, W.C. Post, and O. Pashuk. 2000. Habitat utilization and biological characteristics of adult Atlantic sturgeon in two South Carolina rivers. Transactions of the American Fisheries Society 129:982-988.

Cooper, K. 1989. Effects of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans on aquatic organisms. Reviews in: Aquatic Sciences 1(2): 227-242.

Dadswell, M.J. 1979. Biology and population characteristics of the shortnose sturgeon, Acipenser brevirostrum LeSueur, 1818 (Osteichthyes: Acipenseridae), in the Saint John River estuary, New Brunswick, Canada. Canadian Journal of Zoology 57:2186-2210.

Dadswell, M. 2006. A review of the status of Atlantic sturgeon in Canada, with comparisons to populations in the United States and Europe. Fisheries 31: 218-229.

Dickerson, D. 2006. Observed takes of sturgeon and turtles from dredging operations along the Atlantic Coast. Supplemental data provided by U.S. Army Engineer R&D Center Environmental Laboratory, Vicksburg, Mississippi.

Dovel, W.L. and T.J. Berggren. 1983. Atlantic sturgeon of the Hudson estuary, New York. New York Fish and Game Journal 30(2):140-172.

Dovel, W.L., A.W. Pekovitch, and T.J. Berggren. 1992. Biology of the shortnose sturgeon (*Acipenser brevirostrum* Leseur, 1818) in the Hudson River estuary, New York. Pp 187-216. In: C.L. Smith (ed) Estuarine Research in the 1980s, State Univ. New York Press, Albany.

Dunton, K. J., A. Jordaan, K. A. McKown, D. O. Conover, and M. G. Frisk. 2010. Abundance and distribution of Atlantic sturgeon (Acipenser oyxrinchus) within the Northwest Atlantic Ocean, determined from five fishery-independent surveys. Fishery Bulletin 108:450-465.

ECS (Environmental Consulting Services, Inc.). 1993. Final report of survey of benthos: Delaware River Estuary: from the area of the C&D Canal through Philadelphia to Trenton, prepared for the Delaware River Estuary Program, Delaware River Basin Commission, Environmental Protection Agency, Middletown, Delaware.

Erickson, D. L., A. Kahnle, M. J. Millard, E. A. Mora, M. Bryja, A. Higgs, J. Mohler, M. DuFour, G. Kenney, J. Sweka, and E. K. Pikitch. 2011. Use of pop-up satellite archival tags to identify oceanic-migratory patterns for adult Atlantic Sturgeon, Acipenser oxyrinchus oxyrinchus Mitchell, 1815. Journal of Applied Ichthyology 27:356-365.

Eyler, S., M. Mangold, and S. Minkkinen. 2004. Atlantic Coast sturgeon tagging database. Summary Report prepared by US Fish and Wildlife Service, Maryland Fishery Resource Office, Annapolis, MD. 51 pp.

Federal Register. 2010. Endangered and threatened wildlife and plants: proposed listing determination for three distinct population segments of Atlantic sturgeon in the Northeast region. 75 Federal Register 193 (October 6, 2010), pp. 61872-61903.

Gadomski, D.M. and M.J. Parsley. 2005. Laboratory studies on the vulnerability of young white sturgeon to predation. North American Journal of Fisheries Management. 25: 667-674.

Geoghegan. P, M.T. Mattson, and R.G. Keppel. 1992. Distribution of the shortnose sturgeon in the Hudson River estuary. 1984-1988. Pages 217-227. In: C.L. Smith, editor. Estuarine Research in the 1980s. State University of New York Press. Albany, New York.

Gilbert, C.R. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic Bight)--Atlantic and shortnose sturgeons. U.S. Fish and Wildl. Serv. Biol. Rep. 82(11.122). U.S. Army Corps of Engineers, TR EL-82-4. 28 pp.

Gruchy, C. G., and B. Parker. 1980b. *Acipenser oxyrhynchus* Mitchill, Atlantic sturgeon. Page 41 in D.S. Lee et al. Atlas of North American freshwater fishes. North Carolina State Mu. Nat. Hist., Raleigh.

Grunwald, C., L.Maceda, J.Waldman, J. Stabile, and I. Wirgin. 2007. Conservation of Atlantic sturgeon Acipenser oxyrinchus oxyrinchus: delineation of stock structure and distinct population segments. Conservation Genetics 9:1111-1124.

Haley, N., J.Boreman, and M.Bain. 1996. Juvenile sturgeon habitat use in the Hudson River. Section VIII in J.R. Waldman, W.C. Nieder, and E.A. Blair (eds.) Final Report to the Tibor T. Polgar Fellowship Program, 1995. Hudson River Foundation, New York.

Haley, N., and M. Bain. 1997. Habitat and food partitioning between two co-occurring sturgeons in the Hudson River estuary. Paper presentation at the Estuarine Research Federation Meeting, Providence, Rhode Island, October 14, 1997.

