Pre-Development Assessment of Natural Resources for the Proposed Long Island – New York City Offshore Wind Project Area

Final Report 10-22
Task 3a
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New York State
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Final Report

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ABSTRACT AND KEY WORDS

This report presents the results of a pre-development assessment study of the natural resources in the vicinity of a proposed 700 MW offshore wind energy project in the Atlantic Ocean located approximately 14 nautical miles (16 statute miles) southeast of Rockaway Peninsula, Long Island. The information compiled by this study is intended to provide the Long Island – New York City Offshore Wind Collaborative, a coalition of utilities, State and New York City agencies, and other interested parties, with a baseline of knowledge to facilitate future project planning, siting and measurement activities. The assessment includes a review of the natural resources that exist in the New York Bight (finfish, benthic invertebrates, birds, sea turtles and terrapins, marine mammals, and vegetative communities). The study analyzes the potential impacts of development of the proposed project to each community during the construction phase and the operational phase of the wind project. Impacts to commercial and recreational fishing communities are assessed. The study discusses the visual impacts of development, and considers other uses in the proposed project area. A review of the existing data indicated that development in the proposed project area may be feasible; however, the collection of site specific environmental data as designated by government agencies will required to confidently determine the proposed project's potential impact on local natural resources.

KEY WORDS – offshore wind energy, New York Bight, natural resources, finfish, larvae, eggs, invertebrates, shellfish, birds, sea turtles, terrapins, marine mammals, vegetation, coastal land use, commercial fishing, recreational fishing, impacts, NYSERDA, AWS Truepower, EEA, Inc.

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SUMMARY

This report presents the results of a pre-development assessment study of the biological and associated natural resource features in the vicinity of a proposed offshore wind energy project in the Atlantic Ocean southeast of Rockaway Peninsula, Long Island. The information compiled by this study is intended to provide the Long Island – New York City Offshore Wind Collaborative, which is a coalition of utilities, State and New York City agencies, and other interested parties with a baseline of knowledge to facilitate future project planning, siting and measurement activities. The offshore wind facility, which would be developed and operated by one or more developers selected as part of a formal solicitation process by the Collaborative, is envisioned to be located within a 65,000 acre (263 km^2) area approximately 14 nautical miles (16 statute miles) southeast of Rockaway Peninsula, Long Island. This area could support up to 700 MW of nameplate wind capacity, although an initial phase could be as small as 350 MW.

Given the limited availability of marine ecological information within the proposed project area, data were also obtained for the surrounding New York Bight region, which extends from Cape May, New Jersey to Montauk Point, New York. Data from the New York Bight is pertinent, as the cited marine species that inhabit and migrate through the Bight can be assumed to use the proposed project area as well. In addition to the offshore environment, this report also considers the Collaborative's recommended landfall area on the Rockaway Peninsula for the wind project's transmission line. For all areas, various biological natural resources and land/water use activities are described, together with the potential positive and negative impacts of offshore wind development.

Finfish, benthic invertebrates, sea turtles, terrapins, marine mammals, vegetative communities, and coastal land use within the region are described in detail. While birds are also addressed, a more comprehensive review of bird-related information and potential impacts from an offshore wind project is provided in a separate report, *Pre-Development Assessment of Avian Species for the Proposed Long Island – New York City Offshore Wind Project Area*.

The report analyzes the impacts to each biological community as a result of the construction and operation of an offshore wind project. The impacts of construction, including the noise associated with pile driving, cable installation, and vessel strikes are discussed. Operational impacts, including turbine noise and electromagnetic fields are also evaluated. The anticipated impacts to the natural resources in the project area are based largely on impacts that have been identified in European waters as a result of the construction and operation of several offshore wind projects.

The impacts of development on the visual resources in the area and commercial and recreational fishing are evaluated. Commercial fishing impacts are investigated in depth, especially for the gear types and fishing techniques that are most likely to be affected. The impacts of other usages in or near the project area are

discussed, including artificial reefs, offshore sand borrow areas, navigation, dump sites, and liquefied natural gas facilities. It was determined that multiple weapons training areas are designated within the New York Bight by the U.S. Coast Guard, some of which overlap the proposed project area and may impact turbine siting. The permitting process for this project is then outlined, including specific regulatory approvals and consultations that may be necessary.

The assessment determined that the greatest impacts would be during the construction process, although these would be short term. Pile driving would induce the greatest impact, and noise related injury may occur to marine mammals and fish in the area. Jet plowing for cable installations, vessel strikes, and transmission landfall in sensitive habitats may also impact natural resources in the area. Mitigation measures, such as implementing exclusion zones and environmentally-sensitive construction methodologies (e.g. horizontal directional drilling, use of bubble curtains), may reduce impacts.

The potential long lasting impacts of project development could include noise and electromagnetic fields generated by operation of the turbines, the presence of turbines and foundations in fishing areas, and visual impacts to nearby communities. Noise will be almost continuous and may be perceived by fish, sea turtles, and marine mammals outside of the proposed project area. Electromagnetic fields may impact migration of species and disorient movements. More research is necessary to further determine the long term impacts of development in the New York Bight region.

The presence of turbines in fishing grounds may or may not significantly impact commercial fishing. The level of impact will depend on the limitations placed on fishermen in the area. The most common type of gear used in the area is otter trawl, which is dragged across the sea floor. Trawl fishing may be impacted if this type of gear is not allowed within the project area following development. A positive result of development for fishing communities would be the artificial reef structures created by the turbine foundations and scour protection. The introduction of hard substrate into an otherwise flat, sandy bottomed area may cause the colonization of organisms around foundation structures. These organisms may serve as food for fish, creating a localized habitat, similar to an offshore reef. The reef habitat would benefit recreational fishermen if fishing is permitted within the wind project.

In conclusion, although some impacts to local biological natural resources are possible, this pre-development assessment did not identify major barriers, conflicts or other fatal flaws that would currently preclude development of the proposed offshore wind project southeast of Rockaway Peninsula, Long Island. Additional natural resource studies will be necessary should this project proceed to the permitting and development phase. Site specific field studies will be defined during the environmental impact statement scoping process by the Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEM, formerly the Minerals Management Service [MMS]), with input from other federal agencies, and by applicable New York State agencies (e.g., Department of State, Department of Environmental Conservation, Department of Public Service) as well. Natural resource (non-avian) field studies likely to be required by both federal and State agencies during the environmental impact review process include, but are not limited to, surveys for marine mammals, threatened and endangered sea turtles, and benthic invertebrate species composition and abundance. Additionally, federal agencies may require epibenthic colonization plate surveys and State agencies may require surf clam assessments and peninsula crossing zone botanical and wildlife surveys.

Section 1

1. INTRODUCTION

The Long Island – New York City Offshore Wind Collaborative (the "Collaborative"), a coalition of utilities, State and New York City agencies, is seeking to obtain power from a future offshore wind energy facility located in the Atlantic Ocean. The offshore wind facility, which would be developed and operated by one or more developers selected as part of a formal solicitation process,, is envisioned to be located within a 65,000 acre area approximately 14 nautical miles (16 statute miles)[1] southeast of Rockaway Peninsula, Long Island. The proposed project area could support up to 700 MW of nameplate wind capacity, although an initial phase could be as small as 350 MW.

The New York State Energy Research and Development Authority (NYSERDA) engaged AWS Truepower (AWST) and its subcontractors to conduct pre-development assessment studies of the physical and environmental qualities of the proposed project area and its surroundings. A preliminary review of these qualities is critical in the initial planning stages to determine the existence and nature of any perceived barriers, conflicts, or other fatal flaws that could preclude development of the proposed project. Using existing data, this report characterizes the local species and natural resources of this region. This information is intended to provide interested parties with a baseline of knowledge to facilitate future project planning, siting and measurement activities.

The natural resources assessment focused on the proposed offshore project area and the landfall area for the transmission line on the Rockaway Peninsula, shown in Figure 1 and Figure 2, respectively. The project area is between the Ambrose-to-Nantucket and Hudson Canyon-to-Ambrose shipping lanes, with water depths ranging from 70 to 120 ft.[1] The Long Island Power Authority's (LIPA) Rockaway Substation in Far Rockaway and Con Edison's North Queens Substation have been identified as likely points of interconnection for the first 350 MW phase of the project.[1] If the project is expanded to 700 MW, a second transmission line may be built and connected to a new substation in eastern Queens, New York.[1] Electrical configurations associated with these phases of development are as shown in Figure 3. These areas were evaluated for potential impacts of development to local natural resources.

A variety of organisms—finfish, benthic invertebrates, birds, sea turtles, terrapins, marine mammals, and vegetative communities—inhabit the New York Bight seasonally and year round. As these creatures may be affected by the development of an offshore wind farm in the proposed project area, it is necessary to characterize the biological communities in the region. To accomplish this, site specific data for the project area were evaluated whenever possible; however, since there are few sources that list data for the exact project area, data from the New York Bight Region (extending from Cape May, New Jersey to Montauk Point, New York) are frequently referenced. Data from the New York Bight are pertinent, as the species

[1] A nautical mile equals 1.15 statute miles.

cited in the region migrate throughout the Bight and would be assumed to use the project area if found in the surrounding waters.

Biological communities may be affected by construction activities associated with the project as well as by the physical presence of the wind turbines, foundations, and substation(s) during the project's operational life. Construction impacts are mostly temporary, and include noise associated with pile driving, cable installation, and the risk of vessel strikes. Operational impacts are more likely to be long lasting, and include turbine operational noise and the generation electromagnetic fields. The anticipated impacts to the natural resources in the project area can be extrapolated from impacts that have been identified from several years of data from European offshore wind projects.

Human use of the New York Bight may be impacted by the proposed project. Depending on the gear type and the restrictions imposed after project construction, commercial fishing activities within the proposed project area may be limited. The project will affect the viewshed of land users along the southern shore of Long Island, particularly along Rockaway Beach. Other use in or near the project area, including artificial reefs, offshore sand borrow areas, dump sites, and liquefied natural gas facilities, may either be impacted by project development or may have an impact on the proposed project. Finally, specific marine permits and consultations will be necessary to obtain regulatory approval.

This document is meant to be a reference document for guidance in the development of initial siting plans. As the first step in the siting process, this assessment is meant to identify any obvious fatal flaws to development resulting from natural resources in the area based on existing data. The assessment did not identify any fatal flaws; however, the natural resources in the area are sensitive and should be carefully considered when siting and constructing the project. As the project progresses, it is expected an Environmental Impact Statement (EIS) will be conducted, which will explore the impact of project development in much greater depth.

Section 2

2. NATURAL RESOURCES IN THE ATLANTIC WATERS OF THE NEW YORK BIGHT

This chapter explores the natural resources that are present in the New York Bight, both seasonally and year-round. New York Bight is a highly productive ecosystem that provides habitat for finfish, shellfish, benthic invertebrates, birds, sea turtles, terrapins, and marine mammals. Each of these groups is part of the larger Bight ecosystem and is dependent on each other for existence. Each community will be explored in this chapter in support of the following chapters, which will discuss the impact an offshore wind project built in New York Bight would have on each species and the overall marine ecosystem.

2.1. SIGNIFICANT HABITATS

The Atlantic waters along the south shore of Long Island and east coast of New Jersey are rich in natural resources. The back bays, barrier beaches, and nearshore waters along the Atlantic coastline have been designated as significant habitat by the US Fish and Wildlife Service (USFWS) because significant populations of endangered, threatened, special concern, rare, and migratory species occur naturally in the region.[2] The Significant Habitat and Water Habitat Complexes in the New York / New Jersey Harbor Area are pictured in Figure 4. The USFWS Significant Habitat Complexes are shown in gold and the USFWS Significant Water Habitat Complexes are shown in medium blue. The Significant Water Habitat Complexes are primarily in coastal bays and inlets. These Significant Habitat Complexes do not extend into the offshore project area; however, they may cover portions of the proposed transmission cable route.

There are also New York State designated Significant Fish and Wildlife Habitats along the south shore of Long Island and New York City. Jamaica Bay, Silver Point Beach, just east of east Rockaway Inlet, and Breezy Point, at the western end of the Rockaway Peninsula are all New York State Significant Fish and Wildlife Habitats.[3] These significant habitats are circled in red in Figure 4. Sandy Hook National Wildlife Refuge, also circled in red, is a significant Habitat in New Jersey.

2.2. RESIDENT AND MIGRATORY FINFISH IN THE NEW YORK BIGHT

The New York Bight finfish population is comprised of both resident and migratory species. Finfish that migrate through the area in winter and spring include: goosefish, red hake, silver hake, spiny dogfish, and Atlantic herring.[4] Species that migrate to New York Bight coastal waters in the late spring and summer include: black sea bass, butterfish, northern searobin, scup, spotted hake, summer flounder, alewife, American shad, Atlantic menhaden, Atlantic mackerel, and bluefish.[4] Year round residents include: blueback herring, dusky shark, lined seahorse, scup, striped bass, tilefish, summer flounder, and windowpane.[4] In general, finfish tend to move inshore and north during the spring and summer months and offshore and south during the fall and winter.[2]

2.2.1. Finfish Surveys

Bottom trawl surveys conducted by the National Marine Fisheries Service (NMFS) at stations within proximity to the project area at the end of 2007 and in 2008 identify finfish that may be found in the proposed project area. Winter trawls were conducted beyond the 100 foot depth contour. The dominant species observed near the project area were little skate and spiny dogfish. Other species collected included yellowtail flounder, winter flounder, windowpane flounder, summer flounder, Atlantic herring, and winter skate.[5] Spring surveys near the project area showed the dominant finfish in waters between 60 – 95 ft to be the little skate, followed by spiny dogfish and winter skate. Other species collected near the project area include: silver hake, winter flounder, windowpane flounder, Atlantic herring, and Atlantic mackerel.[6] Finfish species collected closer to Long Island, in an area where the transmission line may come to shore, in approximately 30 ft of water, were dominated by little skate. Other species collected in the nearshore waters included winter flounder, windowpane flounder, and winter skate.[6] During the fall of that year, the dominant offshore species near the project area were summer flounder and bluefish, followed by silver hake, winter flounder, scup, and croaker.[7] Long-finned squid and American lobster were also dominant catches offshore in the fall.[7] Species collected in the possible transmission route included windowpane flounder, summer flounder, bluefish, weakfish, scup, spot, croaker, butterfish, and American lobster.[7] The NMFS survey data provides an example of the migratory patterns of finfish in the Middle Atlantic Bight, spanning from Massachusetts to North Carolina. It shows the entry of some species into the local waters from farther south and also shows the migration of finfish landward for the summer months (e.g. summer flounder).

The US Army Corps of Engineers – New York District (USACE-NYD), conducted a four-year (1999-2002) fisheries survey on the south shore of Long Island, focused at locations east of Shinnecock Inlet and south of Cherry Grove, Fire Island. Demersal finfish were collected by trawl along the 30’, 40’, 50’, and 60’ depth contours. Although the study areas are farther inshore and to the east of the project area, they indicate representative species that may be found in the project area. Numerically dominant finfish species collected from both sampling areas were bay anchovy, Atlantic butterfish, scup, silver hake, spotted hake, little skate, and winter skate.[8,9,10] Total finfish abundances peaked during the summer months of August and September. Generally, finfish numbers and diversity increased with water depth. Dominant finfish species by weight were little skate, winter skate, windowpane flounder, summer flounder, winter flounder, scup, Atlantic butterfish, bay anchovy, and spiny dogfish.[8,9,10] The commercially important species that were landed during the four-year sampling program were Atlantic butterfish, scup, summer flounder, winter flounder, and bluefish. Of these commercially important finfish, summer and winter flounder had the greatest weights, were generally the oldest, and had the largest mean total length per age class.[8,9,10]

The USACE-NYD has conducted several finfish surveys along the northern coast of New Jersey, from Asbury to Manasquan, as part of a beach erosion control project. A three-year baseline survey (1994 –

1996) of finfish between 1.5 to 5.5 miles offshore, in and around sand borrow areas, showed herring as the numerically dominant fish collected by otter trawls during the pre-construction period in the spring of 1995 and 1996. Other numerically dominant finfish collected during those years were hake, American sand lance, winter flounder, windowpane, spiny dogfish, striped bass, skates, butterfish, and scup.[11] Numerically dominant finfish collected during the fall of those years were butterfish, anchovies, skates, searobins, summer flounder, mackerel, scad, weakfish, scup, windowpane, smallmouth flounder, and smooth dogfish.[11] During the 1997 dredging process, dominance shifted to predatory species, skates, and windowpane in the spring and butterfish and searobins in the fall.[12] Dominance shifted back to blueback herring and anchovies in the spring of 1998 and butterfish and searobins again dominated in the fall of that year.[12] It is important to note that even though the dominant species shifted over time, and in response to habitat flux, the species composition did return to pre-construction conditions after the beach nourishment process was completed. The community shift that occurred at this site may be indicative of a temporary shift that may result from the proposed offshore construction.

The BOEM (then MMS) collected finfish in September 2001 and the following June 2002 in proposed sand borrow areas south of Long Island and East of New Jersey. Finfish collected in September south of Long Island, in a borrow area north of the project area for the present study, included northern sea robin, summer flounder, butterfish, and winter skate.[4] Spotted hake was collected in this same area in June.[4] All catches were below 10 individuals.

Backbays, estuaries, and marshes are important nurseries for larval and juvenile fish. The Rockaway Substation, where the transmission line will connect, is located on Jamaica Bay, which is an important nursery. The Bay has several marsh islands which act as nursery grounds, and marsh habitat fringes the edges. Forage species, those that serve as food for birds and other fish, collected in the Bay include: Atlantic silverside, bay anchovy, mummichog, Atlantic menhaden, and striped killifish.[2] Pisciverous fish included scup, bluefish, windowpane, tautog, weakfish, black sea bass, summer flounder, winter flounder, American eel, and searobin.[2] Anadromous species (meaning they spawn in rivers and spend their adult lives in the open ocean) found in Jamaica Bay include: blueback herring, Atlantic sturgeon, alewife, American shad, and striped bass.[2] Many of these species have also been identified offshore in finfish surveys within proximity to the project area. Although Jamaica Bay is a sensitive habitat, construction in the area will not likely be prohibited, however mitigation measures (such as construction windows) may be necessary to reduce impacts to species in the area.

Raritan Bay and Sandy Hook Bay are nurseries located to the west of the project area. Estuarine species inhabiting the area include: mummichog, white perch, and hogchoker.[2] Other species found in the area include: weakfish, bluefish, winter flounder, summer flounder, striped bass, black sea bass, tautog, scup, and spot.[2] Many of these species spawn in the local waters and their larvae use marsh habitats as important nursery grounds before the adults move into open waters.

The above mentioned finfish species collected off the coasts on New York and New Jersey, at varying distances from shore and varying water depths, all indicate the species that can be expected in the project area and proposed transmission corridor. Finfish collection efforts throughout the Bight all produced similar species, over a variety of years, providing strong evidence of species making use of the area. Many of these species also reproduce in the area, or their larvae are carried by currents inshore, where they mature in the New York and New Jersey bays, inshore of the project area.

2.2.2. Federally Managed Species

Essential Fish Habitat (EFH) has been designated for many of the federally managed species that are found in the New York Bight. EFH is defined in the Magnuson-Stevens Fishery Conservation and Management Act as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."[13] NMFS Mid-Atlantic Fishery Management Council (MAFMC) has identified and delineated regions of EFH in their Fishery Management Plan (FMP). NMFS has created maps of EFHs using a variety of sampling methods and analyses in order to determine which areas to consider as EFH for species groups. NMFS has mapped these geographic areas on a grid, with each grid cell representing a 10-minute by 10-minute square of latitude and longitude (quadrat). Figure 5 shows grids used in this analysis. Each quadrat pertains to a group of species and their life stages designated as EFH by NMFS.

The project area and possible transmission route for the proposed project have an EFH designation that incorporates a number of 10x10 squares. The summary of the EFH species for this area includes species from all of the grids that encompass the project area and the possible transmission route. The project area is outlined on this figure and boxes that incorporate the project area are highlighted in purple and boxes that incorporate the possible transmission route are highlighted in orange. Species with EFH designations in the project area waters and possible transmission cabling locations are listed in Tables 1 and 2. The designations have been broken down into life stages: eggs, larvae, juveniles, and adults. Marked boxes indicate essential fish habitat for different life stages of each species.[14]

It is important to note the EFH does not indicate exclusion zones for project activity. It does, however, indicate areas with essential habitat to finfish species that should be taken into consideration during the construction process. Federally permitted projects generally require an EFH Assessment to determine impacts of a project on EFH listed species as part of the permitting process.

2.2.2.1. Project Area. Finfish with EFH designations in the project area that are managed by the MAFMC) include: Atlantic butterfish, Atlantic mackerel, black sea bass, bluefish, scup, spiny dogfish, and summer flounder. Table 3 provides habitat information for these species.[15,16] Other finfish species with EFH designated life stages found in the project area, which are managed by the New England Fishery Management Council (NEFMC), include: Atlantic sea herring, haddock, monkfish, ocean pout, red hake, whiting, windowpane flounder, winter flounder, witch flounder, and yellowtail flounder. Finfish with EFH designations in the project area, which are managed by the South Atlantic Fishery Management Council (SAFMC) include: cobia, king mackerel, and Spanish mackerel. Tables 4 and 5 provide habitat information for species managed by NEFMC and SAFMC.[16] There are also numerous highly migratory species with EFH in the project area including: basking shark, blue shark, bluefin tuna, common thresher shark, dusky shark, sand tiger shark, sandbar shark, shortfin mako shark, skipjack tuna, tiger shark, and white shark. [17] The habitat information for these species is provided in Table 6.[17] Invertebrates, which are governed by the MAFMC, with EFH in the project area include: long finned squid, ocean quahog, and Atlantic surf clam. The habitat information for these species is provided in Table 3.[15,16]

2.2.2.2. <u>Possible Cable Route.</u> Finfish with designated EFH life stages in the possible cable route that are managed by the Mid-Atlantic Fishery Management Council (MAFMC) include: Atlantic butterfish, Atlantic mackerel, black sea bass, bluefish, scup, and summer flounder. Finfish with EFH designations in the possible cable route, which are managed by the New England Fishery Management Council (NEFMC) include: Atlantic salmon, Atlantic sea herring, little skate, monkfish, pollock, red hake, whiting, windowpane flounder, winter flounder, and winter skate. Finfish that have EFH designations in the possible cable route, which are managed by the South Atlantic Fishery Management Council (SAFMC) include: cobia, king mackerel, and Spanish mackerel. Tables 3, 4, and 5 provide habitat information for species managed by MAFMC, NEFMC, and SAFMC.[15,16] Highly migratory species with EFH in the possible cable route include: blue shark, dusky shark, sand tiger shark, sandbar shark, and tiger shark. The habitat information for these species is provided in Table 6.[17] Invertebrates, which are governed by the MAFMC, with EFH in the project area include: long finned squid, ocean quahog, and Atlantic surf clam. The habitat information for these species is provided in Table 3.[15,16]

2.2.3. <u>Federal and State Listed Finfish Species</u>

There are two federally listed endangered finfish species, the shortnose sturgeon (*Acipenser brevirostrum*) and the Atlantic salmon (*Salmo salar*), that are found in the New York Bight.[18] Both species are anadromous, meaning they spawn in rivers and spend their adult lives in the open ocean. Adult Atlantic salmon can be found offshore of New Jersey and Long Island in their migration route to New England rivers to spawn.[19] Figure 6 shows the migration routes of Atlantic salmon and indicates that the project area is in the southernmost reach of the migration pathway. These fish represent the last wild population of Atlantic salmon and are from the Gulf of Maine stock.[19] The shortnose sturgeon is found in nearshore estuaries and rivers, and a significant population of this fish is found in the tidal portion of the Hudson River, which empties into New York Bight.[20] The Hudson River population inhabits the area from the tip of

Manhattan (river mile 0) north to the federal dam at Troy (river mile 152).[21] The shortnose sturgeon is primarily found in coastal rivers and estuaries and do not tend to migrate far offshore.[20] The possible presence of these species in the project area is not expected to be a fatal flaw for this project, however, coordination with federal agencies may be necessary to reduce impacts to these species as a result of the project.

The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) is a candidate species for federal threatened or endangered listing and a federal species of concern throughout its range.[22] It occurs in New York and New Jersey coastal waters and is likely to occur in the project area. Letter correspondence with NMFS concerning this species is included in Appendix A. The Atlantic sturgeon is anadromous and has been reported in the Hudson River, Raritan River, and the Delaware River, although populations are declining in all.[23,24,25] At this time the species receives no protection under the Endangered Species Act (ESA), however, a decision on the federal status is anticipated in the fall of 2010, and conservation actions are recommended along with obtaining the updated status of the species from the National Marine Fisheries Service prior to submittal of any applications for this project.[22] The possible presence of this species in the project area is not expected to be a fatal flaw for the project; however, coordination with federal agencies may be necessary to reduce impacts to the Atlantic sturgeon. Coordination with federal agencies is necessary for all threatened and endangered species, and since the Atlantic sturgeon may be upgraded in status, federal coordination is suggested.

Other species found in New York and New Jersey waters, that are federal species of concern, are: thorny skate (*Amblyraja radiate*), sand tiger shark (*Carcharias taurus*), porbeagle shark (*Lamna nasus*), night shark (*Carcharinus signatus*), dusky shark (*Carcharhinus obscurus*), cusk (*Brosme brosme*), Atlantic halibut (*Hippoglossus hippoglossus*), Warsaw grouper (*Epinephelus nigritus*), rainbow smelt (*Osmerus mordax*), alewife (*Alosa pseudoharengus*), and blueback herring (*Alosa aestivalis*).[18] Cusk is also a candidate species for federal threatened or endangered listing throughout its range. Table 7 lists the endangered, threatened, and candidate fish and their habitats.

The following species of concern can be found coastally, and are probable in the project area: sand tiger shark, dusky shark, rainbow smelt, alewife, and blueback herring. Sand tiger shark are coastal, generally found from the surf zone to depths of 75 ft, although may be found in bays and to depths of 600 ft on the continental shelf.[26] Juveniles are also commonly found in estuaries and are highly dependent on the Delaware Estuary, south of the project area.[26] EFH has been designated for sand tiger shark larvae in the project area and transmission corridor. Dusky sharks are found in warm temperate to tropical waters from the surf zone to offshore waters from surface waters to depths of 1300 ft.[27] Dusky sharks have coastal nursery grounds, however, they avoid estuaries, as the water is not saline enough for the species.[27] EFH has been designated for dusky shark larvae and juveniles in the project area and larvae in the transmission corridor. Rainbow smelt is a northeast anadromous species that spawns in fresh water and migrates offshore for the winter, although generally remaining coastal in shallow water.[28] Alewife and blueback herring are anadromous fish that spawn in coastal rivers and migrate offshore for the winter.[29,30] The possible presence of these species in the project area are not anticipated to result in a fatal flaw for this project.

The following species of concern are found farther offshore or in deeper water: porbeagle shark, cusk, Atlantic halibut, Warsaw grouper, and thorny skate. These species are not anticipated to be in the project area. Porbeagle sharks are cold-temperate coastal and oceanic pelagic species, but rarely enter shallow coastal waters.[31] They are found from surface waters to depths of 1000 ft.[31] The night shark is found in deep waters, 900 to 1200 ft during the day and 610 ft at night.[32] Cusk may be found as far south as New York and New Jersey, but prefers cold, deep (up to 330 ft) water.[33] Atlantic halibut are found in coastal to upper slope areas, near the sea floor, in deep offshore water.[34,35] Warsaw grouper is a deep water species that associates with reefs on the continental shelf break.[36] Adults are generally found in water 18 to 1700 ft deep, although juveniles are occasionally found at shallower reefs and larvae is pelagic.[36] The area of concern for the thorny skate is just east of the project area, but strays have been reported as far away as South Carolina.[37] They are bottom oriented and prefer deep water.[37] The unlikely presence of these species in the project area are not anticipated to result in a fatal flaw for this project.

Some local species are also listed as threatened or endangered on a state level. New York and New Jersey both list the shortnose sturgeon as endangered. New Jersey has two additional finfish species that are listed as threatened: the American shad and the Atlantic tomcod.[23] The American shad is anadromous, and most spawning occurs in New York's Hudson River and farther north.[23] The Atlantic tomcod is found in brackish waters, and the only known population remaining in New Jersey is in Sandy Hook Bay.[23] The possible presence of these species in the project area are not anticipated to result in a fatal flaw for this project.

Information on endangered, threatened, or special concern species and rare communities was requested of the New York State Department of Environmental Conservation (NYSDEC) for the project area. NYSDEC does not have specific data on species as far offshore as the project area, however, USFWS indicates that there are federally listed plants and animals along the New York and New Jersey coastline (Figure 7).[2,38] These listed species would be of greatest concern along the New York coastline, near Jamaica Bay, where the transmission line would connect to the Rockaway Substation. Species that may be of specific concern on the beach, as indicated by the USFWS online database as federally listed and candidate species, includes the beach nesting birds, piping plover (*Crahadrius melodus*) and roseate tern (*Sterna dougallii dougallii*), and the plant, seabeach amaranth (*Amaranthus pumilus*).[39] Shortnose sturgeon was also noted in the database, however, they primarily occur in the Hudson River.[39] Roseate tern and shortnose sturgeon are federally endangered and piping plover and seabeach amaranth are federally threatened.[39] Appendix A contains the database information. The possible presence of these species in the project area is not expected to be a fatal flaw for this project, however, coordination with federal agencies may be necessary to reduce impacts to these species as a result of the project.

2.2.4. <u>Commercial Species</u>

Many of the numerically dominant fish found in New York and New Jersey's coastal waters are also major commercial species. Table 8 presents the major annual landings in New York for the years 2006 to 2008 in pounds and dollars. Silver hake, goosefish, bluefish, golden tilefish, scup, and summer flounder were the top six species landed by weight during those three years.[40] Many of these species also yielded the highest price, with golden tilefish leading in value (over $10.5 million) for the three years. Summer flounder was the next most valuable finfish landed, yielding over $9.4 million over this period.[40] Silver hake yielded over $6.6 million, and goosefish and striped bass each yielded over $5.0 million. [40]

Table 9 presents the major annual landings in New Jersey for the years 2006 to 2008 in pounds and dollars. Atlantic menhaden, Atlantic mackerel, and goosefish were among the top catches from 2006 to 2008.[41] There was also a very large catch of "finfish – General (Uncoded)," but species were unspecified by NMFS.[41] The species yielding the highest price, were goosefish and summer flounder, each over $12 million. The "uncoded" finfish yielded over $5.8 million, Atlantic menhaden and Atlantic mackerel each yielded over $4.0 million, and black sea bass yielded over $3.9 million.[41]

Table 10 summarizes the commercial landings of major commercial species caught at various distances offshore for 2008 from New York waters. Table 11 summarizes the commercial landings of major commercial species caught at various distances offshore for 2008 from New Jersey waters.[42,43] Results from fishing vessel trip reports (FVTRs), which must be submitted by commercial fishermen to identify fishing grounds, indicate that silver hake, which was the greatest catch from New York waters in 2008, was caught entirely in federal waters (three to two hundred miles offshore).[42] Tilefish, which yielded the greatest value from New York waters, was also solely caught three to two hundred miles offshore (Table 10).[42] The hard clam, which is the most valuable invertebrate collected in New York waters in 2008, was only collected from state waters and the sea scallop, which was the fourth most valuable invertebrate, was only collected from federal waters (Table 10).[42] Goosefish, the most valuable fish landed in New Jersey, was only caught in federal waters, and sea scallop, the highest value shellfish, was only harvested from federal waters (Table 11).[43]

2.3. LARVAL FISH AND LARVAL FISH HABITAT

The majority of fish that spend a portion of, or all of their lives, in the New York Bight, either spawn offshore in the Middle or South Atlantic Bight, or in nearshore estuaries and rivers, with the exception of eels, which spawn in the Sargasso Sea in the North Atlantic Ocean.[44] Table 12 details the time of year that these fish spawn, where they spawn, their egg type, and adult habitat preferences. Many of the fish migrate between offshore waters and estuaries or rivers during their life cycle.[44] A large number of species migrate from tropical and boreal (subartic) waters to spawn in the Middle Atlantic Bight, and these seasonal migrations influence the species composition and dominant finfish and larvae.[44]

Finfish spawning in the Middle Atlantic Bight reaches a peak in mid-to-late summer and is lowest during the winter.[44] The most abundant larval species found in the Middle Atlantic Bight during the winter include: American sand lance, rock gunnel, and winter flounder.[44] Spring larval assemblages are dominated by American sand lance, yellowtail flounder, and Atlantic mackerel.[44] Dominant larval species found in the summer include: fourbeard rockling, fourspot flounder, butterfish, cunner, and hake species.[44] Spotted hake, Gulf Stream flounder, smallmouth flounder, and windowpane dominate larval species assemblages in the fall.[44]

After fish spawn, their larvae are dependent on currents for dispersal. Some larvae may stay locally in an estuary, while others may travel down river or across the continental shelf. Some larvae may travel north from the South Atlantic Bight, where fish such as crevalle jack, grey snapper, striped mullet, white mullet, and bluefish spawn.[44] Larvae may be carried northward in the Gulf Stream and be transported inshore in warm-core rings that break off the Gulf Stream and move landward.[45] Many fish that spawn in the Middle Atlantic Bight—Atlantic herring, anchovies, hakes, searobins, weakfish, cunner, tautog, butterfish, black sea bass, windowpane, and flounders—move inshore to develop and may be found in estuaries during part of their life cycle.[44] Larvae of anadromous fish make their way down rivers toward the nurseries of bays and estuaries. Some anadromous fish that spend part of their lives in rivers and part in estuaries or ocean waters include: blueback herring, alewife, shad, white perch, striped bass, and sturgeon.[19,20,25,44] The mummichog, killifishes, silversides, sticklebacks, and gobies spawn in estuaries and spend most of their lives in marshes and estuaries.[44] They do not undergo the large migration that several of the other fish in the Middle Atlantic Bight do to spawn, however, they are very important because they provide food for piscivorous fish (fish that eat other fish), including many of the juvenile fish that migrate to estuaries to mature. They also provide a food source for shorebirds and diving ducks.

Larval finfish data that was collected within a reasonable distance from the proposed project area indicated the species that could be present in the project area. Larval fish collected in the surf zone off northern New Jersey (Asbury to Manasquan) in the spring and summer months of 1994 – 1996 show populations to be dominated by silversides and anchovies.[11] Other larval fish observed in the surf zone include black sea bass, windowpane, northern pipefish, goosefish, cunner, tautog, searobins, conger eel, Atlantic needlefish, northern puffer, weakfish, fourbeard rockling, hake, and winter flounder.[11] Larval fish identified in surface waters farther offshore include: anchovies, silversides, Atlantic menhaden, and windowpane.[11] Larval fish collected from the bottom of the water column offshore include: tautog, black sea bass, conger eel, windowpane, anchovies, cunner, butterfish, longhorn sculpin, fringed flounder, and summer flounder.[11]

Larval species collected in the nearshore area from May to July in 1995 - 1999, in approximately 20 ft of water, between Deal and Manasquan Inlet, New Jersey, indicate species that are anticipated for the project area. The most abundant species collected, in order of density, were: anchovies, Atlantic menhaden, Atlantic mackerel, blackfish, windowpane, cunner, weakfish, bluefish, and goosefish.[46] The species found in this nearshore zone were similar to species collected on the continental shelf, in estuaries, and elsewhere in the New York Bight.[46] The similarity in species composition throughout the New York Bight, in several environments, may be partially due to ocean spawning species, whose larvae are transported inshore toward estuaries and seasonal spawning migrations, that enable broad distributions of larvae across many habitats.[46]

Larval species were collected slightly farther south, off the coast of New Jersey between Manasquan and Cape May, in approximately 10 to 90 ft of water in 1998, 2005, and 2006 by researchers at Rutgers University. Larval fish species collected during the early summer include: spotted hake, three-spined stickleback, northern puffer, northern stargazer, and butterfish.[47] Larval species collected during the late summer include: butterfish, bluefish, and smallmouth flounder.[47] Atlantic menhaden, hake species, red hake, bluefish, smallmouth flounder, butterfish, and feather blenny were collected in the fall.[47] Although these species were collected south of the project area, they are similar to those collected farther north and it is anticipated that similar species will be found near the project area, as these larvae are planktonic and disperse with currents.

2.4. INVERTEBRATES

Benthic communities include those organisms that live on the sea floor or in the surface sediment layer. Epifaunal benthic organisms live on the surface of the sediment, whereas infaunal organisms live within the sediment itself. Examples of epifaunal benthic organisms include: crabs, sponges, snails, mussels, and some amphipods. Infaunal benthic organisms include: worms, clams, and some amphipods.