Haley, N. 1998. A gastric lavage technique for characterizing diets of sturgeons. North American Journal of Fisheries Management 18:978-981.

Hall, J.W., T.I.J. Smith and S.D. Lamprecht. 1991. Movements and habitats of shortnose sturgeon, *Acipenser brevirostrum*, in the Savannah River. Copeia 1991:695-702.

Hoff, J. G. 1980. Review of the present status of the stocks of the Atlantic sturgeon *Acipenser oxyrhynchus*, Mitchill. Prepared for the National Marine Fisheries Service, Northeast Region, Gloucester, Massachusetts.

Hoff, T.B., R.J. Klauda, and J.R. Young. 1988. Contribution to the biology of shortnose sturgeon in the Hudson River estuary. Pages 171-189. In: C.L. Smith, editor, Fisheries Research in the Hudson River. State University of New York Press, Albany, New York.

Huff, J.A. 1975. Life History of Gulf of Mexico sturgeon, *Acipenser oxyrhynchus desotoi*, in Suwannee River, Florida. Fla. Mar. Res. Publ. 16:1-32.

Johnson, J.H., D.S. Dropkin, B.E. Warkentine, J.W. Rachlin, and W.D. Andrews. 1997. Food habits of Atlantic sturgeon off the central New Jersey coast. Transactions of the American Fisheries Society 126:166-170.

Kahnle, A. W., K.A. Hattala, K.A. McKown. 2007. Status of Atlantic Sturgeon of the Hudson River estuary, New York, USA. Pages 347-363 in J. Munro, D. Hatin, J.E. Hightower, K.A. McKown, K.J. Sulak, A.W. Kahnle, and F. Caron, editors. Anadromous sturgeons: habitats, threats and management. American Fisheries Society, Symposium 56, Bethesda, Maryland.

Keevin, Thomas M. and Hempen, G. L. 1997. The Environmental Effects of Underwater Explosions with Methods to Mitigate Impacts. U. S. Army Corps of Engineers, St. Louis District.

Kieffer, M.C. and B. Kynard. 1993. Annual movements of shortnose and Atlantic sturgeons in the Merrimack River, Massachusetts. Transactions of the American Fisheries Society 122:1088-1103.

Kieffer, J. D., D. W. Baker, A. M. Wood, and C. N. Papadopoulos. 2011. The effects of temperature on the physiological response to low oxygen in Atlantic sturgeon. Fish Physiology and Biochemistry DOI: 10.1007/s10695-011-9479-y.

Kynard, B., M. Horgan, M. Kieffer, and D. Seibel. 2000. Habitats used by shortnose sturgeon in two Massachusetts rivers, with notes on estuarine Atlantic sturgeon: a hierarchical approach. Transactions of the American Fisheries Society 129: 487-503.

Kynard, B., and M. Horgan. 2002. Ontogenetic behavior and migration of Atlantic sturgeon *Acipenser oxyrinchus oxyrinchus*, and shortnose sturgeon, *A.brevirostrum*, with notes on social behavior. Environmental Behavior of Fishes 63:137-150.

Laney, R. W., J. E. Hightower, B. R. Versak, M. F. Mangold, W. W. Cole Jr., and S. E.

Winslow. 2007. Distribution, habitat use, and size of Atlantic sturgeon captured during cooperative winter tagging cruises, 1988–2006. In Anadromous sturgeons: habitats, threats, and management (J. Munro, D. Hatin, J.E. Hightower, K. McKown, K. J. Sulak, A. W. Kahnle, and F. Caron, eds.) p. 167–182. Am. Fish. Soc. Symp. 56, Bethesda, MD.

Mangin, E. 1964. Croissance en longuer de trois sturgeons d'amerique du nord: Acipenser oxyrinchus, Mitchell, Acipenser fulvescens, Rafinesque, et *Acipenser brevirostris* LeSuer. Verth. Int. Ver. Limnology 15: 968-974.

Marchette, D.E. and R. Smiley. 1982. Biology and life history of incidentally captured shortnose sturgeon, Acipenser brevirostrum, in South Carolina. South Carolina Wild. Mar. Res. Inst. 57 pp.

Moser, M.L. and S.W. Ross. 1995. Habitat use and movements of shortnose and Atlantic sturgeons in the lower Cape Fear River, North Carolina. Transactions of the American Fisheries Society 124:225-234.

Moser, Mary. 1999. Cape Fear River Blast Mitigation Tests: Results of Caged Fish Necropsies, Final Report to CZR, Inc. under Contract to US Army Corps of Engineers, Wilmington District.

Murawski, S. A. and A. L. Pacheco. 1977. Biological and fisheries data on Atlantic Sturgeon, Acipenser oxyrhynchus (Mitchill). National Marine Fisheries Service Technical Series Report 10: 1-69.

National Marine Fisheries Service. 2000. Biological opinion on the effects of the Army Corps of Engineers' (ACOE) proposed New York and New Jersey Harbor Navigation project on threatened and endangered species. Sea turtles (F/NER/2000/00596).

National Marine Fisheries Service. 2010. Species of Concern, Atlantic Sturgeon, Acipenser oxyrinchus oxyrinchus. www.nmfs.noaa.gov/pr/pdfs/species/atlanticsturgeon_detailed.pdf.

National Marine Fisheries Service. March 1, 2011. Letter to Jenine Gallo regarding the Ambrose Obstruction Removal Project; Threatened or Endangered Species Information Request.

NRDC (National Resource Defense Council). 2009. Petition to List Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus) as an Endangered Species, or to List Specified Atlantic Sturgeon DPSs as Threatened and Endangered Species, and to Designate Critical Habitat. 77pp.

Niklitschek, E.J., and D.H. Secor. 2005. Modeling spatial and temporal variation of suitable nursery habitats for Atlantic sturgeon in the Chesapeake Bay. Estuarine, Coastal and Shelf Science 64:135-148.

Peterson, D. L., M. B. Bain, and N. Haley. 2000. Evidence of declining recruitment of Atlantic sturgeon in the Hudson River. North American Journal of Fisheries Management 20: 231-238.

Pottle, R. and M.J. Dadswell. 1979. Studies on larval and juvenile shortnose sturgeon. Report to Northeast Utilities. Hartfoed, Connecticut. (MS report available from M.J. Dadswell).

Rau, M., C. Smith, and N. Lombardero. Undated. Biological Assessment for the Use of Bed-Leveling Devices in Port Canaveral – Baseline Research and Data Compilation. Prepared for the USACE-Jacksonville District.

Rochard, E., M. Lepage, and L. Meauze. 1997. Identification and characterization of the marine distribution of the European sturgeon, Acipenser sturio. Aquatic Living Resources 10: 101-109.

Ruben, H. J., and Morreale, S. J. 1999. Draft Biological Assessment for Sea Turtles New York New Jersey Harbor Complex. (Submitted to NMFS as part of consultation process).

Ryder, J.A. 1890. The sturgeon and sturgeon industries of the eastern coast of the United States, with an account of experiments bearing upon sturgeon culture. Bulletin of the U.S. Fish Commission (1888)8:231-328.

Savoy, T. and D. Pacileo. 2003. Movements and important habitats of subadult Atlantic sturgeon in Connecticut waters. Transactions of the American Fisheries Society 132:1-8.

Secor, D. H. 1995. Chesapeake Bay Atlantic sturgeon: current status and future recovery. Summary of Findings and Recommendations from a Workshop convened 8 November 1994 at Chesapeake Biological Laboratory. Chesapeake Biological Laboratory, Center for Estuarine and Environmental Studies, University of Maryland System, Solomons, Maryland.

Secor, D.H., E.J. Niklitschek, J.T. Stevenson, T.E. Gunderson, S.P. Minkkinen, B. Richardson, B. Florence, M. Mangold, J. Skjeveland, and A. Henderson-Arzapalo. 2000. Dispersal and growth of yearling Atlantic sturgeon, Acipenser oxyrinchus, released into Chesapeake Bay. Fishery Bulletin 98:800-810.

Shirey, C.A., C.C. Martin, and E.J. Stetzar. 1997. Abundance of subadult Atlantic sturgeon and areas of concentration within the lower Delaware River. Final Report. August 1, 1996-September 30, 1997. Delaware Division of Fish and Wildlife, Dover, DE. 21 pp.

Simpson, P.C. 2008. Movements and habitat use of Delaware River Atlantic sturgeon. Master Thesis, Delaware State University, Dover, DE 128 p.

Sindermann, C. J. 1994. Quantitative effects of pollution on marine and anadromous fish populations. NOAA Technical Memorandum NMFS-F/NEC-104, National Marine Fisheries Service, Woods Hole, Massachusetts.

Smith, C. L. 1985a. The inland fishes of New York State. The New York State Dep. Of Environmental Conservation. Albany. Xi + 522 pp.

Smith, T.I.J. 1985b. The fishery, biology, and management of Atlantic sturgeon, Acipenser oxyrhynchus, in North America. Environmental Biology of Fishers 14(1):61-72.

Smith, T.I.J., and E.K. Dingley. 1984. Review of biology and culture of Atlantic (Acipenser oxyrhynchus) and shortnose sturgeon (*A. brevirostrum).* Journal of World Mariculture Society 15: 210-218.

Smith, T.I.J., E.K. Dingley, and E.E. Marchette. 1980. Induced spawning and culture of Atlantic sturgeon. Progressive Fish Culturist 42:147-151.