Benthic organisms are a building block of marine communities. They serve as food sources for many species of larger invertebrates and finfish. Finfish will often eat amphipods, worms, crabs, and the siphons of clams. The species found on or within the sediment is partially determined by the grain size of the sediment itself. Species that are deposit feeders (ingest sediment for food) are generally found in finer grained sediments (muds, slits, and clays), whereas, species that filter feed (collect their food from the water column) are more often found in coarser sediments (sands and gravels).[48]

2.4.1. Benthic and Epibenthic Species

A Benthic Resource Characterization Survey was conducted as part of a permit application for another project on the Cholera Banks in BOEM Lease Block 6655. This BOEM Lease Block is located in the northwest section of the Long Island – New York City Offshore Wind Project area (see Figure 8). Benthic samples collected from the lease block were numerically dominated by: nematodes; the archannelid, *Polygordius* sp.; the tanaid, *Tanaissus psammophilus*; oligochaetes; the nemertean worm, *Procephalothrix spiralis*; the polychaete worms *Goniadella gracilis*, *Cirrophorus lyra*, and *Aricidea cerrutii*; and the sand dollar, *Echinarachnius parma*.[49,50] Many of these species are known to associate with sandy sediments that have low organic carbon content.[49,50]

The BOEM conducted benthic grab sampling at proposed sand borrow sites off the south shore of Long Island and New Jersey coast in 2001 and 2002. The sand borrow area closest to the project area, and in a location where the transmission cable may traverse, showed September 2001 benthic populations to be dominated by the amphipod, *Gammarus annulatus*, and the archannelid, *Polygordius* sp.[4] June 2002 samples of the following year were dominated by *Polygordius* sp., and the polychaetes, *Aricidea catherinae, Aricidea cerrutti*, and *Lumbrinerides dayi*.[4] The mean number of taxa at this station in September was 35 and in June was 37.[4] Four hundred twenty two individuals (4,215 individuals/m^2) in September, and 562 individuals (5,620 individuals/m^2) in June were identified in this borrow area.[4]

Epibenthic invertebrates collected south of Long Beach, New York in September 2001 included squid, sea stars, longnose spider crab, rock crab, and the flat clawed hermit crab.[4] Invertebrates collected in June 2002 included sand dollar, sea star, flat clawed hermit crab, rock crab, common northern moon snail, squid, long wrist hermit crab, and nudibranchs.[4] It is anticipated that similar species would be found in the offshore project area and transmission route.

Data from other benthic surveys throughout the New York Bight can also be indicative of the benthic species that may be present in the project area, especially since much of the sea floor sediment in the New York Bight is sandy material. Benthic samples collected throughout the Bight indicated that the most abundant benthic organisms between zero and 72 ft of water were dominated by bivalves (702g/m^2).[51] Other benthic organisms found at these depths, with biomasses ranging from 23g/m^2 to 32g/m^2, include: annelids, crustaceans, and echinoderms.[51] The species with the greatest biomass at water depths between 73 and 150 ft were echinoderms (65g/m^2) and bivalves (40g/m^2).[51] The animals that had the greatest biomass in sandy sediment, that is present in the project area, were bivalves, followed by echinoderms.[51] Those that had the greatest biomass in sandy gravel, which does occur in parts of the project area, were bivalves, followed by decapods.[51]

Benthic grabs were collected from 1980 through 1985 throughout the New York Bight by the National Oceanic and Atmospheric Administration (NOAA). Figures produced from the study indicate that the station at the southern edge of the project area (30) had approximately 50 benthic species per 0.1 m^2 in the summer of 1980.[52] Station 30 was not analyzed on an individual station basis; however, Station (31), slightly northeast of the project area, was analyzed separately. This station, located 25 km SSE of Fire Island Inlet, may indicate species expected to be present in the project area. Station (31) was dominated by amphipods (*Pseudunciola obliquua*, *Byblis serrata*, *Corophium crassicorne*, and *Rxepoxynius hudsoni*) and tanaidacean (*Tanaissus liljeborgi*).[52] Sand dollar was dominant by biomass at this station.

2.4.2. <u>Commercially Important Invertebrates</u>

Several commercially important megainvertebrates, such as Atlantic surfclam, ocean quahog, American lobster, Atlantic sea scallop, blue crab, short-finned squid, and long-finned squid, are found in New York and New Jersey waters. Species managed by the Mid-Atlantic Fishery Management Council include: long-finned squid, short-finned squid, Atlantic surfclam, and ocean quahog. The Atlantic sea scallop is managed by the New England Fishery Management Council.

Landings data from the years 2006 to 2008 indicates the quahog to be the most valuable shellfish collected in New York waters (Table 8).[40] During those three years, over 4.7 million pounds of meat was collected, yielding over $39 million.[40] During that time period, longfin squid was the next most valuable catch (over $16.2 million), followed by Atlantic surfclam (over $16 million), American lobster (over $15 million), and sea scallop (over $12.4 million).[40]

Landings data from the same period indicates the sea scallop to be the most valuable shellfish harvested from New Jersey waters (Table 9). Sea scallop yielded over $226 million.[41] The next most profitable shellfish included Atlantic surf clam, blue crab, quahog, and ocean quahog.[41] Atlantic surf clam had the greatest total weight of harvested meat (140 million pounds, see Table 9).[41]

The quahog, or hard clam, *Mercenaria mercenaria*, was the most valuable commercial invertebrate landed from New York waters in 2006 – 2008.[40] The hard clam is found burrowed in soft sandy or muddy sediments where it positions its shell below the sediment surface and extends its siphons into the water to collect food and for gas exchange.[53] It is found in shallow bays and in water up to approximately 45 ft deep.[54] Hard clams are long-lived and can survive for more than 30 years. Commercial harvesting of this species is generally conducted by rake or tongs, either from a boat or by standing in shallow water.[53]

Hard clams, however, are primarily harvested from shallow bays, and therefore, the population or its harvest is not a potential conflict for the proposed offshore wind project. Raritan Bay has an abundant population of hard clams; harvests from this bay account for approximately 45 percent of New York’s hard clam production.[55] Hard clams, harvested from Raritan Bay, however, must be depurated (impurities removed) in the unpolluted water of the Peconic Estuary on eastern Long Island to eliminate its bacterial load before sale to market.[55] This project also will not affect the depuration program on eastern Long Island.

The Atlantic surf clam is a species that is found in open ocean waters in the low intertidal and subtidal zone close to the coastline. They are generally not found in water deeper than 100 ft, but have been reported to depths of 480 ft.[56,57] The Atlantic surf clam is most abundant on sandy bottoms in water of 50 to 100 ft deep.[58] This species prefers turbulent waters at the edge of the breaker zone.[59] The densest commercial populations of Atlantic surf clam are found off New Jersey, the Delmarva Peninsula, and on Georges Bank.[59] Atlantic surf clams, however, are found near the project area and in the transmission corridor, and EFH is designated for adult and juvenile Atlantic surf clams in the project area (see Table 1). Table 3 shows the EFH information and habitat preferences of this species.[15,16]

According to a 2008 survey conducted by the NMFS in the continental shelf waters of the Middle Atlantic Bight, Atlantic surf clam populations are concentrated in nearshore waters and the densest populations are south of the project area, as shown in Figure 9.[60] All stations sampled in the vicinity of the project area produced zero Atlantic surf clams, except for one that produced three.[60] Two stations closer to shore produced 26 and 27 surf clams during the sampling event.[60] Atlantic surf clams identified as part of the Benthic Resource Characterization Survey for the Atlantic Sea Island Safe Harbor Project, in BOEM Lease Block 6655, which is located on the Cholera Banks in the northwest section of the project area, indicate that Atlantic surf clam densities range from 0.01 to 1.21 clams / m^2.[49,50] This estimate is far less dense than beds used for commercial clamming.[49,50]

In 1999 the NYSDEC made preliminary estimates on the population of Atlantic surf clams along the south shore of Long Island (shoreline to three miles offshore) from Rockaway Inlet to Montauk Point. The three-mile line is significant because it marks the separation between New York State and federal waters. Atlantic surf clams populate the entire Long Island coastline, but populations are heaviest in central and western Long Island coastal waters (see Figure 10).[61] Populations were estimated to be heaviest (4.6 millions of industry standard bushels) from Fire Island Inlet to Moriches Inlet (shoreline to one mile offshore) and from Jones Inlet to Fire Island Inlet (one to two miles offshore) where population estimates were 2.1 millions of industry standard bushels. Populations were estimated to be between 0.6 and 1.5 million industry standard bushels from East Rockaway Inlet to Jones Inlet from the shoreline to three miles offshore.[61] Populations were estimated to be greater than a million industry standard bushels between these inlets from the shoreline to one mile offshore and from two to three miles offshore.[61] The area between these inlets is where the transmission line is anticipated to come ashore, and therefore, the Atlantic surf clam beds in the transmission route would be impacted.

BOEM data for a proposed sand borrow area south of Long Beach, New York, beyond the three mile state limit, indicated the presence of juvenile Atlantic surf clams. Sampling events in September produced eight clams / m^2 in the borrow area, and in June there were three clams / m^2.[4] The sampling conducted in this proposed borrow area can be used in conjunction with the NYSDEC survey and may prove indicative of the densities that would be encountered in the transmission corridor.

Landings data for New York in 2008 (Table 10) show that over 5.9 million pounds of Atlantic surf clam meat were collected in New York State waters (between the shoreline and three miles offshore) and over 2.8 million pounds of meat were landed from federal waters (3 to 200 miles offshore).[42] Atlantic surf clam yields are over twice as much within three miles from shore than they are in federal waters (Table 10). Atlantic surf clam landings from New Jersey waters for 2008 were primarily harvested between three and 200 miles offshore (Table 11).[43] Based on the data, over 51.5 million pounds of Atlantic surf clam meat was harvested that year.[43] Also, based on Figure 9, the denser Atlantic surf clam beds off New Jersey are farther offshore.[60] Commercial landings from middle Atlantic states have historically shown a large percentage of Atlantic surf clam landings to be from New Jersey waters. Historical stock assessments show the greatest abundance of Atlantic surf clams located between Montauk Point, New York and Cape Hatteras, North Carolina, to be concentrated between Barnegat and Cape May, New Jersey, at water depths between 40 and 480 ft.[57] These data indicate that the densest Atlantic surf clam beds and heaviest industry lie south of the project area.

The landings and survey data indicate that Atlantic surf clam beds should not experience significant impact from the proposed project. The most dense and commercially fished beds appear to be located south of the project area. These beds are more heavily targeted by New Jersey fishermen. Some clam beds south of Long Island are commercially harvested by New York fishermen, and may be impacted as a result of the installation of the transmission line. The greatest impact to the Atlantic surf clam beds would be south of Far Rockaway, where the transmission line would make landfall.

The sea scallop is an oceanic species, but is generally concentrated farther offshore than the Atlantic surf clam.[63] The most recent NMFS population survey of sea scallops, shown in Figure 11, indicates that the US stock of sea scallops is almost entirely in federal waters,[64] as shown by commercial landing data from 2008 (Tables 10 and 11).[42,43] The majority of the sea scallops harvested in the US were landed in New Jersey and Massachusetts.[64] The sea scallop can be found to water depths of 600 ft, however, commercial concentrations are most abundant at 120 to 300 ft.[56,58] The sampling station that was closest to the project area produced 117 sea scallops.[63] The available data indicates that sea scallops may be present in the project area, however, they are not expected to be present in quantities that draw commercial harvesting.

The ocean quahog is also generally concentrated farther offshore than the Atlantic surf clam and the US stock of ocean quahogs is almost entirely in federal waters.[60,62] Ocean quahog is generally found in waters of 30 to 1,300 ft and commercial concentrations of the ocean quahog are found at water depths of 75 to 120 ft.[15,58,62] Figure 12 shows the results of NMFS most recent population surveys for ocean quahogs. Surveys produced between one and 69 ocean quahogs at stations sampled near the project area.[60] Stations sampled north of the project area, closer to Long Island, did not produce any ocean quahogs.[60] The northwest portion of the project area (BOEM Lease Block 6655) produced zero to 0.68 ocean quahogs per m^2, which is a density much lower than commercially fished beds.[49,50] There are EFH designations for adult and juvenile ocean quahogs in the project area (Table 1).[14,15] Table 3 shows the EFH information and habitat preferences of this species.[15,16] The available data indicates that ocean quahog may be present in the project area, however, they are not expected to be present in quantities that draw commercial harvesting.

Long-finned squid and short-finned squid migrate seasonally, moving closer to shore during the summer and farther off shore during the winter months.[56,65] Trawl surveys from 2008 show the long-finned squid to be abundant near the project area during the fall months.[7] The long-finned squid was not collected near the project area during the spring or winter sampling events.[5,6] All commercial landings in 2008 in New Jersey were taken from federal waters (Table 11); however, commercial landings in New York were harvested from both State and federal waters, with three times as much coming from federal waters compared to state waters(Table 10).[42,43] An EFH has been designated for juveniles and adults in the project area, and for juveniles in the waters closer to shore (see Tables 1 and 2). Table 3 shows the EFH information and habitat preferences of this species.[15,16]

The long-finned squid has been reported along the south shore of Long Island, from Jones Inlet to Shinnecock Inlet.[8,9,10] According to the NMFS, the long-finned squid was the second most valuable marine species landed in New York from 2006 to 2008 (Table 8).[40] Long-finned squid use the waters south of Long Island as breeding grounds and egg masses and young-of-year squid have been recorded in the waters between the shoreline and the 60 ft depth contour.[8,9,10] Long-finned squid populations also appear to be influenced by water depth, where biomass is greater along the 50 ft and 60 ft depth contours.[8,9,10] Long-finned squid may be present in the project area and it is anticipated that commercial fishermen may pursue this species within the project area.

American lobster is a valuable crustacean that is landed locally. American lobster yielded over $15 million from New York waters from 2006 – 2008 (Table 8).[40] New York lobstermen harvested most from State waters in 2008 (Table 10).[42] Conversely, the majority of American lobster landings in New Jersey were caught in federal waters in 2008 (Table 11) and the largest lobsters were reported to be at the edge of the continental shelf.[43,56] The prevalence of lobsters at greater distances from shore may be related to cooler deep waters in these locations, as American lobsters are a cold water species. Very few American lobster were observed near the project area during fishery trawl surveys in 2008.[5,6,7] Only one lobster was collected near the project area during the fall months.[7] The lobster catch was probably incidental, since lobsters tend to congregate near submerged structures such as rock piles and artificial reefs, while trawl surveys are taken over open sandy bottoms. Based on American lobster habitat preferences and commercial landing statistics, it is anticipated that they will not be present in the project area.

Blue crab is another valuable commercial species, yielding over $17.9 million from New Jersey waters from 2006 – 2008 (Table 9).[41] Blue crabs range from estuaries to offshore waters of 120 ft deep.[56] They winter in deep water, but are abundant in shallow inshore water during the summer.[56] All blue crabs commercially taken in 2008 were from New York and New Jersey state waters (Tables 10 and 11),[42,43] and most crabbing is conducted in back bays and estuaries. Based on blue crab habitat preferences and commercial landing statistics, it is anticipated that they will not be present in the project area.

2.5. BIRDS

Many species of birds are found along the coastline of the New York Bight. Since the Bight is situated within the Atlantic Flyway, extending along the Atlantic Coast, the area provides an important stopover site for birds migrating between North and South America. Stopover sites in coastal areas, marshes, parks, and wildlife refuges are extensively used during the spring and fall avian migrations. Major stop over locations include Sandy Hook, New Jersey and Jamaica Bay, Breezy Point, and Silver Point Beach, New York. A greater look at the avian species that use the area is presented in a separate report, *Pre-Development Assessment of Avian Species for the Proposed Long Island – New York City Offshore Wind Project Area*, which will discuss further impacts to migratory and resident species that may be using the project area or foraging in the offshore construction site.

While avian considerations are addressed in detail in a separate report, this section of the Natural Resources Assessment briefly discusses endangered and threatened avian species that may be directly impacted as a result of the installation of the transmission line on the beachfront. Several avian species breed and winter in the area. The following paragraphs discuss avian species that may use or breed on the beachfront of the project area.

Birds found along the New York Bight coastline that are of endangered, threatened, or special concern status are listed in Table 13. This table lists the birds' federal and New York State status, habitat and nest areas, breeding status, and other notes. Birds with both New York and New Jersey status are considered due to the location of the project in relation to both states and utilization of the coastlines by birds during yearly migrations. The possible use of the project by threatened or endangered species is not expected to be a fatal flaw for this project; however, coordination with federal agencies may be necessary to reduce impacts to these species as a result of the project, as coordination with agencies is necessary for threatened and endangered species.

Least tern and roseate tern are federally endangered. Bald eagle and piping plover are federally threatened. American bittern, northern harrier, sedge wren, short-eared owl, and black rail are federal species of special concern. Birds that are endangered in New York include: roseate tern, piping plover, short-eared owl, golden eagle, and black rail.[66,67] Birds that hold a New Jersey State listing of endangered that are found along the coast include: least tern, roseate tern, bald eagle, piping plover, American bittern, northern harrier, sedge wren, short-eared owl, black skimmer, Henslow's sparrow, peregrine falcon, pied-billed grebe, and yellow-crowned night-heron.[68,69,70,71] Birds that are threatened in New York include: least tern, bald eagle, northern harrier, sedge wren, and pied-billed grebe.[66,67] New Jersey threatened birds include: black rail, black-crowned night-heron, bobolink, Ipswich sparrow, long-eared owl, osprey, red knot, and Savannah sparrow.[68,69,70,71] All other birds listed in Table 13 are either special concern in New York or New Jersey, or both.[66,72] Species of special concern are not listed as threatened or endangered, but are candidates for such listings. Most of these birds have been observed in specific wildlife refuges and marsh islands for migration stopovers, breeding, and wintering (see Table 13).[68,69,70,71,73]

The listed birds that nest on the ground (usually sandy beaches) are the least tern, roseate tern, piping plover, black skimmer, American oystercatcher, and common tern (Table 13). These colonial nesting shorebirds have been reported to nest along coastlines of New York and New Jersey, especially on barrier beaches.[66,67,74,75,76] The birds that will be most impacted are those that nest on the shorefront on the south shore of Long Island in the vicinity of the landfall of the transmission line. Birds nesting on surrounding beaches of New York and New Jersey are not expected to be far enough away not to be impacted by project construction.