Smith, T.I.J., and J.P. Clugston. 1997. Status and management of Atlantic sturgeon, *Acipenser oxyrinchus*, in North America. Environmental Biology of Fishes 48:335-346.

Stein, A.B., K.D. Friedland, and M. Sutherland. 2004. Atlantic sturgeon marine distribution and habitat use along the northeastern coast of the United States. Transactions of the American Fisheries Society 133:527-537.

Stevenson, J. T. 1997. Life history of Hudson River Atlantic sturgeon and a model for fishery management. Masters Thesis, University of Maryland, College Park. Maryland, USA: 222 pp.

Stevenson, J.T., and D.H. Secor. 1999. Age determination and growth of Hudson River Atlantic sturgeon, *Acipenser oxyrinchus*. Fishery Bulletin 97:153-166.

Sweka, J.A., J. Mohler, M.J. Millard, T. Kahnle, K. Hattala, G. Kenny, and A. Higgs. 2007. Juvenile Atlantic sturgeon habitat use in Newburgh and Haverstraw Bays of the Hudson River: implications for population monitoring. Transactions of the American Fisheries Society 27:1058-1067.

Teleki, G.C. and A.J. Chamberlain. 1978. Acute Effects of Underwater Construction Blasting in Fishes in Long Point Bay, Lake Erie. J. Fish. Res. Board Can. 35: 1191-1198.

U.S. Army Corps of Engineers (USACE), New York District. 1999a. Interim Report for the Army Corps of Engineer Biological Monitoring Program: Atlantic Coast of New Jersey, Asbury Park to Manasquan Inlet Section Beach Erosion Project.

U.S. Army Corps of Engineers (USACE), New York District. 1999b. Draft Biological Assessment for Sea Turtles New York and New Jersey Harbor Complex.

U.S. Army Corps of Engineers (USACE) New York District. 2004. Environmental Assessment for the New York and New Jersey Harbor Deepening Project.

U.S. Army Corps of Engineers (USACE) New York District. 2004a. Blast Monitoring Program for the Kill Van Kull Deepening Project.

U.S. Army Corps of Engineers (USACE) New York District. Draft Report September 2007. New York/New Jersey Harbor Deepening Project 2006 Migratory Finfish Report.

U.S. Army Corps of Engineers (USACE) New York District. 2010. Ambrose Obstruction Biological Sampling Report.

U.S. Army Corps of Engineers (USACE), Philadelphia District. 2011. Supplemental BA for Potential Impacts to the New York Bight Distinct Population Segment of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) which is proposed for Federal endangered species listing resulting from the Delaware River Main Stem and Channel Deepening Project.

U.S. Army Corps of Engineers (USACE) New York District. 2011a. Technical memo: Far-Field Surveys of Suspended Sediment Plumes Associated with Harbor Dredging in Upper Bay, S-AN-2 contract area (Anchorage Channel).

Van Eenennaam, J.P., S.I. Doroshov, G.P. Moberg, J.G. Watson, D.S. Moore, and J. Linares. 1996. Reproductive Conditions of the Atlantic sturgeon (Acipenser oxyrinchus) in the Hudson River. Estuaries 19(4):769-777.

van den Avyle, M. J. 1983. Species profiles: life histories and environmental requirements (South Atlantic) - Atlantic sturgeon. U.S. Fish and Wildlife Service, Division of Biological Services FWS/OBS-82/11. U.S. Army Corps Eng. TREL-82-4. 38 pp.

van den Avyle, M. J. 1984. Species profile: life histories and environmental requirements of coastal fishes and invertebrates (south Atlantic)—Atlantic sturgeon. U.S. Fish Wildl. Serv. Biol. Rep. 81(11.25). U.S. Army Corps of Engineers, TR EL-82-4. 17 pp.

Vladykov, V.D., and J.R. Greely. 1963. Fishes of the Western North Atlantic 1:24-60.

Waldman, J. R., K. Nolan, J. Hart, and I.I. Wirgin. 1996. Genetic differentiation of three key anadromous fish populations of the Hudson River. Estuaries 19: 759-768.

Wilber, D. H. and D. G. Clarke. 2007. Defining and assessing benthic recovery following dredging and dredged material disposal. Proceedings of the Eighteenth World Dredging Congress. Pp. 603-618. Robert E. Randall, editor. Newman Printing Company, Bryan, Texas 77801.

Wiley, M.L., J.B. Gaspin, and J.F. Goertner. 1981. Effects of Underwater Explosions on Fish with a Dynamic Model to Predict Fishkill. Ocean Science and Engineering 6(2): 223-284.

Winemiller, K.O., and K.A. Rose. 1992. Patterns of life history diversification in North American fishes: implications for population regulation. Can. J. Fish Aquat. Sci. 49: 2196-2218.