The New York State Breeding Bird Atlas lists several nesting birds that have been identified as confirmed, probable, or possible breeders on the beach area where the transmission line is proposed to come ashore. The Rockaway Substation, shown in Figure 2, indicates the general area of the transmission landfall on the Rockaway Peninsula. There are two blocks in the Breeding Bird Atlas that cover the possible landfall locations. Block 6049C is located at East Rockaway Inlet and 5949D is located just west of the Inlet (Figure 13).[77] Near the Inlet, confirmed breeding bird species include the osprey, piping plover, least tern, common tern, black skimmer, and horned lark.[77] Seaside sparrow is listed as probable breeding, and northern harrier is listed as possible breeding. Confirmed breeding species west of the Inlet include: piping plover, least tern, common tern, and black skimmer.[77] Horned lark is listed as probable breeding species. Northern harrier, horned lark, and seaside sparrow do not nest on the beach, and therefore, should not be impacted by the installation of the transmission line.

The NYSDEC conducts the Long Island Colonial Waterbird and Piping Plover Survey. There are two survey stations, Far Rockaway and Arverne by-the-Sea, that are along the stretch of beach that may serve as the landfall for the transmission line that will connect to the Rockaway Substation.[78,79] The Far Rockaway stretch includes East Rockaway Inlet and the Arverne by-the-Sea stretch is west of the Far Rockaway stretch. The Far Rockaway site is closer to the Rockaway Substation, and may therefore be the stretch of beach most impacted by the transmission line installation. There is another site across East Rockaway Inlet, starting at Silver Point Beach and stretching eastward along Atlantic Beach of Long Beach Island, NY. Figure 14 shows the locations of these survey sites. Beach nesting birds at the Far Rockaway, Arverne by-the-Sea, and Long Beach Island Atlantic Beach sites are too far removed to be impacted by the offshore construction of the turbines, but may be impacted by the transmission line installation.

NYSDEC reports that from 1994 to 1999, only one piping plover pair was noted in the Far Rockaway stretch, which was in 1999.[78] Between 2000 and 2008 the Far Rockaway site had between zero and three piping plover pairs.[79] Least tern pairs fluctuated between 54 and 198 between 1994 and 1999 at this site and no common terns were nesting at the Far Rockaway site during this period.[78] Least tern pairs were significantly reduced in 2001 as least terns and common terns were not present at the Far Rockaway site between 2001 and 2008.[79]

There is a possibility that the cable may make landfall along the Arverne by-the-Sea stretch of beach, although less likely, because the substation is located to the east of this stretch of beach. Piping plover pairs increased from five in 1996 to 12 in 1999 along the Arverne by-the-Sea stretch.[78] Arverne by-the-Sea site had between 14 and 21 piping plover pairs from 2000 – 2008.[79] This site had between 18 and 270 least tern pairs and between zero and three common tern pairs between 2001 and 2008.[79] There were no common terns present in 2007 or 2008 at Arverne by-the-Sea.[79]

Piping plover, least tern, and common tern nest along the Long Beach Island Atlantic Beach site to the east of East Rockaway Inlet. There were between five and ten pairs of nesting piping plovers reported at this site between 2001 and 2008.[79] Common tern and least tern nesting significantly increased at this site over the past few years. There were between zero and 355 common tern nesting on Long Beach Island Atlantic Beach between 2001 and 2008, 355 of which nested in 2008, and 344 nested in 2007. There were between 0 and 333 nesting least tern pairs between 2001 and 2008. 333 pairs nested in 2007 and 263 pairs nested in 2008.[79]

Figure 15 shows potential habitat for ground nesting birds. The potential habitat is based on the combination of sandy beaches and vegetated dunes that provide protection for birds. Potential habitat is located along the beach at Far Rockaway along the mouth of the Inlet and on the far side of the Inlet at the tip of Long Beach. Potential habitat also exists along the stretch of beach at Arverne by-the-Sea. There is no potential habitat between Far Rockaway and Arverne by-the-Sea, along the beach just south of the Rockaway Substation. The lack of habitat is because there are no vegetated dunes to provide suitable shelter.[79] The least environmentally sensitive area for the cable landfall is the area south of the Rockaway Substation in the Far Rockaway stretch of beach; however, the Arverne by-the-Sea or Long Beach Island Atlantic Beach sites are not considered exclusion zones for the cable landfall. The possible presence of nesting birds, including some threatened and endangered species, in the project area is not expected to be a fatal flaw for this project. Nevertheless, coordination with federal agencies may be necessary to reduce impacts to these species as a result of the project, which may include no-work windows for construction activities during the breeding season.

Piping plovers nest on the beach at Sandy Hook, along with common tern and black skimmer.[2] Piping plover and least terns had successful nesting populations along the entire New Jersey coast in 2002, the last published survey, several of which were in the Sandy Hook area.[74,75] Black skimmers had more nesting sites and greater reproductive success in 2002 in the southern portion of New Jersey.[76] All species nesting on New Jersey beaches are too far removed from the project area to have nesting activity impacted by related construction and operation.

2.6. SEA TURTLES AND TERRAPINS

Sea turtles have migratory patterns that include the New York and New Jersey coastline. Sea turtle species that migrate through the New York Bight include: Kemp's ridley (*Lepidochelys kempi*), leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), loggerhead (*Caretta caretta*), and hawksbill (*Eretmochelys imbricata*). National Marine Fisheries Service has indicated that sea turtles that may be found near the project area between June and November include: Kemp's ridley, leatherback, green, and loggerhead (see Appendix A).[22] The loggerhead is most abundant in the area, followed by the Kemp's ridley sea turtle.[22]

The Atlantic leatherback, Kemp's ridley, and Atlantic hawksbill turtles are state (New York and New Jersey) and federally endangered. The Atlantic green turtle is state (New York and New Jersey) and federally threatened. The Atlantic loggerhead turtle is federally threatened and threatened in New York State, but endangered in New Jersey. The northern diamondback terrapin (*Malaclemys terrapin*) is also a species of concern in New Jersey and inhabits marshes of the New York Bight year round. Table 14 lists the sea turtles' status, range, and habitat.

The preferred habitat of the sea turtles is shallow, sheltered areas along the coastline and in estuaries., They are most frequently encountered during the summer months.[80,81,82,83] As the water cools in the fall, they move offshore and migrate south along the continental shelf.[84] The life stage of sea turtles most common in New York waters is small juveniles.[85] Juveniles are generally found foraging in coastal embayments at water depths of approximately 15 to 50 ft.[84] Juvenile loggerhead sea turtles can be found in Long Island Sound and bays on eastern Long Island. Adults have even been found in New York Harbor.[80] Kemp's ridley is the most endangered of all sea turtles and is found in Long Island's coastal waters and estuaries during the summer months.[80] Green sea turtles can be found in Long Island's shallow bays.[80] Leatherback sea turtles are an open ocean species, found farther offshore of Long Island in the late summer, often at the sea surface.[80,81,82,83] The hawksbill turtle prefers vegetated areas in water less than fifty ft.[81,82,83] The project area is considered farther offshore of the typical range of the hawksbill sea turtle.[85] The diamondback terrapin can be found year round in coastal marshes along the shores of New York and New Jersey.[86] It feeds in marshes and nests on sandy beaches.[3] The use of coastal marsh habitat in Jamaica Bay suggests that the hawksbill turtle may inhabit areas that are in proximity to the proposed path of the transmission line.

Leatherback, green, and hawksbill sea turtles nest far south of the project area. Critical habitat for nesting leatherback, hawksbill, and green turtles has been designated around Puerto Rico and the US Virgin Islands.[81,82] The Atlantic loggerhead turtle has been reported to nest on beaches as far north as New Jersey, with a specific nest cited in Island Beach State Park, just north of Barnegat Inlet, which is south of the project area.[81,82] The diamondback terrapin is known to nest in Jamaica Bay and Sandy Hook.[86] Nesting occurs during the summer and the species hibernates during the winter.[86] Sea turtles nest sites will not be impacted by the installation of the transmission line; however, diamondback terrapin nests may be impacted.

Sea turtle strandings in New York and New Jersey can be used to determine whether the species migrates through or near the project area. Sea turtles that have stranded on the south shore of Long Island between 1980 and 2009 include the loggerhead, green, leatherback, and Kemps ridely.[87,88] Loggerhead turtles strand most frequently, followed by Kemp's ridley.[87] In 2003 most loggerhead sea turtles stranded in July and August.[88] Loggerhead turtles have also stranded within Jamaica Bay itself.[2] Sea turtles that have stranded on New Jersey beaches in 2009 included leatherback, green, Kemp's ridley, and loggerhead. Also here, loggerhead stranded the most frequently (22 strandings), followed by Kemp's ridley (14 strandings).[89]

Field studies and documented observations within the New York Bight can also be useful in determining species that may use the project area. Geo-Marine Inc. conducted sea turtle baseline studies of New Jersey's coastal waters for the New Jersey Department of Environmental Protection (NJDEP) for a proposed offshore wind project. Aerial and shipboard surveys were conducted between Stone Harbor and Seaside Park, NJ, from the coastline to 20 nautical miles offshore, from January 2008 to June 2009. The sea turtles observed during this study were leatherback and loggerhead sea turtles.[90] Loggerhead turtles were observed in April, June, July, and September of 2008 and May and June of 2009.[91,92,93] Leatherback sea turtles were observed in July and September of 2008.[92] Although these sightings were south of the project area, they indicate that the species may migrate through the area.

Based on the above information, leatherback, loggerhead, green, Kemp's ridley, and possibly hawksbill sea turtles may be present in the project area. Use of the project area would be during migration, and limited to the months of June to November. The diamondback terrapin is present in the area year round, although it hibernates during the winter. The greatest impact to the diamondback terrapin would occur close to shore and in marsh areas near the transmission line landfall and the onshore substation. The possible presence of sea turtles and terrapins in the project area is not anticipated to be a fatal flaw for the project; however, due to the threatened and endangered status of the sea turtles, coordination with federal agencies may be necessary during the permitting process.

2.7. MARINE MAMMALS

All marine mammals are protected under the Marine Mammal Protection Act (MMPA) and some are additionally protected under the ESA. Several marine mammals have migratory routes in the waters along New York and New Jersey. Species that have been observed in the New York Bight are presented in Table 15, along with their range and distance from shore.

NOAA Fisheries provided information on species that would likely use the project area (Appendix A). NOAA Fisheries indicated that several federally endangered whale species may be found near the project area including: northern / north Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeagliae*), fin whales (*Balaenoptera physalus*), sei whales (*Balaenoptera borealis*), and sperm whales (*Physter macrocephalus*).[22] Grey seals (*Halichoerus grypus*), harbor seals (*Phoca vitulina*), and harbor porpoise (*Phocoena phocoena*) may be present in the project area as well.[22]

Publicly available NOAA and United States Coast Guard (USCG) correspondence letters for the proposed Safe Harbor Energy liquified natural gas project were also referenced for the listed species that may be present on site. This proposed facility area is within the far western portion of the offshore project area. Other marine mammals that may use the coastal and offshore waters of New York and New Jersey include minke whale (*Balaenoptera acutorostrata*), longfinned pilot whale (*Globicephala melas*), Atlantic white-sided dolphin (*Lagenorhynchus acutus*), bottlenose dolphin (*Tursiops truncates*), common dolphin (*Delphinus delphis*), Risso's dolphin (*Grampus griseus*), Atlantic spotted dolphin (*Stenella frontalis*), and striped dolphin (*Stenella coeruleoalba*).[85]

Sightings data collected from the New York Bight indicates species that may use the project area. Field data collected by Geo-Marine Inc. for the previously-mentioned NJDEP study also provides useful marine mammal data for the New York Bight. Marine mammal baseline studies of New Jersey's coastal water were conducted through aerial and shipboard surveys between Stone Harbor and Seaside Park, New Jersey, from the coastline to 20 nautical miles offshore, from January 2008 to June 2009. The species observed during this study are expected to be similar to those observed in the proposed project area, and therefore, are indicative of those species that may be impacted by the project. The most frequent species cited included bottlenose dolphin, fin whale, harbor porpoise, common dolphin, humpback whale, north Atlantic right whale, and harbor seal.[90]

Marine mammals species identified during the NJDEP baseline surveys observed from January through March of 2008 included fin whale, minke whale, humpback whale, common dolphin, bottlenose dolphin, harbor porpoise, and harbor seal.[94] Harbor porpoise, common dolphin, and fin whale were the most abundant.[94] Species identified from April through June, 2008, included fin whale, north Atlantic right whale, common bottlenose dolphin, and harbor seal.[91] Bottlenose dolphin and fin whale were the most abundant.[91] Humpback whale, fin whale, bottlenose dolphin, and harbor porpoise were identified July through September, 2008, with bottlenose dolphin being the most abundant.[92] Marine mammals identified from December 2008 through March 2009 included north Atlantic right whale, humpback whale, fin whale, common dolphin, and harbor porpoise.[93] Harbor porpoise was by far the most abundant species observed.[93] Humpback whale, minke whale, fin whale, bottlenose dolphin, and harbor porpoise were identified in April to June 2009, with bottlenose dolphin being the most abundant.[95]

Stranding data can be used to determine that species are using the project area and surrounding waters. Seals that have stranded on the south shore of Long Island from 1980 through 2009 include: harp, harbor, hooded, gray, and ring seals.[87,88] The seals that have stranded in the highest numbers were harp and harbor seals.[87,88] Gray seal strandings are also increasing.[87] In 2003 seals stranded more frequently from January through May than the remainder of the year.[88] Grey, harbor, and harp seals stranded on New Jersey beaches in 2009.[89] Between 23 and 28 of each species stranded that year.[89]

Whales that have stranded along the south shore of Long Island from 1999 into August 2004 include minke whale, sei whale, fin whale, north Atlantic right whale, humpback whale, and sperm whale.[96] Whales that stranded along the Rockaway Peninsula and Long Beach were the sperm whale, humpback whale, and north Atlantic right whale, as shown in Figure 16.[96] The north Atlantic right whale had evidence of ship strike.[96] The whales stranded on Staten Island—sei whale, fin whale, and humpback whale—also all had evidence of ship strike.[96] Cetaceans that have stranded on New Jersey beaches in 2009 include Atlantic white-sided dolphin, bottlenose dolphin, common dolphin, fin whale, humpback whale, harbor porpoise, manatee, minke whale, pilot whale, pygmy sperm whale, and Risso’s dolphin.[89] Bottlenose dolphin stranded most frequently (17 individuals), followed by common dolphin (7) and harbor porpoise (5).[89]

Published literature on the habitat preferences and behavior of marine mammals may also help to determine that species may be present in the project area. The cetaceans that are found closest to the coast are the bottlenose dolphin, harbor porpoise, North Atlantic right whale, and humpback whale.[97] The harbor porpoise and the coastal stock of the bottlenose dolphin are found from the shoreline to the 200 m depth contour (harbor porpoise) or 25 m depth contour (bottlenose dolphin).[97] During a fall migration, satellite tagged harbor porpoises were observed migrating farther offshore, along the 92 m depth contour.[97] The bottlenose dolphin resides in the New York Bight waters during the summer months. Harbor porpoises can be found from New Jersey north in October through December and April through June; during the months between fewer are seen in New York waters as the species migrates south.[97]

The North Atlantic right whale, the most endangered of the large whales, can be found from coastal waters to the continental shelf, and generally migrates within 20 miles of the shore.[97,98] North Atlantic right whales may be found near the project area during migration between November 1 and April 30, although this species has been documented year round off the coast of New York and New Jersey.[22,85,99] Historically, the majority of the North Atlantic right whale sightings on the East Coast occur zero to five nautical miles from shore and the next greatest number of sightings occur between five to ten nautical miles from shore.[100] The North Atlantic right whale is most frequently sighted in water depths between 30 and 60 ft, followed by the coast to 30 ft of water.[100] Although most north Atlantic right whale sightings occur within 30 nautical miles of shore, slightly more sightings occur greater than 30 nautical miles from the New York and New England shore as the whale migrates around Cape Cod.[100] Data collected between 1970 and 2002 indicate that nine north Atlantic right whale sightings have been reported within 40 nautical miles of the New York / New Jersey Harbor Port entrance.[100] Sightings near this port entrance occurred during the months of February, April, June, August, and September.[100]

Humpback whales feed in coastal waters during the spring, summer, and fall, and may be found in the project area during these seasons.[22,85] They are frequently found in New York Bight and are most abundant near Long Island from June through September.[99] Humpback whales also enter Long Island Sound and inlets on the south shore of Long Island, including Shinnecock Inlet, Fire Island Inlet, and New York Harbor.[99] They have also been occasionally sited in New York Bay.[2]

Fin whales are large baleen whales that are present in Long Island waters year round.[99] It is approximated that 200 to 400 fin whales live in New York waters, and many of these whales frequent eastern Long Island waters.[99] Fin whale research has indicated that individual fin whales have been found reoccurring off of Long Island between 1979 and 1996.[101] Stays have been recorded as long as nine weeks, indicating a significant seasonal residency for this species.[101] From April through August they are found at feeding grounds within 30 miles of land.[99] The fin whale moves offshore to the 200 m contour from September through early December, and then moves inshore again January through March, where it can be found within a mile of the eastern shore of Long Island.[99] They have been detected within five to ten miles of New York Harbor.[85] Calves can be seen year round and newborns appear in early July.[99]

The sei and sperm whales typically migrate farther offshore, beyond the project area.[22] Sei whales may be seen in the spring and summer in New York waters, however, this is south of their typical range.[85] Sperm whales, which are the whales that dive the deepest and longest, can be found off New York in the fall and winter and again in the late spring and early summer during migrations.[99] Sperm whales are typically a deeper water species, but occasionally are found in shallower waters of the mid-Atlantic Bight.[85]

Pilot whales are found in New York waters year round and congregate in groups from a few to hundreds.[99] Long and short finned pilot whales tend to prefer deeper waters, but have been known to travel to coastal waters following food sources.[102,103] Pilot whales are found offshore on the continental slope during the winter and spring, and travel inshore during the summer and fall.[102,103] Minke whales are one of the smaller baleen whales and usually travel as a single individual.[99] They can be found coastally or further offshore and tend to feed in cooler waters at higher latitudes.[104]

Pinnipeds (seals and sea lions) that inhabit the nearshore New York and New Jersey waters are the harbor seal, gray seal, and the harp seal.[22,97] These marine mammals are generally seen in the New York Bight during the winter months, and sightings of these species are increasing in the New York Bight.[97] The New York Bight is the southern point of the harp seal migration, however, sightings and strandings are increasing here from January to May.[105] Harbor seals arrive in New York waters in November and stay through mid-May, although some remain year-round.[106] Harbor seals can also be found within Jamaica Bay and some use docks and jetties at Breezy Point Inlet as haul-out areas.[2] Harbor and grey seals reproduce in the New York Bight.[107] Grey seals have a breeding colony in eastern Long Island Sound.[106]

Marine mammals are protected under the MMPA, which prohibits the taking of marine mammals by US citizens and in US waters (with certain exceptions) and the importation of marine mammals and projects into the US.[22] Site specific data is currently unavailable for the proposed project area, and agency-directed studies will likely be conducted during the EIS processes. As the proposed offshore wind project may impact these mammals, it is recommended that project proponents discuss permitting needs with NMFS' Office of Protected Resource Permits, Conservation, and Education Division.[22] The possible presence of marine mammals in the project area is not anticipated to result in a fatal flaw for the project, however, coordination with federal agencies will be required during the permitting process and mitigation measures may be required.