Wooley, C. M. 1985. Evaluation of morphometric characters used in taxonomic separation of Gulf of Mexico sturgeon, *Acipenser oxyrhynchus desotoi.* Pages 97-103 in F.P. Binkowski and S.I. Doroshov, eds. North American sturgeons: biology and aquaculture potential. Developments in environmental biology of fishes 6. Dr W. Junk bv Publishers, Dordrecht, the Netherlands. 163 pp.

Young , J.R., T.B. Hoff, W.P. Dey, and J.G. Hoff. 1988. Management recommendations for a Hudson River Atlantic sturgeon fishery based on an age-structured population model. Fisheries Research in the Hudson River. State University of New York Press, Albany, New York. 353pp.

APPENDIX A:
CHRONOLOGY OF EVENTS LEADING UP TO THIS ASSESSMENT

In October 2000, the Northeast Regional Office of NMFS issued a Biological Opinion (BO) for the impacts of the HDP on threatened and endangered sea turtles in the New York/New Jersey (NY/NJ) Harbor (NMFS 2000). NMFS determined that the proposed dredging project may adversely affect, but is not likely to jeopardize, the continued existence of endangered Kemp's ridley, green, leatherback and threatened loggerhead sea turtles. An incidental take statement was issued for each species on the use of hopper dredges in only one section of the Harbor, Ambrose Channel (Lower Bay), due to the potential to encounter sea turtles. Reasonable and prudent measures and terms and conditions to minimize impacts to turtles were also provided in the BO. To date, the NYD has not had any incidences of turtle takes for the 50 foot Harbor Deepening Project.

In fall 2010, the NYD began development of an Environmental Assessment for a proposed elimination of a navigational obstruction in the Ambrose Channel (Lower Bay). Coordination with NMFS and US Fish and Wildlife Service (USFWS) was initiated via letter on 18 February 2011 with a file search request for threatened and endangered marine species and their habitat affected by the proposed project.

On 1 March 2011, NMFS provided the following information:

- Threatened and endangered sea turtles are known to be present in the Lower Bay, typically from May to November. The most abundant species expected is the loggerhead turtle (typically small juveniles), followed by the Kemp's ridley. The waters off NY have also been found to support green sea turtles and leatherback sea turtles, however leatherbacks are more typically found in deeper, offshore waters.
- The endangered Shortnose sturgeon may be present in the Lower Bay, but this is likely not a high use area due to high salinities. NMFS therefore determined that only rare, transient sturgeon are likely to be present within the project area.
- Threatened and endangered whales occur seasonally in the offshore waters of NY. North Atlantic right whales and humpback whales are found off the coast of NY. Fin and sperm whales are also seasonally present in the waters off NY, but are typically found in deeper offshore waters. However, due to the depths and near shore location of the project site, listed whales are extremely unlikely to occur in the action area. Therefore, an impacts analysis was not required for these species.
- The Atlantic sturgeon is known to occur in the NY Bight and the NY Bight Distinct Population Segment is proposed for listing as endangered under the ESA. Per 50 CFR 402.10, Federal agencies are required to confer with NMFS on any action likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat.

A conference call was held with NMFS on 24 May 2011 to discuss the proposed Atlantic sturgeon listing and compliance under ESA for on-going NYD projects, including the remaining dredging contracts under the HDP and the proposed Ambrose obstruction project. During subsequent correspondence with NMFS, and given the estimated timeframe to proposed listing of the Atlantic sturgeon, the probability of the species being listed, and the significant economic implications for any delays to the HDP schedule, it was determined that conducting formal consultation under Section 7 of the ESA would be more efficient than conducting a conference under 50 CFR 402.10. Therefore, the NYD decided to prepare a BA and NMFS agreed to issue a BO on an accelerated schedule.

Upon further coordination with NMFS on 19 August 2011 and 9 September 2011, it was determined that the only remaining contract areas of the HDP project in which Shortnose sturgeon could occur following issuance of the BO is in Bay Ridge (BR) (see Figure 1 and Table 1, Chapter 2). "A population of the federally endangered shortnose sturgeon (*Acipenser brevirostrum*) occurs in the Hudson River and has been documented from the Troy Dam (rkm 248) to the waters near Staten Island in NY Harbor (rkm -5.6)" (NMFS 2011). For the following reasons, the NYD and NMFS agreed that impacts to shortnose sturgeon are expected to be negligible: the contract areas in BR are not expected to have preferred habitat for shortnose sturgeon because of the higher salinity levels in Upper Bay, and the area is not likely to have quality food resources. Also, all shortnose sturgeon observations during USACE programs have been just north, or north-west, of the BR channel (see Table 4). Even though shortnose sturgeon occur in the Upper Bay, the best available information indicates that only rare transient sturgeon are likely to be present.