2.8. VEGETATION

A prior terrestrial ecological study of the beachfront on Rockaway Beach, between 32nd and 81st Streets indicates vegetative communities of maritime beach, maritime dunes, and shrublands.[108] The eastern portion of this study area is located along the shorefront that could be the landfall location for the transmission line. The species and communities identified in the beachfront survey are expected to be found farther east as well. Seabeach amaranth (*Amaranthus pumilus*), dune sandspur (*Cenchrus tribuloides*), and seabeach knotweed (*Polygonum glaucum*) were all identified on the beachfront.[108] Seabeach amaranth is federally threatened and state endangered. Dune sandspur is listed in New York State as threatened, and seabeach knotweed is listed in New York as rare.[108] Figure 17 shows the mapped seabeach amaranth locations on the Rockaway Peninsula near the project area. The presence of these protected species is not anticipated to result in a fatal flaw for this project and will not preclude the cable landfall in this area, however, mitigation measures may be necessary during the permitting process.

Seabeach amaranth is primarily found on sandy, sparsely vegetated beaches between the high tide line and toe of the primary dune.[109] This plant was most heavily concentrated closer to the ocean where there was less competition from other plants.[108] The other state listed species, dune sandspur and seabeach knotweed, were found in low numbers within the area where seabeach amaranth was identified.[108] All three species are sensitive to foot and vehicular traffic and may therefore be impacted during the transmission line installation.[108]

Figure 15 is indicative of the potential extent of listed vegetative species, such as seabeach amaranth, dune sandspar, and seabeach knotweed, which use similar habitats to the beach nesting birds.[79,108] Relative to the shoreline area shown in Figure 17, listed vegetative species are expected to extend farther east and encompass shoreline areas southwest and southeast of Rockaway Substation (refer to Figure 15). As with beach nesting seabirds, no habitat exists for listed plants on the stretch of beach directly south of the Rockaway Substation, between Far Rockaway and Arverne by-the-Sea where there are no vegetated dune systems. This location would therefore be an area of the beach that would likely have the least environmental impact from a transmission line landfall.

Tidal wetlands are present in the vicinity of the Rockaway Substation. The substation is located on Mott Basin, a basin off Jamaica Bay. Jamaica Bay is a New York State and federal significant coastal habitat. The substation has property boundaries on the littoral zone and intertidal marsh and coastal shoals / mudflats that lie adjacent to the property (refer to Figure 18).[110] Marshes are nurseries for juvenile fishes and provide food and shelter for fish. These areas are highly used by fish and tend to congregate them. Baltz *et al*. (1993) concluded that species richness in finfish communities was affected by distance from a marsh edge, where many species selectively chose marsh habitats for shelter and food (Meng & Powell, 1999).[111,112] Juvenile killifish and grass shrimp have been documented to use the shallow aquatic microhabitats on the surface of the intertidal marsh at low tide.[113] The sensitive marsh habitats near the Rockaway Substation need to be considered during the cable installation process.

Eelgrass grows in shallow waters where light penetrates to the seabed, enabling photosynthesis.[114] Its presence creates an important habitat for juvenile finfish and invertebrate development. There is no eelgrass presently living in Jamaica Bay.[115] There are, however, three locations within the Bay that are slated for restoration projects: Little Egg Marsh, Barren Island, and Rockaway Beach.[115] These locations are far from Mott Basin, and will therefore not be impacted by project construction. Eelgrass is also not present in the offshore project area, as it is too deep to support eelgrass. Eelgrass has not been reported in the project area in the Biological Resources Report for the Safe Harbor Energy Project.[50]

2.9. COASTAL LAND USE

The following subsections briefly describe the coastal land use of western Long Island, Queens, Brooklyn, and northern New Jersey. State and national parks, land cover, and population density are identified.

2.9.1. State and National Parks

Jamaica Bay Wildlife Refuge is the largest coastal wetland ecosystem in New York State. It is part of the Gateway National Wildlife Refuge and listed as a New York State Significant Coastal Fish and Wildlife Habitat.[3] Silver Point Beach, to the east of East Rockaway Inlet, and Breezy Point, on the western end of the Rockaway Peninsula, are also New York State Significant Coastal Fish and Wildlife Habitats.[3] Jacob Riis Park and Breezy Point, on the Rockaway Peninsula, are also part of the Gateway National Wildlife Refuge. Rockaway Beach & Boardwalk Park stretches from B 3 to B 73 Street on Rockaway Peninsula. Rockaway Boardwalk stretches from B73 to B109 on the Peninsula. Rockaway Park stretches from B110 to B126 on Rockaway Peninsula. Floyd Bennet Field and Canarsie Pier are located on the Brooklyn mainland. These parks are identified in Figure 19.

The New Jersey coastline holds numerous state and national parks and wildlife management areas. The New Jersey Coastal Heritage Trail Route, which is managed by the National Park Service, follows the Atlantic and Delaware Bay coastline. The trail route begins at Perth Amboy and extends 300 miles south to Cape May Point and around the peninsula along the Delaware Bay up to the Delaware Memorial Bridge.[116] The trail encompasses all of the barrier islands and bays, and in general extends landward just west of the Garden State Parkway on the Atlantic coast. The Sandy Hook region of the New Jersey Coastal Heritage Trail is show in Figure 20. The Sandy Hook Unit of the Gateway National Wildlife Refuge is also identified in this figure. The Gateway National Recreation Area is a 1665 acre national park located on the Sandy Hook Peninsula. The park includes seven miles of beach, Sandy Hook Bay, and the surrounding marsh habitats.[117]

2.9.2. Land Use / Land Cover

Brooklyn and Queens, the portions of New York City to the north and northwest of the project area, have the greatest population density of the surrounding areas (Figure 21).[118] The Rockaway Peninsula, where the transmission line will make landfall, is also heavily populated.[118] The Rockaway Substation is located in Queens near the Nassau County border. The Nassau County areas that border Queens are dominated by residential housing and recreational / open space (Figure 21).[119] There is also some industrial and utility usage in the area surrounding the Rockaway Substation. Silver Point Beach lies on the Nassau County side of East Rockaway Inlet and is listed as a New York State Significant Fish and Wildlife Habitat by the Department of State.

The Rockaway Peninsula in Queens consists of one, two, and multi-family residential housing (Figure 22).[120] The coastal beaches to the east of the Rockaway Peninsula are considered open space, as are Jacob Riis Park and Breezy Point Park. The marsh islands within the Bay and the wetlands near the Rockaway Substation area also listed as recreational areas.[120] Public facilities are interspersed along the Rockaway Peninsula. Jamaica Bay and Breezy Point Park are listed as a New York State Significant Fish and Wildlife Habitat by the Department of State.

New Jersey is a heavily populated state, especially near the coast. The land use / cover for Monmouth County, which is west of the project area, is shown in Figure 23. The coastline is characterized as having urban development with scattered wetlands throughout. Wetlands are most abundant slightly inland of the coastline.[121] The Sandy Hook National Recreation Area is dominated by forests and wetlands along the edges, with an urban section on the back side of the sandspit.[121]

Section 3

3. CONSTRUCTION IMPACTS

Environmental impacts from offshore wind project construction may range from negligible to major.[122] The impact and intensity of the impact is dependent on the setting, the species found in the project area, and the communities utilizing the environment. This document will review some of the impacts that may occur, based on anticipated construction procedures.

The proposed project is in its initial stages, and project details are not finalized. The foundation type for the proposed project could either be a monopile or a jacket. In order to determine what would likely be the worst-case environmental impacts for the project, the analysis assumed that the project would use monopile foundations and that electric cables would be installed using a jet plow, consistent with onsite conditions. While these conditions may not represent the details of the final as-built project, these assumptions allow for a worst-case assessment of the environmental impact of the proposed project.

The support structure that will be chosen is dependent on the seabed. Monopile and jacket foundations may be easier to install in a sandy sea floor. Surface sediments in the project area are primarily composed of very fine sand and silt.[4] Sediment samples collected from the northwest section of the project area in BOEM Lease Block 6655 indicated a high-energy environment (i.e. turbulent water movement) with medium to coarse sand.[49,50] This environment may lead to a greater amount of scouring than a low-energy environment with larger sediment particles. Side-scan sonar and seismic imagery collected in the New York Bight indicates that the project area is located in Holocene fine sand ridges with Pleistocene coarse sediments.[4,123,124] It lies just south of early Tertiary / late Cretaceous coastal plain strata and associated reworked gravelly lag deposits.[4,123,124] The coastal seafloor, in the area where the transmission cable could come ashore, contains Pleistocene fluvioglacial gravelly sands reworked into a series of low-amplitude, fine sand, traverse bedforms.[4,124] Figure 24 shows side-scan sonar imagery of the seafloor in the project area.

Side-scan sonar imagery taken in the northeast section of the project area (BOEM Lease Block 6655) indicates coarse sediment is present in the northern and eastern areas of the block and finer sediment comprises the remainder of the block.[50] Sand waves, up to seven ft tall and oriented in an east-west direction, are present in the sections of the block with coarser sediment. The remainder of the block, where sand is finer, is generally smooth.[50] Sediment samples collected near the project area verify the sandy substrate with some gravel mixed in.[124,125] Lead levels in the sediment in the project area are at background concentrations.[126]

It is anticipated, based on the sandy seafloor in the area and current technology, that either monopile or jacket foundations will be used for the proposed project. A monopile foundation consists of a hollow pile two to six meters (six to twenty feet) in diameter that is driven 20 to 40 m (66 to 131 ft) into the seabed.[122] Soft substrate, such as sand, is preferred for this installation technique. A jacket foundation is composed of a steel pipe support structure that is connected using casted joints. If a jacket foundation is used, a four legged structure will be fixed to the sea floor with four smaller piles driven into the seabed.[208] Each jacket foundation pile is approximately one to two meters (three to six feet) in diameter and a soft substrate sea floor is preferred for installation.[208] The seabed data indicate substrate that will support pile driving activities for either these turbine foundations. Sand or mud is also preferred for the jet plowing technology anticipated for use in the inner-array and transmission line installation. The jet plowing technique fluidizes the seabed allowing the cable to lie in a narrow trench below the seafloor. The impacts to biological populations expected in the New York Bight area anticipated from these construction techniques will be discussed in the following sections.

3.1. NOISE ASSOCIATED WITH PILE DRIVING

The sandy substrate makes it likely that either monopile or jacket foundations may be installed in the project area (shown in Figure 41). Installation activities for these foundation types would require pile driving and associated noise. Danish reports indicate that a single monopile installation may take several hours with hammering intervals of approximately one second.[127] According to estimates in the Final Cape Wind Offshore Wind Project Environmental Impact Statement (EIS), pile driving for each monopile would take four to six hours and the driving rate would be between 2 and 36 impacts per minute.[128] Still, the noise and installation time for this procedure is dependent on sediment type, the surrounding environment, the diameter of the monopile, and the size of the hammer.[127] Because the project details are unknown at this time, the noise levels that will be produced and installation time are uncertain. Maximum noise levels under water are estimated to occur at 200 Hz and the distance the noise travels would be dependent on the surrounding environment.[122] Peak pile driving noise levels have been reported at 205 dB 30 m from the pile driving activity.[122] Models have estimated that some species can hear sound from pile driving activity at distances up to two km from the noise source.[128] Sound pressure of 200 dB is considered the pressure threshold for physical trauma to marine mammals, birds, and fish, and sound from pile driving may exceed 200 dB.[134] Pile driving activity is expected to be the greatest of all noise impacts.[122]

If a jacket foundation is used, it is anticipated that it will take two hours to drive each of the four piles (8 hours total) for one jacket foundation.[208] The piling operation will be more similar to oil and gas platform installations than monopile installations.[208] There are no published noise measurements for the installation of a 1.8 m diameter pile in sand, however, it has been determined that there is a correlation between the diameter of the pile and the noise created.[208] Based on calculations, it is anticipated that the noise level from the driving of a 1.8 m pile may be 225 dB.[208]

Research indicated that both monopile driving and jacket foundation pile driving may result in physical trauma to marine mammals, birds, and fish near the pile driving activity. The following noise impact discussion is based on worst-case scenario. Mitigation measures are discussed later on.

3.1.1. Impacts to Finfish

Finfish may be impacted by the noise of pile driving. Responses could range from temporary avoidance behavior to hearing impairment, stunning, and death at close range.[122,129] Fish found in the project area that are most sensitive to pile driving are the clupeids (e.g. herring).[129,130] Herring display escape responses to pile driving and it is possible that their hearing could be temporarily damaged from the noise.[129] Fish with swim bladders are more sensitive to pile driving activities than fish without them,[122] as swim bladders increase hearing ability. Fish with these organs (e.g., pelagic fish) may also avoid pile-driving activity, as their hearing is more sensitive than those without swim bladders (e.g., demersal fish).[129]

Hearing injury to fish is not expected to occur at 30 m (98 ft) or greater distance from pile driving activity, although avoidance responses may occur at much greater distances.[128] Avoidance responses of fish to pile driving were reviewed in the Final Cape Wind EIS. Fish sensitivity to pile driving noise varies depending on the fish's hearing ability and presence of swim bladder, which amplifies the noise. Atlantic salmon, which have swim bladders that are partially filled with air, are anticipated to display avoidance at 60 m (197 ft) from pile driving, while other species with swim bladders will display avoidance responses at 100 m (328 ft) for bass, 180 m (591 ft) for tautog, and 350 m (1,148 ft) for cod.[128] Cod and herring, which have swim bladders, are estimated to be able to hear pile driving up to 80 km from the sound source, although it is not conclusive whether they show avoidance responses at this distance.[131] Avoidance responses are not expected to be long term. Previous studies indicate that finfish returned to the Horns Rev offshore wind project in Denmark and used the area after construction was complete.[122,132]

3.1.2. Impacts to Sea Turtles and Terrapins

Data on the impacts of pile driving noise on sea turtles are limited. Sea turtle behavior, however, may be affected by pile driving activity. Sea turtles may cease feeding in the construction area and altogether avoid the construction area during the pile driving activity.[122,128] Although the sea turtles are either threatened or endangered, impacts to the overall sea turtle population will not be significant, as only a few individuals may be impacted by construction noise at one time.[122]

3.1.3. Impacts to Marine Mammals

The impact of pile driving noise on marine mammals is of great concern because all marine mammals are protected under the MMPA and some are additionally protected under the ESA. Marine mammals may be harassed by the noise associated with construction of the wind project. Harassment is defined in the MMPA as "any act of pursuit, torment, or annoyance which – (i) has the potential to injure a marine mammal stock in the wild; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavior patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering." Pile driving may cause high sound pressure levels which may impact marine mammal foraging, orientation, and communication.[127] Peak impact sounds may be well above 200 dB near the site of pile driving activity.[133] Sound pressure above 200 dB may result in hearing injury to marine mammals, as 200 dB is considered the pressure threshold for physical trauma to marine mammals, birds, and fish.[134] Marine mammals may be disrupted several miles from the pile driving and mammals close to the construction site may incur hearing impairment.[127,133] Pile driving may interfere with feeding behavior, mask calls, disrupt echolocation, and mask the sounds of predators.[122] Responses of marine mammals may include avoidance of the construction area, cessation or disruption of feeding, and cessation or reduction of echolocation and communication.[122]

3.1.3.1. Toothed Whales. A literature review on harbor porpoises, striped dolphins, and bottlenose dolphins, indicate that harbor porpoises are least sensitive of the three to construction noise.[128] While most toothed whales will produce an avoidance response to pile driving sounds at 710 m (2,329 ft) from construction, striped dolphins will show an avoidance response at 790 m (2,592 ft), and harbor porpoises will show an avoidance response at 1,410 m (4,626 ft).[128] These data indicate that toothed whales may experience acoustic harassment at distances greater that two km from the pile driving and possible injury at 500 m to 1800 m from the activity.[128,131]

Harbor porpoises may perceive pile driving noise ten to hundreds of kilometers from the sound source.[122] The impact of pile driving on harbor porpoises was studied during the construction of the Horns Rev offshore wind project in Denmark. Impacts to harbor porpoises were recorded up to 15 km from the construction site.[135] The harbor porpoise swam in non-directional paths on days when pile driving was not occurring. Thus, it was presumed that harbor porpoise was foraging in the area.[135] When pile driving was occurring, the harbor porpoise swan directionally, which was interpreted to be a traveling activity.[135]

Harbor porpoises were noted to reduce echolocation activity during the construction of the Nysted and Horns Rev offshore wind projects in Denmark, and returned to normal activity levels after the pile driving ceased. The reduced vocalization of harbor porpoises at Horns Rev was also observed 15 km from the construction site.[131,135] The time to return to normal activity was faster at Nysted.[127,135,136] Fewer harbor porpoises used the Nysted wind project area during the first two years of operation than did during the baseline studies, although total numbers were initially low before installation.[131,136,137] After the first two years, echolocation behavior and activity of harbor porpoises increased in nearby reference areas. Although numbers were still reduced in the project area compared to the preconstruction baseline, echolocation activity was returning to preconstruction levels, indicating that harbor porpoise activity in the project area may recover with time.[137]

Bottlenose dolphins were reportedly impacted by pile driving activity up to 40 km from the sound source.[134] Pile driving activity that measured 9 kHz was able to mask strong communication of the bottlenose dolphin at 10 - 15 km from the sound source and weak vocalizations 40 km from the pile driving activity.[134] Another study indicated that bottlenose dolphins may have sensitivities similar to harbor porpoises and hear pile driving greater than 80 km from the sound source.[131] Orcas, striped dolphins, and other offshore dolphins may also detect pile driving noise as far as 80 km from the sound source.[131]

3.1.3.2. <u>Baleen Whales.</u> There is very little published research on the impacts of pile driving on baleen whales. Baleen whales are more prone to hearing loss from pile driving than the toothed whales.[122] Bowhead whales have shown avoidance activity to pile driving, which may indicate that other baleen whales, such as the North Atlantic right whale, may avoid pile driving activities as well.[127] Minke whales, which have hearing and communication abilities in low frequency ranges, may hear pile driving activities tens of km from the sound source.[131] Pile driving may also mask calls within this distance.[131] Avoidance of impulsive sounds by minke whales has also been documented, even at some distance from the source of the sound, indicating that baleen whales may avoid areas of pile driving activity.[131]

3.1.3.3. <u>Seals.</u> Seals may perceive pile driving noise ten to hundreds of kilometers from the sound source.[122] Seals in the project area may experience sound levels above the NOAA limit for acoustic harassment and may be able to hear sounds at the harassment level two km from the construction site.[128] The noise harassment would most likely result in an avoidance response.[128] Hearing loss for seals may occur at a distance of 400 m from the pile driving.[131]

Pile driving impacted the haul-out (a temporary movement from sea to land) behavior of harbor seals during the construction of the Nysted offshore wind project. During pile driving, there was a 10% to 60% decrease in the number of seals hauled-out on a sand bank ten km from the construction area, as compared to periods when pile driving was not occurring.[138] Seal activity in the area did increase after the wind project was built and activity was similar to baseline levels once the wind project was in operation.[137]

3.1.4. <u>Resultant Pile Driving Noise Impacts</u>

Noise from pile driving is expected to affect a limited number of individuals in the area of impact,[122] which are expected to leave the area of impact, reducing the likelihood of permanent hearing injury.[122] A potential impact could result if marine mammals begin avoiding preferred habitats as a result of noise harassment.[122] It is anticipated that normal activity will resume once pile driving has stopped or marine mammals have relocated.[122] As noted in previous sections, marine mammal activity and populations have generally been observed to return to baseline once construction has been completed, although at differing rates. Some marine mammals may permanently relocate as a result of the harassment from the pile driving noise;[122]

however, the pile driving activity is not expected to affect overall migration, feeding, or communication of the population of whales as a whole.[128]

3.1.5. Mitigation of Pile Driving Noise Impacts

Impacts from pile driving noise may be mitigated in several ways, including the use of physical barriers surrounding the work area, such as bubble curtains, insulated piles, and caissons or coffer dams.[122] The impact of pile driving noise may be reduced by using ramp-up procedures and / or limiting work to daytime and slack tide.[122] Acoustic harassment devices, devices that protect marine mammals by creating sounds that cause them to avoid construction areas, may also be implemented to reduce impacts.[133] Monitors may be used to alert construction workers to the presence of marine mammal or turtles, and passive acoustic monitors (PAMs) can be implemented to detect marine mammal calls and noise levels during pile driving.[122] Construction may also be avoided during periods when marine mammals and anadromous fish are common in the project area and in sensitive habitats.[122] It is also suggested that developers consult with NOAA and USFWS before beginning work and comply with the ESA and MMPA regulations.[122]

Guidelines implemented for the Cape Wind Offshore Project required a 750 m (2,461 ft) radius exclusion zone around each monopile during installation to prevent marine mammals from approaching the work area in order to protect them from serious noise related injuries.[128] Field measurements were required to determine the actual underwater noise produced. If noise levels were lower than expected, the field measurements may result in a smaller buffer zone, .[128] BOEM (then MMS) also required that a NOAA Fisheries observer monitor pile driving activities, and required a soft-start to be used when starting the pile driving process.[128] Soft-starts begin by using a low energy start to the pile driving process, which warns marine organisms in the area to leave before the pile driving energy and associated noise level increases.[134]

It is anticipated that a similar exclusion zone and other requirements will be set for the proposed project in an effort to reduce the noise impact to marine mammals, fish, and sea turtles. It is also possible that construction windows will be set, at least in portions of the project area, to reduce impact to spawning fish, migratory marine mammals, and sea turtles. If construction work windows are necessary, they would be identified during the permitting process of the project.

3.2. HABITAT CHANGES DUE TO FOUNDATION INSTALLATION

The physical presence of turbine foundations, whether they be monopile or jacket foundation, will alter the habitat during the construction period. Benthic habitat will be lost due to the physical presence of the foundation of the sea floor. Bird foraging habitat may also be lost due to construction activity. Humans may experience the loss of fishing grounds and navigation pathways as a result of construction equipment in the project area. While some changes will be temporary, others will be permanent.

3.2.1. Benthic Habitat Loss

The benthic habitat directly beneath the turbine foundations and offshore substation platform foundation(s) would be permanently lost by the development of the proposed project. Based on offshore wind projects in Europe monopiles may be 16 to 18 ft in diameter. Each pile that anchors a jacket foundation is approximately 1.8 m (six ft) in diameter, with four piles per jacket foundation. The steel monopile structures or piles from jacket foundations will permanently displace the soft sediment community that was present before construction. The area lost will be dependent on the support structure chosen, diameter of the supports, and the number of monopiles or jacket foundations installed.

Short term impacts to benthic organisms will also occur. Infauna (animals that live in the sediment) may be impacted by the jack-up barges that are used to install the wind turbines and offshore substation. Jack-up barges generally have six spuds with ft that measure 10 by 20 ft each.[128] Other spud barges used in the project's construction phase may have two to four spuds each, with diameters of two to four ft.[128] The platform feet will leave an impression on the sea floor, smother benthos directly underneath, and will cause suspended sediment following deployment and retrieval.[128]

Construction activities will also result in temporary suspended sediment and resultant sediment deposition. It is anticipated that minimal sediment disturbance would result from pile driving activities, as the piles are hollow and will self contain much of the disturbed sediment.[128] Jet plowing activity will also physically remove surface infauna in the transmission path, but the transmission pathway will refill with the fluidized sediment and will remain available for benthic recolonization. Since the sediment in the area is sandy, any sediment that becomes suspended during the pile driving and jet plowing will settle out of the water column within a few hours, and will not be displaced a great distance.

Turbidity (cloudiness or haziness of the water) and smothering impacts will be temporary. The affected benthic communities are anticipated to recolonize within a year of disturbance.[142] The benthic community at the Horns Rev offshore wind project rebounded after construction, and the communities in the project area were comparable to those in the reference areas.[137] It should be noted, however, that dominant species abundances did differ between areas, although the difference was due to other environmental factors.[137] Benthic community recovery to pre-existing conditions was also noted at four offshore wind projects in Europe: no major impact on benthic communities was observed three years after offshore wind project construction.[122,164]

Although wind project footprints are large, the actual area of impact to benthos from the foundation footprints is relatively small compared to the surrounding benthic environment.[122] The turbines are spread throughout the project area, and impact is not expected to be far removed from the foundations.[122] Jet plow impact is not expected to be far removed from the area of disturbance.[137] The outer continental shelf (OCS) in this area is primarily a sandy habitat, therefore, the disturbance and slight local temporary loss of benthic habitat will not impact the benthic population on the OCS.

3.2.2. Bird Habitat Loss

The construction of the offshore turbines may impact birds foraging offshore or those migrating through area. Any birds foraging offshore may be temporarily displaced during the construction of the wind project.[122] The birds of greatest concern for displacement are those with endangered or threatened status, some of which may use the project area for foraging. The following paragraphs will highlight research conducted on avian impacts for offshore wind project construction in Europe. This section is only a general overview. A separate report, *Pre-Development Assessment of Avian Species for the Proposed Long Island – New York City Offshore Wind Project Area*, provides a more detailed look at the avian impacts as a result of the construction of offshore wind projects.

During the construction phase, birds may avoid the area due to noise and human activity. Most bird species in the Horns Rev area were observed in lower numbers during the construction of the wind project.[166] Gulls, however, did not avoid the area, and the herring gull appeared to be attracted to the construction site, possibly because of boat activity, which the species may associate with food.[166] Diving ducks and alcids also avoided the Horns Rev area during construction of the wind project.[137]

Research has been conducted on bird populations near operating offshore wind projects. One study showed a decline of ducks (eiders and common scooters) in the Tunø Knob wind project after construction; however, the decline in populations may have been due to a temporary decrease in food (benthic organisms).[167] It was anticipated that populations would increase after the benthic population reestablished in the area.[167]

After the Horns Rev wind project was completed, divers, gannets, common scoters, guillemots, and razorbills avoided the project area, but great black-backed gulls, little gulls, and common terns showed a preference for the project area.[137] The reason for the avoidance behavior is unknown, but it may be due to the presence of wind turbines, increased human activity in the area (for maintenance), or changes in food distribution in the area.[137]

The initial impact to birds as a result of offshore wind project construction is displacement. Construction activity has been shown to deter many species from foraging near the activity; however, because the New York Bight is large and there are no essential feeding grounds in the project area, birds are anticipated to feed in similar areas nearby. Avian use of the area once construction is completed will depend on birds' willingness to approach the wind project and the prevalence of food present in the project area. Once benthic communities are reestablished, some birds may use the area, as seen in Denmark.

3.2.3. Fishing and Navigational Area Loss

The construction of offshore wind turbines may impact commercial fishermen and vessel navigation in the area. The construction activity may result in localized closures of areas of the wind project to fishing and passage. Areas would be closed to prevent collision between traveling or fishing vessels and construction vessels, and to keep fishing gear out of active construction areas.

Construction activities may only pose partial restrictions on fishing activity, as the construction area is limited and work is expected to only take place at one or two turbine locations at a time.[122] The duration of time an area will remain closed will depend on the time it takes to complete construction on each turbine.

The Cape Wind Project Final EIS proposed limited temporary vessel restrictions within construction areas.[128] It was proposed that commercial and recreational fishing activity be allowed during the construction process, except for the use of fixed gear (pots and nets) in the areas where cables and foundations were scheduled to be installed. Once the cable or foundation is installed, fixed gear would be allowed near the turbines and in the cable paths at the fisherman's discretion, as long as its use does not affect maintenance vessel access.[128]

It will be important to work with fisherman to alleviate concerns about offshore wind development. Possible contention with vessel operators may be mitigated by limiting construction to a few turbines at a time and having open communication with fishermen to keep them updated with progress and developments, as was suggested for the Lynn offshore wind project.[181] The Cape Wind Project anticipated construction to occur in phases, resulting in minimal restriction of marine traffic. Restrictions were anticipated to be localized to the locations of one to two turbines at a time.[128] Restrictions were also limited to placement of fixed gear in construction areas to prevent damage to construction equipment and fishing gear.

3.3. CABLE INSTALLATION

The project's collection system consists of the inner cable array between turbines. The collection system and the transmission line to shore are expected to be installed using a jet plow. Jet plows use high pressure water jets to fluidize the seabed, creating a trench into which cable is laid. The proposed Cape Wind cable trench was estimated to be four to six ft wide, with a depth of eight ft below the sea floor.[128] It is estimated that at least three sq. ft of the sea floor will be disturbed for each linear foot of installed cable.[122] The majority of the fluidized sediment remains within the trench and past studies estimate that less that 20 percent of the fluidized sediment is displaced by transverse currents.[139] Any sediment that escapes the trench is anticipated to fall out of suspension quickly because the sea floor in the project area is most likely sandy.[139] Suspended sediment should return to the sea floor within a few hours after jet plowing has ceased.[128] The actual jet plowing will be a short term impact, as the plow can move at a rate of one mile per day, making the time scale of sediment disturbance very small.[139] The impacts associated with the jet plowing process include suspended sediment (turbidity), sediment deposition, and temporary loss of benthic habitat as a result of cable installation.

The cable laying activity uses a barge that is connected to a tug boat through a pulley system. Anchors are laid and repositioned to move the jet plowing vessel forward using the cable and pulley system. The anchors may leave depressions in the seafloor and the cables may leave sweep marks. Much of the sediment on the anchor is expected to return to the anchor footprint once the anchor is retrieved, reducing the depth of the depression.[128] The impact of the cables sweeping along the seabed are minimized by attaching mid-line buoys to hold the cables off the bottom and preventing sweep scours.[128]

The cable transition to land will use either open trenching or horizontal directional drilling (HDD). Open trenching involves the physical digging of a trench for cable laying, which is refilled once the cable is installed. Open trenching will involve disturbance of the beach and dune area. HDD involves the installation of a conduit that will be drilled beneath the dunes and beach. No surface disturbance will occur on the beach with the use of this technology. HDD will result in fewer environmental impacts, as it does not disturb surface communities. The details of the landfall and installation methodology will be determined during the permitting process.

3.3.1. Impacts to Finfish

Offshore wind project construction may impact the health and survival of finfish. Suspended sediment from cable installations may cause temporary displacement of some species, and may be lethal for others. Turbidity (sediment suspended in the water column) may affect the ability of finfish to locate food, causing fish to temporarily leave the impacted area and feed elsewhere.[140] Adult finfish generally display avoidance behavior when water concentration of suspended sediment reaches a scale of more than 1 mg/L.[130] Suspended sediment concentrations on the order of grams per liter may be lethal to juvenile and adult fish.[130] Adult finfish thresholds of suspended sediments in the water column vary by species, but are generally between 0.5 g/L and 2.0 g/L.[141] Some fish, however, are more tolerant of suspended sediment than others. For example, bottom dwellers, such as flounders, are more tolerant of suspended particles than pelagic species, and clupeids (herring) are most sensitive to suspended sediment as it easily clogs their gills.[130]

Sediment transport and deposition models for the Cape Wind Project indicate that typical jetting operations (moving at 91 m/hr) for a cable (3.0 m^2 cross section) may result in approximately 30 percent of the trench volume escaping to the water column.[209] Based on these assumptions, the coarse sediments of Nantucket Sound would remain close to the trench. Deposition thicknesses of 20 mm were expected next to the trench and smaller depositions of one to five millimeters were expected within a few hundred meters of the trench.[209] Water column concentrations of sediment were predicted to be 50 mg/L, with peaks of 100 mg/L, and would remain in suspension for less than two hours.[209] It is anticipated that the sandy sediment on the Cholera Banks would behave similarly to the sediments in Nantucket Sound, and similar results would be produced for this project.

Theoretically, turbidity (the sediment that is suspended in the water column) may affect the ability of finfish to locate food, therefore, causing fish to leave the area of impact and feed elsewhere.[140] Nevertheless, adult finfish generally display avoidance behavior when suspended sediment reaches a concentration of a milligram of sediment per liter of water or greater.[130] Based on this and the anticipated sediment concentration adjacent to trenching activities during construction, it is expected that finfish will avoid the area during construction. Turbidity from cable installation is a short term impact and is anticipated to diminish within two hours of suspension.

Suspended sediment concentrations on the order of grams per liter may be lethal to juvenile and adult fish.[130] Adult finfish thresholds of suspended sediments in the water column range for species, but are generally between 0.5 g/L and 2.0 g/L.[141] Some fish, however, are more tolerant of suspended sediment than others. For example, bottom dwellers, such as flounders, are more tolerant of suspended particles than pelagic species, and clupeids (herring) are most sensitive to suspended sediment as it easily clogs their gills.[130]

Based on the Cape Wind jet plowing calculations, suspended sediment concentrations should not reach lethal concentrations for adult finfish; however, finfish will most likely avoid the area as they generally avoid concentrations in this range.

The smothering of benthic organisms by sediment deposition from jet plowing may result in the temporary loss of feeding habitat for finfish.[122] The greatest impact is anticipated to be near the trench. The displacement period of fish would depend on the construction and recovery period, estimated to be between six months to two years.[122]

Ichthyoplankton (fish eggs and larvae) are generally more sensitive to construction impacts than adult finfish.[130] Generally, a lethal concentration of suspended sediment in water for fish eggs and larvae is on the scale of milligrams per liter.[130] The minimum affect threshold of suspended sediment for finfish eggs and larvae is approximately 100 to 200 mg/L of water.[141] Based on the Cape Wind calculations, the jet plow should not produce suspended sediment concentrations lethal to finfish eggs and larvae. Demersal fish eggs (those that sink or lay on the substratum), however, maybe smothered by sediment deposition. Pelagic eggs are free floating and could be carried or swept through an impact area, but impacts are expected to be negligible. Larval forms that have motility (i.e., can swim) will behave like adult finfish and avoid areas where the environmental conditions are unfavorable. As with the eggs, any that are swept through the plume of the jet plow would not be exposed to suspended sediments for extended periods of time due to current velocities and precipitation of the larger grain sized sediment in the plume.

3.3.2. Impacts to Benthic Communities

The greatest impact to the benthic community would to be to organisms that are in the direct path of the jet plow, which would be physically removed during the cable installation. Benthic organisms in the area of impact (the area surrounding cable trenching into which sediment falls out of suspension) may be smothered by the sediment. Post construction surveys at offshore wind projects in Denmark indicate that the greatest impact to benthic communities was the area close to the cable installation.[137]

Benthic communities are generally able to recover from disturbance within the yearly reproduction cycle.[142,143] Rapid recovery by opportunistic species has been observed in offshore dredged areas.[142,143] Survey results in the Baltic Sea did not reveal any significant changes in benthic communities resulting from cable installation after a one-year recovery period.[144] Mobile benthic organisms, such as crabs, would likely temporarily leave the area as turbidity increases and return once construction has ceased and sediments have settled out of the water column.[122] These results indicate that the local depletion or relocation of the benthic community will be a short term impact.[122]

The physical destruction of any offshore Atlantic surf clam beds in the transmission corridor will be limited and temporary. The area of disturbance due to the installation of the cable is minimal compared to the extent of the Atlantic surf clam beds south of Long Island. The ocean floor in the project area already experiences a level of disturbance due to commercial dredging activities. The potential removal of the Atlantic surf clams from the swath of the plow will be no more detrimental to the population than commercial harvesting. Local Atlantic surf clam stocks will also be replenished during the yearly local recruitment during the summer and early fall months when water temperatures are greater than 15ºC.[145]

The turbidity and siltation resulting from approximately 20 percent of the fluidized sediment escaping from the trench will have a minimal affect on the Atlantic surf clams. The sediment is likely sandy and will precipitate out shortly after the physical disturbance has stopped.[139] The Atlantic surf clams in the area of impact should not be negatively affected by the suspended sediment because Atlantic surf clams are used to shallow, sandy environments that are often disturbed by storms and bottom currents. The species is adapted to handling periods of suspended sediment.[146]

3.3.3. Impacts to Birds

Cable installation activities on the beachfront will result in increased human activity in the area. Increased activity may impact bird foraging, nesting, or resting in the construction area. Breeding and foraging habitat for ground nesting birds on the beachfront may be temporarily lost. Behaviors may be altered in response to increased activity. Beach nesting birds may be affected if the transmission line comes to shore during the nesting season. Adults may abandon nests, resulting in an impact to the overall species population.[122] Cable installation on the beachfront is of concern because some threatened and endangered birds, piping plover, least tern, and common tern, may be nesting in or adjacent to the transmission route. Impacts to threatened or endangered species during the nesting season may lead to a local population decrease. Birds may also lose some foraging area during the construction period, but this loss is expected to be temporary and the construction area is expected to be relatively small.[122] Permanent habitat loss is not anticipated.