As stated above, consultation under the ESA was completed for the impacts of the HDP on threatened and endangered sea turtles in 2000. NYD will continue to follow the "Reasonable and Prudent Measures" and "Terms and Conditions" outlined in the 2000 BO. Through coordination with NMFS on 19 August 2011, and per the habitat suitability analysis in the USACE 1999 BA for the impacts of sea turtles on the HDP, it was determined that the presence and absence of sea turtles in the HDP area remains unchanged. Sea turtles are rare in Upper Bay, but are likely to occur in Lower Bay. See Section 6.0 for additional information.

Further discussions were had with NMFS on 29 August 2011, regarding additional proposed projects to capture the benefit of the deepening project: PJ Expansion and KVK Bend Easing (see Figure 1). It was determined that sea turtles are not expected to occur in the KVK or PJ and therefore impacts would be expected to be negligible. Impacts to shortnose sturgeon and Atlantic sturgeon are also expected to be negligible. The best available data shows that both species do not utilize KVK. While Atlantic sturgeon do utilize Upper Bay and likely the PJ channel, the PJ expansion is unlikely to impact them because the proposed project is located at the deepest point into the berthing area, the area is an active channel with concentrated and high activity, and there are likely no food resources available. Also, a mechanical dredge would be used to remove material, and it is expected that most adult sturgeon would actively avoid a working dredge (see section 5.1).

APPENDIX D –

NATIONAL ENVIRONMENTAL POLICY ACT

DRAFT FINDING OF NO SIGNIFICANT IMPACT (FNSI)

Elimination of "High Spot C" Obstruction to Navigation within the New York Bight Navigational Precautionary Area – Ambrose Channel

New York and New Jersey 50 Foot Harbor Deepening Project

NATIONAL ENVIRONMENTAL POLICY ACT

DRAFT FINDING OF NO SIGNIFICANT IMPACT (FNSI)

Elimination of "High Spot C" Obstruction to Navigation within the New York Bight Navigational Precautionary Area – Ambrose Channel

New York and New Jersey 50 Foot Harbor Deepening Project

I. FINDING

Based on the following summary, and as discussed in the Environmental Assessment (EA), I have determined that Alternative 2 will not have a significant impact on the human and natural environment. As a result of this FNSI, an Environmental Impact Statement (EIS) will not be prepared and the project as described for Alternative 2 in the Final EA may proceed.

II. INTRODUCTION AND PURPOSE AND NEED

The U.S. Army Corps of Engineers (USACE), New York District (NYD) proposes to eliminate an obstruction to navigation (known as High Spot C) located in Federal waters within the New York Bight, near the approach to the New York (NY) and New Jersey (NJ) Harbor. The obstruction is located just north of the Ambrose Channel Lighted Whistle Buoy A. Ambrose Channel is the main entrance channel, or approach area, to the Port of NY and NJ (Port).

The obstruction is being investigated as part of the ongoing NY and NJ 50 Foot Harbor Deepening Project (HDP). The Ambrose Light Tower has been struck several times since the HDP feasibility study was completed. It has now been determined that the tower should be replaced with a lighted buoy. Due to this change, the U.S. Coast Guard (USCG) and NY and NJ Sandy Hook Pilots examined the approaches to the Ambrose Channel, identified High Spot C as a potential hazard to navigation, and requested that the NYD and the Port Authority of NY and NJ (PANYNJ) investigate the obstruction. Based on the investigation, the obstruction was identified as a natural geologic formation with a uniform, rocky bottom with no articulated vessel structures or debris piles.

High Spot C contains a number of high spots within the rock formation that are considered to be navigational hazards to full use of the seaward approach to the Ambrose Channel, thus triggering the need for the proposed project. The purpose is to provide a more fully functional and safer navigational passage to the Port of NY/NJ for larger and heavier vessels by removing the navigational hazard. A recommendation was made to re-profile the high spots to 57 feet +2 feet mean low water (MLW). This purpose and need is in addition to the over-arching Purpose and Need for the 50 foot HDP, which remains the same as that described in the USACE 1999 EIS for the project.

III. PROPOSED ACTION AND ALTERNATIVES

The proposed action is to remove and/or shift approximately 6,000 yd^3 of rock and gravel material to a depth of 57 feet +2 feet MLW. The total area within the footprint of High Spot C requiring modification is approximately 65,000 ft^2. Three alternatives were evaluated, including the No Action Alternative (Alternative 1). Alternative 2 (Preferred Alternative) would relocate the high spots to a depth of 57 feet +2 feet at MLW within the existing footprint of the rock pile. Alternative 3 would entail removing the high spots to a depth of 57 feet +2 feet at MLW, and would require the transport and relocation of the material to an offsite disposal area outside of the rock pile footprint.