3.3.4. Impacts to Sea Turtles and Terrapins

Hatchling, juvenile, and adult sea turtles may be impacted by cable trenching. Jet plowing and cable trenching may physically harm individuals that come in contact with the equipment and habitat usage may be temporarily impacted by construction activity.[122] Hatchlings are the most susceptible to construction activities, as they are not strong swimmers, and are carried by currents.[122] They may be swept into or through the construction area, causing injury or death.[122] Hatchlings may be greatly impacted if congregated in the construction area, however, because nesting grounds are far south of the project area, hatchlings are not anticipated in the project area.[122] Adults and juveniles are stronger swimmers, and can swim to avoid construction activities.[122]

Jet plowing may also impact foraging habitat. These impacts, however, should be short term, as soft bottom benthic communities are expected to recover within a year of the disturbance.[142,143] Also, any submerged vegetation beds, the preferred food of many sea turtles, would most likely be avoided in the transmission route design.[122] Jet plowing construction will be localized and short term, resulting in the impact to few adults and juvenile sea turtles.[122]

Diamondback terrapins mate in May and nest from June through August.[147] Fall hatchlings appear from September through November and spring hatchlings appear April through June.[147] Diamondback terrapin hatchlings may be impacted if they are congregated near jet plowing activity. Adults will hibernate from late October through April.[147] In order to avoid impacting the nesting adults and hatchlings, cable installation could be conducted from December through March.

3.3.5. Impacts to Marine Mammals

There are little published data on the impacts of turbidity on marine mammals. It is anticipated that marine mammals will avoid areas of increased suspended sediment, as it may impact their ability to locate food and navigate. Jet plow noise and vessel operations may also deter marine mammals from approaching the construction area.[122]

3.3.6. Impacts to Vegetation

Trenching and jet plowing activity may impact sensitive intertidal and subtidal habitats. Submerged aquatic vegetation communities may be smothered by sediment deposition outside of the trench. There are no known eelgrass communities in the proposed cable route and transmission landfall, and therefore, no impacts to eelgrass are expected. Turbidity may, however, reduce photosynthesis by phytoplankton and algae in the area. This impact will be temporary.

While the methodology for the cable landfall is yet to be determined, possibilities include open trenching and HDD. If trenching is chosen, upland **c**able installation may destroy some vegetation in the construction area. Seabeach amaranth, which is state and federally listed, may be physically removed during the trenching process, reducing the local population. The impacts, however, would be limited to the footprint of the cable trench.[122] Disturbance of dunes may result in erosion.[122] Dune and beach vegetation may be slow to reestablish.[122] When a transmission route is chosen, a route with minimal impacts to sensitive receptors is preferable, avoiding sensitive habitats in the area as best as possible.[122] Permitting may be necessary from federal, New York State, and local agencies.[122] Based on the ESA, all construction activities must avoid impact to endangered species and habitats.[122]

HDD may result in reduced environmental impact as the cable would be installed in a conduit that would be drilled beneath the barrier beach. This would eliminate the impacts to sensitive vegetation on the beach. Permitting would require the cable to be installed with the least environmental impact, so staging for drilling activities would need to be in an area without sensitive resources (e.g., a median or roadway).

3.3.7. Mitigation of Cable Installation Impacts

In order to reduce impacts to marine and terrestrial organisms from the cable installation process, several mitigation measures may be taken. Initial site reconnaissance should be conducted so that the transmission corridor to land follows a path of least environmental impact. Specific impacts will be dependent on the installation methodology; however, many of the following mitigation measures are recommended for either methodology (open trenching or HDD) and may be required for permitting.

Based on available literature, the threatened and endangered piping plover, common tern, and least tern may nest on beaches near the transmission landfall. There is a stretch of beach that does not appear to be a valuable habitat for beach nesting birds just south of the Rockaway Substation (Figure 15). This may be the best location for transmission landfall. Still, due to the sensitivity of these bird species and the possibility that they are nesting nearby, cable installation on the beach may be conducted during time windows when breeding is not occurring in the area. The NYSDEC often uses April 1 to September 1 as a no work window to protect breeding birds. This window is likely to be imposed for either installation method, as both methods may disturb nesting birds. Work windows will be determined during the permitting process.

The location of the transmission landfall may be a habitat for federally and New York State listed seabeach amaranth. If open trenching is used, this plant will be physically removed if it is growing in the path of the transmission line. The area should be canvassed for plants prior to cable installation and the selected pathway should displace the least number of plants possible. It is possible that the stretch of beach just south of the Rockaway Substation is free of both seabeach amaranth and breeding birds, as it may not provide the proper habitat (Figure 15). If seabeach amaranth is disturbed during the construction process, a transplantation / restoration project for the species may also be implemented. Seabeach amaranth has successfully been transplanted on barrier beaches and the species has recovered in areas where it has been transplanted.[148]

If the horizontal directional drilling (HDD) methodology is chosen, the impacts to beach vegetation will be eliminated because the cable will be installed in a conduit beneath the beach. No activity will occur on the beach, eliminating the need for a possible seabeach amaranth transplantation program. The HDD technology is much less intrusive and may be favorable to permitting agencies, as it will result in the least environmental impact to the area.

Many finfish spawn during the summer months. Impact to eggs and larvae in the area can be avoided by conducting jet plowing in months when eggs and larvae are not present. The NYDEC has finfish / shellfish spawning no work windows between June 1 and September 30. There are also winter flounder spawning no work windows between January 15 and May 15 because winter flounder eggs are demersal and can easily be smothered by depositional sediment.

Diamondback terrapins may use the beach or marsh near the Rockaway Substation. They typically nest from June to August, fall hatchlings emerge September through November, and spring hatchlings emerge April through June.[147] If sensitive marshes are encountered in the pathway, HDD may also be opted for in those areas. The use of HDD in beach and marsh areas may protect the diamondback terrapin. There are no state environmental windows specific to the diamondback terrapin, but the bird and finfish / shellfish no work windows may protect nesting adults, some early fall hatchlings, and spring hatchlings.

Based on the bird, finfish / shellfish, and winter flounder no-work windows, there is a limited window where jet plowing may be conducted from October 1 to January 15. While this window may only be enforced in state waters, the BOEM may enforce its own environmental windows or refer to NOAA windows on the OCS. The environmental windows for work conducted on the OCS may also protect migratory marine mammals and sea turtles. Environmental work windows would be addressed in the permitting process of the project. State environmental windows would be covered in the Article VII application for the transmission line, while federal windows would be covered by the BOEM in the outer continental shelf leasing process when obtaining bottomlands for the project.

The use of the HDD technique beneath the barrier beach and marsh areas is preferable to open trenching, as it may reduce or eliminate many of the above mentioned impacts. Sensitive dunes, vegetation, and bird habitats would not be affected at the location of cable landfall. Engineering techniques will be finalized during the permitting process.

3.4. VESSEL STRIKES

Vessel strikes may occur as a result of turbine construction and cable installations. Increased vessel activity during construction may impact marine mammals and sea turtles in the project area.[128] Many of the marine mammals and sea turtles that are most commonly struck by vessels may use or migrate through the project area. Vessel strike to a sea turtle or marine mammal may cause a significant impact to these species, as many sea turtle and marine mammals in the area are threatened or endangered.[122]

3.4.1. Impacts to Sea Turtles and Terrapins

Vessel strikes are a concern for sea turtles, since sea turtle species are either endangered or threatened. Adult and juvenile sea turtles are difficult to spot on a clear day and difficult to spot when resting below the water's surface or at nighttime.[122] Slow moving sea turtles may be at risk for vessel strike as they migrate through the project area. Construction vessels are not anticipated to impact sea turtle nesting, as nesting occurs farther south of the project area.[128] Diamondback terrapin foraging and nesting, however, may be impacted by the cable installation near the substation, and vessels and equipment may cause injury to diamondback terrapins.

Sea turtle and diamondback terrapin hatchlings are susceptible to vessel collisions, as they have limited swimming ability and move with currents. Most sea turtle hatchlings are likely located south of the project area, but may be impacted if groups of them converge in a northward traveling current, or if a mat of floating *Sargassum* seaweed comes in contact with a traveling vessel.[122] Diamondback terrapin hatchlings may be in the project area and may be impacted by construction vessels. Hatchlings are difficult to spot from moving vessels, which reduces the vessel's ability to avoid them.[122]

3.4.2. Impacts to Marine Mammals

A worldwide data set indicates that the greatest number of vessel—whale collisions occurs on the east coast of the US.[149] Vessel strikes are more common with larger whales than smaller, agile ones, and are a significant cause of mortality for inshore baleen whales.[128] Fin whales are most frequently struck by vessels, followed by right whales, humpback whales, sperm whales, and grey whales.[149,150] These whales may be present in the project area and are protected under the Marine Mammal Protection Act. North Atlantic right whales are a slow moving species and vessel strike is a major cause of mortality, as they are often unable to avoid collision.[50,97,151] Approximately one third of all fin and right whale strandings appear to be caused by ship strikes.[150]

Analysis of vessel speed and strike frequency indicated that the greatest number of strikes occurred when vessels were traveling 13 to 15 knots.[149] Slightly higher (16 to 18 knots, and 22 to 24 knots) vessel speeds resulted in the next greatest strike injury.[149] Vessel speeds of approximately 14 knots or faster caused the most severe injuries and most vessel strikes result in death.[149,150]

3.4.3. Mitigation of Vessel Strikes

Vessel strikes are anticipated to be minor, as it is expected that the construction vessels will move slowly (less than 14 knots) and will be required to follow NOAA Fisheries Regional Viewing Regulations, as was required in the Cape Wind Final EIS.[128] Construction will be limited to one or two turbines a day, limiting the estimated vessel traffic to one vessel per day.[122] By limiting the number of construction vessels and by reducing traveling speeds, collision probability will be reduced. Observers should be implemented during construction activities, and vessels should travel at reduced speeds when marine mammals and sea turtles are observed, maintaining a safe distance from the animals.[122] Developers should coordinate with NMFS and USFWS to determine if MMMPA authorization is necessary to conduct work in the project area. If so, this may require additional observers.[122]

Section 4

4. IMPACTS DURING PROJECT LIFETIME

Operational impacts will span the lifetime of the project, and include the physical presence of the turbines and their foundations, the noise generated by the turbines, the electromagnetic force (EMF) generated by the collection system and transmission line, loss of benthic habitat, gain of epibenthic habitat, and possible impacts to the commercial and recreational fishing communities. The operational impacts of offshore wind projects have been studied at European sites; however, since these projects have only been in operation for a short period, long term impacts are not known at this time and some operational impacts are still inconclusive.

4.1. OPERATIONAL NOISE

Mechanical noise produced by the gearbox and turbine generator vibrates down the monopile and travels through the surrounding water and seabed.[122,127] In general, the noise generated by turbines is of low intensity and the energy is concentrated at low frequencies.[133] The noise generated from turbines is present during the life of the wind project and the less background noise that exists in the area, the more audible noise from the wind turbines will be.[133] The underwater noise generated by turbines has been measured to reach 90 to 115 dB at 110 m from the turbine in moderate winds.[122] These levels may cause marine organisms to modify their behavior.[122] Because project details are still being determined (turbine type, number of turbines, etc.), published measurements can only be used as an estimate for what noise levels may be encountered by marine organisms for this project. While very little research has been conducted on impacts of operation turbines on marine organisms, a summary of existing studies is presented below.

4.1.1. Impacts to Finfish

The impact of operational turbines on fish varies depending on the fish species, the size and number of turbines, the hearing abilities of fish, background noise levels, wind speed, water depth, and sea floor geology.[152] The ability of fish to hear low frequency sounds using the inner ear is similar for all species.[152] Fish hearing abilities in the higher frequencies vary by species depending on anatomical factors such as the presence of a swim bladder, swim bladder air content, and the presence of a connection between the swim bladder and the inner ear.[152] Fish that have a connection between their swim bladder and inner ear, such as herring, are called hearing specialists and have the greatest hearing ability.[131] Fish that do not have this connection, which are most fish, are called hearing generalists.[131] Some “hearing generalists” have a swim bladder, but it is not connected to their inner ear, such as cod and salmon, while others do not have a swim bladder at all, such as dab and other flatfish.[131]

Studies were conducted on several species to determine their hearing sensitivity to the noise produced by turbines. Flounders, for example, do not have a swim bladder, and are not as sensitive to sound as pelagic species that possess a swim bladder (such as cod and herring). Atlantic salmon generally have little air in their swim bladder, and are therefore much less sensitive to sound than species that have more air in their swim bladders.[152] Catfish, herring, and carp have a structure between the inner ear and swim bladder, making them very sensitive to sound.[152]

Studies on three species—Atlantic salmon, cod, and catfish / carp—indicated that these fish were able to detect sound from turbines during wind speeds of eight to 13 m/s at a distance of 0.4 km to 25 km away.[152] At eight m/s wind speeds, goldfish (i.e. carp), with a structure between the swim bladder and inner ear, were estimated to detect sounds 25 km from a turbine at a frequency of 63 Hz.[152] Alternatively, cod, which do not have a structure between the swim bladder and inner ear, were estimated to hear sounds 13 km from the turbine at a frequency of 63 Hz.[152] Atlantic salmon, which has hearing abilities similar to a flatfish, were estimated to hear sounds 0.4 km from a turbine at 100 Hz.[152] At 13 m/s wind speeds, it was estimated that goldfish and cod would hear a frequency of 180 Hz at 15 km (goldfish) and seven km (cod) from the turbine,[152] while the Atlantic salmon was estimated to hear sounds 0.5 km from the turbine at 100 Hz.[152] Dab and salmon were estimated to be able to hear the noise of an operational turbine up to 1 km from the turbine, while herring and cod may hear the sound 4 to 5 km from the source.[122,131] At lower wind speeds (e.g., three m/s), a 1.5 MW turbine's operational noise under water may be the same as ambient noise levels at one km from the foundation.[131]

Experiments indicate that fish do not appear to incur hearing impairment within 10 m from the operational turbine foundation; however, fish within four meters of the turbine foundation were deterred at wind speeds higher than 13 m/s.[152] Estimates indicate that fish may avoid operational turbines up to four miles away.[122,152] The hearing abilities of each species likely determines the behavior of fish near turbines and typical avoidance distances. Silver eels and Atlantic salmon, which have very little air in their swim bladders, were not deterred by sound at a distance of one meter from a turbine foundation.[152,153] Literature review of research by Westerberg (1994) indicated that silver eels, which do not have swim bladders, swimming 0.5 m from a turbine did not significantly change their swimming behavior.[152] Studies also suggested that cod, which do have swim bladders, swimming within 100 m of the turbine were twice as easily caught when the rotor was stopped than when it was operating.[152]

These estimates could be used to predict the impact to fish species in the New York Bight. It may suggest that flatfish, and those that carry very little air in their swim bladders, will be found closer to the turbine foundations than those with air filled swim bladders and and a connection between the swim bladder and the inner ear. It also suggests that flatfishes and those less sensitive to hearing would be more likely to colonize the turbine foundations.

Some fish communicate with sound, however, the impact of noise from turbines on fish communication is yet to be determined.[152] It is possible that operational turbines may mask communication between fish or cause stress to the animals; however, it is anticipated that these impacts will occur very close to the turbines.[131] Research indicates that operational noise is not expected to impair the ability of fish to detect other animals.[154] More research is necessary to further define the impacts of operational turbines on fish communities.

4.1.2. Impacts to Sea Turtles and Terrapins

Sea turtles, which are listed as threatened or endangered, may experience disorientation or feeding behavior disruption as a result of operational turbine noise.[122] Sea turtles may also avoid the project area altogether.[122] Adults and juveniles have strong enough swimming abilities to avoid the operational noise of a wind project, but hatchlings passively traveling through a wind project on currents may experience long-term exposure to turbine noise.[122] The impacts of noise on sea turtles is greatly unknown;[122] however, analyses conducted for the Cape Wind Project indicated that the sound produced by operational turbines under water should not injure or harass sea turtles within 66 ft of the turbine foundation.[128]

4.1.3. Impacts to Marine Mammals

Wind turbine operation is not expected to cause hearing impairment in marine mammals.[127] The impact of the turbine's operational noise on marine mammals depends on the species' hearing ability, the surrounding environment, and other noise sources in the area, such as vessels.[127] Behavioral impacts are expected to occur within a few hundred meters of the turbines or less.[133] The operational impact of offshore wind projects on marine mammals is of great concern because these animals are federally protected and may be sensitive to the operational sounds of turbines.

The offshore wind project may produce noise levels of 90 to 115 dB frequencies almost continuously over the entire wind project that are detectable by marine mammals, even at a distance from the towers.[122] Research was conducted on underwater noise produced from a 1.5 MW turbine in Sweden during moderate winds. It was found that marine mammals would hear the wind turbine's noise at 110 m away and may avoid the noise.[122,131] Data indicate that seals and harbor porpoises may hear the sound generated by a 1.5 MW turbine 100 m from the foundation if the wind is blowing at 12 m/s.[131] Another study estimated that harbor porpoises will be able to detect noise 50 m away from the turbines and seals will be able to detect the noise 1,000 m away.[155] Harbor porpoises are not anticipated to be able to hear the turbine 1,000 m from the foundation.[131] Baleen whales may also be able to detect an operational turbine within several kilometers.[131] The sound of the operational turbine is anticipated to be below the harassment levels for seals and toothed whales within 66 ft of the foudnation.[128] It should be noted that the analyses to date have been conducted on 1.5 MW turbines, and larger turbine designs may generate more noise.[131]

Marine mammals may become accustomed to the noise and activity at an operational wind project. Seals have been known to reestablish in areas where in-water structures were built.[156] Seals and porpoises left locations in Denmark where wind projects were being constructed, but returned after construction was completed.[137] Wind turbine structures may even have a positive affect on marine mammals, as they may increase local fish populations that marine mammals feed on, creating a reef effect.[157] Porpoises and seals are reported to become accustomed to some boat traffic in areas.[158]

Noise impacts will likely be species and site specific; however, it should be noted that although some species may adapt, underwater noise may result in long-term avoidance of the project area by some marine mammals or may result in permanent disruption of migratory routes or abandonment of feeding grounds.[122] Underwater noise may also potentially affect the echolocation ability of harbor porpoises in the area.[154] Operational noise of turbines may mask some marine mammal calls, although data indicate that the masking may be negligible.[131] More research is necessary to better understand the impacts on the habitual underwater noise of marine mammals.