IV. SELECTION OF ALTERNATIVE

Potential direct, indirect and cumulative impacts of the proposed action and associated alternatives were evaluated in the EA analysis. The EA analyzed the effects of the proposed action and alternatives on the following environmental components: biological and cultural resources, navigation, socioeconomics, hydrodynamics, geology, water quality, noise, and air quality. Selection criteria were also established to determine suitability of the alternatives for the proposed action. An assessment of the criteria for each alternative resulted in the following conclusion, and subsequently led to the identification of Alternative 2 as the Preferred and Selected Alternative in this NEPA analysis.

Criteria	**Alternative 1 (No-Action)**	**Alternative 2 (relocate material within footprint)**	**Alternative 3 (relocate material outside footprint)**
1. Improves navigational safety requirements?	NO	YES	YES
2. Provides maximum use and function of a 50 foot channel as described in the Purpose and Need for the 50 foot HDP?	NO	YES	YES
3. Minimizes potential environmental impacts to the fullest extent?	NO	YES	NO
4. Minimizes potential project costs to the fullest extent?	N/A	YES	NO

The No Action Alternative does not fully meet the selection criteria, or the Purpose and Need for the proposed project, and is therefore rejected as a viable alternative to meet the requirements of the proposed project. Also, under the No Action Alternative, High Spot C would continue to pose a hazard to navigation that could potentially cause much larger impacts to the environment and humans through vessel groundings on the obstruction, increased vessel maneuvering to avoid the obstruction, and vessel-to-vessel collisions. Each of these potential impacts could in turn negatively impact the regional economy and the Port of NY and NJ, which currently supports an estimated 270,000 direct and indirect jobs and nearly $29 billion in business activity in NY and NJ.

Alternative 3 does not fully meet the requirements of the criteria. This alternative would have additional impacts beyond the immediate area of the High Spot C rock pile, including environmental impacts associated with removing the material and transporting it to a different location, as well as additional costs.

The proposed removal of High Spot C under Alternative 2 (Selected Alternative) is not anticipated to have significant adverse impacts on the environment. Under Alternative 2, modifying the rock pile to a depth of 57 feet +2 feet at MLW would have a beneficial impact on navigation within the NY/NJ Harbor, a need identified by the USCG and stakeholders responsible for safely and efficiently conducting waterborne navigation and commerce in the region. Removal of the hazard to navigation would ensure a safer route for larger and heavier ships (Criteria 1), allow vessels to fully utilize the benefits of the 50 foot HDP, and allow the region to continue reaping the economic benefits of deeper navigation channels

(Criteria 2). Implementation of Alternative 2 would also be less costly compared with Alternative 3 (Criteria 4).

Of the three alternatives, Alternative 2 minimizes the potential environmental impacts to the fullest extent (Criteria 3). Potential short-term, negligible to minor adverse impacts on biological resources could result from the construction activity under Alternative 2, which is expected to take approximately one month to complete. Most importantly, unlike Alternative 3, Alternative 2 would relocate material within the footprint and would limit the impacts to High Spot C by preventing an alteration to the basic substrate type of the rock pile, a habitat component that biological resources would use to begin recovery.

It is anticipated that Alternative 2 could result in minor, short-term adjustments to vessel approaches during construction, and potential minor, but insignificant impacts to local socioeconomics due to a temporary reduction of commercial and recreational fishing in the immediate area of the rock pile. However, this alternative would offer long-term, beneficial impacts on navigation and the regional economy. Alternative 2 could also result in minor, short-term impacts on noise, air and water quality as well as long-term but insignificant impacts on hydrodynamics and geology at the obstruction. There are no impacts on cultural resources.

Based on the analysis, no mitigation measures are necessary for the implementation of Alternative 2.

V. PUBLIC REVIEW

The Draft EA was made available for a 15-day public comment period ending XX. The documents were posted to the World Wide Web, with links to each document provided at XX. Printed copies of the document were made available for viewing during the 15-day comment period at (x local libraries).

VI. CONCLUSION

Given that there are no anticipated significant, direct, indirect, and/or cumulative impacts associated with the implementation of the proposed action, this EA concludes that there will be no significant impact on the quality of the human or natural environment. Pursuant to this conclusion, a Finding of No Significant Impact has been prepared. Therefore, an Environmental Impact Statement is not required.

Date:

JOHN R. BOULÉ II
Colonel, U.S. Army
District Engineer

APPENDIX E –

Mailing List

&

Notice of Availability Release Letter

Draft Environmental Assessment

Elimination of High Spot C Obstruction to Navigation Within the New York Bight Navigational Precautionary Area – Ambrose Channel

New York and New Jersey 50 Foot Harbor Deepening Project

Mailing List

Federal Agencies

Ms. Mary Colligan
National Oceanic and Atmospheric Administration - Fisheries
Protected Resources Division
Northeast Regional Office
55 Great Republic Drive
Gloucester, MA 01930

Ms. Karen Greene
National Oceanic and Atmospheric Administration - Fisheries
James J. Howard Marine Sciences Laboratory
74 Magruder Road
Highlands, NJ 07732

Ms. Diane Rusanowsky
National Oceanic and Atmospheric Administration - Fisheries
Habitat Conservation Division
212 Rogers Ave.
Milford, CT 06460-6499

Ms. Grace Musumeci
US Environmental Protection Agency, Region II
Environmental Review Section
290 Broadway
New York, NY 10007

Mr. Jeff Yunker
US Coast Guard Sector NY
Waterways Management Coordinator
212 Coast Guard Drive
Staten Island, NY 10305

Mr. Ron Popowski
US Fish and Wildlife Service
927 N. Main Street
Heritage Square, Building D
Pleasantville, New Jersey 08232

Mr. Doug Hobbs
US Fish and Wildlife Service, Sport Fishing & Boating Partnership Council

SFBPC Coordinator
4401 North Fairfax Drive
Mailstop 3103-AEA
Arlington, VA 22203

State Agencies

Mr. Tom Costanzo
Port Authority of New York and New Jersey
Port Commerce Department
225 Park Ave. South, 11th Floor
New York, NY 10003

Mr. Matt Masters
Port Authority of New York and New Jersey
Port Commerce Department
225 Park Ave. South, 11th Floor
New York, NY 10003

Ms. Suzanne Dietrick
New Jersey Department of Environmental Protection
Office of Dredging and Sediment, PO Box 028
Assistant Commissioner's Suite, 6th Floor
401 East State Street
Trenton, NJ 08625

Mr. Stephen Zahn
New York State Department of Environmental Conservation
Division of Environmental Permits, Region 2
47-40 21st Street
Long Island City, NY 11101

Ms. Ann Ezelius
New York State Department of Environmental Conservation
I FISH NY
47-40 21st Street
Long Island City, NY 11101

Mr. Daniel Saunders
Historic Preservation Office
P.O. Box 404
Trenton, New Jersey 08625-0404

Ms. Tina Berger
Atlantic States Marine Fisheries Commission
Public Affairs Specialist
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22201

Mr. Jeffrey Zappieri
State of New York

Department of State
Division of Coastal Resources
One Commerce Plaza
99 Washington Avenue
Albany, NY 12231

Other
Mr. Jack Olthuis
Sandy Hook Pilots
201 Edgewater Street
Staten Island, NY 10305

Mr. Samuel Chanowich
Interport Pilots
PO Box 236
Port Monmouth, NJ 07758

T. Fote
Jersey Coast Anglers Association
1201 Route 37 E # 9
Toms River, NJ 08753

Ms. Deborah A. Mans
NY/NJ Baykeeper
52 West Front Street
Keyport, NJ 07735

Ms. Cindy Zipf
Clean Ocean Action
18 Hartshorne Drive, Suite 2
Highlands, NJ 07732

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO
ATTENTION OF

June 25, 2012

Planning Division

Notice of Availability of Draft Environmental Assessment

The U.S. Army Corps of Engineers, New York District (NYD) announces the availability of the *Draft Environmental Assessment (DEA) for the Elimination of "High Spot C" Obstruction to Navigation within the New York Bight Navigational Precautionary Area – Ambrose Channel, New York and New Jersey 50 Foot Harbor Deepening Project.*

The NYD proposes to eliminate an obstruction to navigation (known as High Spot C) located in Federal waters within the New York Bight, near the approach to the New York (NY) and New Jersey (NJ) Harbor. The obstruction is being investigated as part of the ongoing NY and NJ 50 Foot Harbor Deepening Project, and was identified as a natural geologic formation with a uniform, rocky bottom with no articulated vessel structures or debris piles.

High Spot C contains a number of high spots within the rock formation that are considered to be navigational hazards to full use of the seaward approach to the Ambrose Channel. If approved, this project would ultimately provide a more fully functional and safer navigational passage to the Port of NY/NJ for larger and heavier vessels.

For further project information contact:

Tom Shea
Project Manager
NYD
Thomas.Shea@usace.army.mil

An electronic copy of the document will be posted to the NYD website (http://www.nan.usace.army.mil/index.php), under "Recent Postings", on the date of publication listed below. To request a hard copy of the DEA, or submit written comments on this document, contact:

Mailing address:

Ann DiLorenzo
Project Biologist
US Army Corps of Engineers, New York District
Attn: CENAN-PL-E
26 Federal Plaza
New York, NY 10278-0090

E-mail address: cenan-ambrose@usace.army.mil

Your written comments to the Draft EA are due 15 calendar days from the date of publication release and will be addressed in the Final EA for this project.

Date of publication release: Tuesday, June 26, 2012

Comments due by: Tuesday, July 10, 2012