4.2. ELECTROMAGNETIC FIELDS

The impact of electromagnetic fields (EMF) on fish, sea turtles, and marine mammals is unclear and research has not been conclusive. Limited research has been conducted and results vary. It is anticipated that the wind project's collection system will produce 60 Hz time-varying fields.[128] Both electric and magnetic fields will be produced by the transmission line; however, there will be no impacts from electric fields, since the cable will be shielded, interrupting electric fields that may affect the environment.[122,128] Magnetic fields, however, will still be produced. The results of EMF field studies conducted at operational wind projects are presented in the following paragraphs.

4.2.1. Impacts to Finfish

Certain fish can detect electric fields and may use them for orientation and navigation. Research on fish at the Nysted offshore wind project in Denmark has indicated both avoidance of and attraction to offshore cables.[128,159] Studies conducted on both demersal and pelagic fish before and after the transmission line was installed at the Nysted offshore wind project concluded that overall, the presence of the cable did not alter the distribution of fish in the area.[159] The distribution of all species of fish on either side of the cable was similar and migration before and after the cable was installed was in the same direction (west to east).[159] It should be noted that this result is not conclusive, as there was significant variability in the collected data. Pelagic species may need to be removed from the dataset as they may not be impacted as much as demersal species. More research and analysis is necessary to better understand the effects of EMF on fish species.[159]

Further studies on Baltic herring, common eel, Atlantic cod, and flounder are not conclusive, but suggest that migration of some species across the cable may be impaired (but not completely blocked).[137] A significant correlation was found with flounder, which only crossed the cable when EMF fields were low (conditions were calm).[137] Although more research is necessary, it can be concluded that as long as enough finfish pass over transmission lines to enable migration and genetic diversity, populations will not be affected by transmission lines.[122]

A literature review conducted by the BOEM (then MMS) indicated that, overall, magnetic fields will not impact marine organisms.[122,128] Animals with sense organs capable of perceiving magnetic fields (e.g. sharks, rays, eels) will not be impacted by 60 Hz magnetic fields because the current alternates direction and averages to zero over one-sixtieth of a second.[122] The magnitude of the 60 Hz magnetic field produced by the cable may also be below the geomagnetic field of the Earth in many places, which may make it comparably insignificant.[122] Finally, the thermal energy absorbed by nearby organisms is expected to be very low.[122]

4.2.2. <u>Impacts to Marine Mammals</u>

There is no research available on the impacts of EMF on marine mammals and marine mammal migration. Toothed whales and seals are the most abundant marine mammals in this area and are the most likely to be impacted. It is expected that 60 Hz time-varying electrical fields will be created from wind project cabling. Electric fields will be blocked by cable shielding, and 60 Hz alternating power-line EMF fields have not been reported to impact seal or cetacean behavior, orientation, or migration to date.[128]

It is possible that geomagnetic anomalies associated with transmission cables of wind projects may affect toothed and baleen whales, as these anomalies have been correlated with strandings.[154] These geomagnetic anomalies, however, would not be present everywhere, and as BOEM (then MMS) indicated, the 60 Hz magnetic field produced by the cable may also be below the geomagnetic field of the Earth in many places.[122] Magnetic fields are not expected to affect harbor porpoises and seals.[154] Research needs to be conducted to determine the actual impact of EMF on marine mammals.

4.3. MITIGATION OF OPERATIONAL IMPACTS

Operational impacts are not well known and research is not conclusive. Based on the preliminary research, there may be some operational impacts due to operational noise and EMF. Mitigation procedures should be implemented to reduce or eliminate negative impacts to marine organisms. Site surveys and coordination efforts with NMFS and UFSWS should be conducted to make sure facilities are not located in cetacean feeding or mating grounds, pinniped haul out areas, or important migratory routes.[122] Placing wind projects out of important nursing grounds or migratory paths will help prevent reduction in already impaired marine mammal and sea turtle communities. Cables should be shielded to reduce electromagnetic fields, especially in areas where shark or rays, species sensitive to EMF, may be present.[122] More research should be conducted to help pinpoint impacts.

4.4. IMPACTS OF PHYSICAL PRESENCE OF WIND TURBINES TO MARINE LIFE

The physical presence of wind turbine generators may have both positive and negative impacts on marine life. The foundations of turbines and the offshore substation will be present during the life of the offshore wind project. The local environment will recover from short construction term impacts, as these are not unlike impacts from other project-area activities, such as commercial dredging. While short-term impacts are temporary, the long term impact will be an altered environment. The following section discusses how the physical presence of the offshore wind project will affect marine life.

4.4.1. <u>Finfish Habitat</u>

The addition of hard substrate (surface for growth) in the form of wind turbine foundations would provide sources of food and shelter for a wide variety of organisms, and may act as an artificial reef. Encrusting organisms (animals that grow on hard surfaces) will be able to colonize at the turbine foundation in a place that was previously open sandy substrate. The epibenthic colonizers on the new structure will provide fish with food, and the structure will provide shelter for marine life. This interaction is called a reef effect.

The structure of the turbine foundation influences the incidence of reef effect at the wind project. Monopile support structures are sturdy, but offer little complexity, limiting biofouling (organism growth on the hard substrate), which provides habitat for fish and epibenthic organisms.[154] Complex substrate may attract more fish that feed on encrusting organisms and seek shelter of structure.[154] If a protective layer (e.g. rocks) is placed around the foundation base, as was done at Horns Rev and Nysted, the available surface area for colonizers increases and more epibenthic animals may settle on foundations.[154] Jacket foundations, having more surface area, may provide more substrate for encrusting organisms than monopile foundations.

It is anticipated that finfish will congregate around turbine foundations for food and shelter. There are varying amounts of reef effect at different offshore wind projects in Europe. Reef effect was observed at two wind projects, Yttre Stengrund and Utgrunden, in the Baltic Sea off the southeast coast of Sweden. A positive correlation was observed between the presence of monopiles and the abundance of fish.[164] Finfish populations were greater near the monopiles than in the open sea between them. Species diversity was similar near monopiles and in the surrounding waters.[160] Fish populations were greater within one to five meters from the monopiles than 20 m from the structures.[164] A sharp decreasing gradient of some species, particularly gobies, was observed with increased distance from the monopile.[164] This study indicated that offshore wind projects can act as artificial reefs and serve as fish aggregation devices (FADs – objects that attract fish) for fish in the area.[164]

Offshore wind projects in Denmark did not indicate an obvious reef effect. Although fish density was expected to increase around turbine foundations, there was not a statistical difference between finfish density near the turbine foundations and the surrounding waters between the turbines at the Horns Rev and

Nysted offshore wind projects.[137] There were not a statistical difference between presence of fish found within and outside of the Nysted wind project.[137] Physical aspects of the environment (currents, time of day) appeared to influence usage of the turbine reefs, which appear to offer shelter for fish. At Nysted, fish were observed congregating on the leeward side of turbines to be sheltered from the current.[137] It was also noted at Nysted that a greater number of small fish were present within the footprint of the wind project at night than in the day.[161] Conversely, at Horns Rev, larger finfish were more prevalent within the wind project footprint during daylight hours than at night.[132] Although these observations were made at different wind projects, the data suggest that smaller fish may move inside the wide project, away from the larger predatory fish at night to use the shelter of the turbine reefs.

The limited number of statistical correlations between fish and turbine foundations in the offshore wind projects in Denmark may be due to the methods employed in the study. A study at Horns Rev measured the prevalence of fish using reference stations 500 m from the wind project; however, it is possible that this reference station was too close to the wind project to establish a strong correlation, as populations observed at this reference station may still have been influenced by the presence of the wind project.[162] Also, the use of hydroacoustic loggers may have limited the study results, as hydroacoustics primarily identify fish with swim bladders, and the majority of finfish collected were demersal (bottom dwelling) and semi-pelagic fish (those that only spend a portion of their life in the water column), neither of which have swim bladders.[163] Demersal fish are not identified with hydroacoustics and semi pelagic fish are only sometimes registered if they are swimming in the water column.[163]

The few significant correlations within the study did indicate that finfish density is significantly greater near turbine foundations than between turbines.[162] While the hydroacoustic loggers were ineffective for demersial and semi-pelagic fish counts, the fish collected in nets indicated that fish density was increasing around turbines.[163] It appears that demersal and semi demersal fish are more attracted to turbines than other species, possibly because they are less sensitive to the noise produced by operational turbines than fish with swim bladders.

If turbine foundations result in artificial reef habitats at the proposed project, species expected to use the reefs would be tautog, cunner, black sea bass, scup, red hake, silver hake, grey triggerfish, ocean pout, bluefish, summer flounder, striped bass, and Atlantic cod. Many of these species are recreationally sought. If the presence of the turbines significantly increases finfish populations in the area, it is possible that the area will be fished more heavily, assuming fishing is allowed within the wind project.[122] If fishing is not allowed, a marine sanctuary may develop, and fishery resources may multiply.[160]

4.4.2. Benthic Habitat Loss

The benthic habitat directly beneath the turbine foundations and offshore substation platform foundation(s) would be permanently lost by the development of the proposed project. The infaunal benthic organisms beneath each pile will be physically removed. The steel monopile structure would permanently displace the soft sediment community that was present before construction. The area lost will be dependent on the diameter of the monopile and the number of monopiles driven. Monopiles are anticipated to be 16 to 18 ft in diameter.

Benthic habitat that was disturbed during the cable installation would recolonize within a year of disturbance.[142] The organisms that are repopulating the disturbed areas would be similar to those in the surrounding sediment. The new benthic population would supply food for fish in the area.

4.4.3. Creation of Epibenthic Habitat and Artificial Reefs

The foundations present a new habitat for encrusting organisms. This habitat is different from the existing soft sediment bottom, and introduces a hard substrate for epibenthic colonizers. The presence of epibenthic colonizers may in turn attract fish, which may attract birds.[122] This is an overall habitat change that could be significant if the project area is large.[122]

Epibenthic organisms colonized the Horns Rev and Nysted foundations after scour protection had been placed at the base of each monopile.[137] The monopiles and scour protection at Nysted were colonized by mussels, barnacles, and amphipods during the first few years.[165] Vertical zonation along the monopile was evident, and species richness was greatest on the scour protection at the bases and least on the monopiles.[137] Within three years, the monopile colonization was dominated by mussels and had reached a climax community (stable late successional community).[165] In contrast, communities at the scour protection level had not reached a climax due to smothering of encrusting organisms from re-suspended sediment during construction.[165] A similar setback in succession (sequencing towards a stable community) was observed at Horns Rev. The epibenthic community was beginning to demonstrate succession at Horns Rev, although a climax community had not yet been formed during the five years of epibenthic growth.[137] The delayed succession may be a result of storms and harsh winters that disrupt the growth of the community.[137] Storms may move enough bottom sand around to “sandblast” foundations, removing epibenthic colonizers.[154]

Community succession is achieved at different rates depending on the environment. Storms, sediment re-suspension, and construction vessel impact may slow growth of colonizing species, or even completely remove them from their substrate, requiring epibenthic communities to start over. It is anticipated that foundations for the proposed project will act as substrate in which epifaunal communities will grow. Similar successional growth and disruptions by storms are expected, as storms are frequent in the New

York Bight. Overall, an epibenthic community will grow where there was not one before due to the lack of hard substrate.

4.4.4. Bird Habitat

The physical presence of the offshore turbines may impact birds foraging offshore or those migrating through area. Some birds may permanently abandon the area once the turbines are in place.[122] Birds may also be struck by the turbines. The greatest concern for strikes are those involving endangered or threatened species. The following paragraphs will highlight research conducted in avian impacts from the operation of offshore wind projects in Europe. This section is only a general overview. A separate report, *Pre-Development Assessment of Avian Species for the Proposed Long Island – New York City Offshore Wind Project Area*, provides a more detailed look at the avian impacts as a result of offshore wind projects.

If an offshore wind project is placed along a migratory pathway, bird strikes are more likely to be a concern. Birds that fly at the critical altitudes for strikes, such as diving birds, dabbling ducks, shorebirds, terns, and gulls, are at increased risk.[168] It has been documented that daytime migrants generally avoid turbines, while nocturnally migrating birds are less likely to exhibit this response.[168] Poor weather and fog may also increase bird strike rates.[122]

Research has indicated the migratory birds mostly fly around the operational Horns Rev offshore wind project and many avoid the wind project area altogether, altering their course at a distance from the wind project.[137] Few birds entered the wind project area, and those that did flew parallel to the rows.[137] Gulls and terns were the species most frequently observed within the wind project.[137] Studies at Nysted also indicated the birds migrated around the wind project area, with fewer birds that were flying within the project area after construction than before development.[137] The general migration pattern was around the project area rather than through it.[137] Birds flew closer to the perimeter of the wind project at night, probably resulting from decreased visibility.[137]

Research is being conducted to develop a bird impact detection system for wind turbines. The sound of a strike would activate a system that records images taken from a camera.[169] This would allow for detailed data collection on bird strikes, helping to identify the species at greater risk.

4.4.5. Sea Turtle and Terrapin Habitat

There is no published research on the impact of operational wind projects on sea turtles. Operational impacts, however, are anticipated to be much less that construction impacts. Seabed habitat is expected to recolonize and any impacted foraging grounds should repopulate within a year.[142] It is also possible the turbine foundations, once colonized by encrusting organisms, may provide foraging habitat for some sea turtles.

4.4.6. Marine Mammal Habitat

Research conducted in Denmark indicates the operational offshore wind projects do not appear to negatively impact marine mammals. Operation of the Horns Rev offshore wind project did not appear to have impact on harbor porpoise and seal usage of the area.[137] Harbor porpoise recovery was slower at the Nysted offshore wind project. Although fewer harbor porpoises used the Nysted offshore wind project area during the first two years of operation than during the baseline studies, ecolocation behavior and activity of the harbor porpoises is increasing at nearby reference areas, and is expected to rebound in the project area with time.[137] It is possible that the length of the recovery period is more closely related to the pile driving noise during construction than to the operational aspects of the wind project. Seal activity at Nysted did not appear to be impacted by turbine operation: activity returned to baseline levels after the wind project was commissioned.[137] More research is necessary to determine long term impacts of offshore wind projects on marine mammals.

4.5. IMPACT OF PHYSICAL PRESENCE OF WIND TURBINES TO FISHERMEN

The physical presence of offshore wind turbines may impact commercial fishermen. The structures may limit some commercial fishing activities in the footprint of the wind project and enhance others. The fishing activity that will be allowed within the footprint of the wind project has yet to be determined.

The commercial fishing communities of both New York and New Jersey are detailed in this section, as fishermen from both states fish the waters of the project area. New York and New Jersey have extensive commercial fishing industries. An economics and socio-cultural report using 2000 data indicated that New York's commercial fishing population consists of 78,180 people and New Jersey's fishing population consists of 84,002 people.[170] New York and New Jersey had six ports ranked in the top 90 ports of the United States in millions of pounds landed and value yielded in 2008.[171,172] Commercial fishing ports, commercial fishing grounds, gear types used, and species harvested are analyzed to determine the impact of the proposed offshore wind project.

4.5.1. Fishing Ports in Project Vicinity

New York has seven major commercial fishing ports located at Montauk, Hampton Bays / Shinnecock, Islip, Freeport / Point Lookout, Greenport, Mattituck, and New York City. New Jersey has five major commercial fishing ports: Belford, Point Pleasant, Barnegat Light, Atlantic City, and Cape May / Wildwood. Figures 25 and 26 show the locations of these ports. Detailed information about these ports is presented in Tables 16 and 17.

The Freeport / Point Lookout, NY Port is located near Jones Inlet and is the largest commercial fishing port near New York City.[173] Point Lookout is located at the eastern tip of Long Beach at Jones Inlet, and

Freeport is located three miles east of the inlet. The Freeport and Point Lookout fleets are composed of deepwater commercial vessels, smaller baymen vessels, and recreational charter boats.[173] There are approximately 10 commercial vessels and 20 charter boats at Freeport. The commercial fleet consists of 7 trawlers and 3 surf clam vessels.[173] Freeport commercial vessels fish solely in the Atlantic Ocean and operate year round.[173] There are also 15 head (recreational party) boats and approximately 4,500 pleasure boats located at Freeport.[173] Fish markets at this port include: Bracco's, St. Peters Dock, Cossing Fish Market, and Fiore's Fish Market.[173] Surf clam, gill net, crab, small trawlers, and long line vessels are located at Point Lookout.[173] The Point Lookout fleet also fishes exclusively in the Atlantic Ocean.[173] Twelve commercial vessels are documented during the summer at Point Lookout and six fish year round.[173] Three surf clam vessels and seven trawlers are documented at this port, in addition to those vessels at Freeport.[173] There are also four head boats (recreational party) at Point Lookout.[173] Jones Inlet Packing and Doxsee Offshore Seafood operate out of this port.[173]

The Port of Islip, NY is composed of smaller ports at Babylon, Bay Shore, Orowoc Creek, West Sayville, Sayville, Patchogue, and Bellport. These smaller ports primarily consist of commercial baymen charter fishing boats, recreational boats, ferries, and commercial boat yards.[173] There do not appear to be many ocean going commercial fishing vessels at this port.

The Hampton Bays / Shinnecock, NY commercial Port consists of Shinnecock Canal, which is primarily home to recreational charters, and Shinnecock Inlet, which is home to deep water commercial fleets and commercial baymen. The Shinnecock Inlet Fishing Cooperative is also at this port.[173] Trawlers are the most common vessels in the Shinnecock fleet. There are approximately 30 to 35 trawlers that operate out of this port, and an additional 20 transient vessels that offload their catch here.[53] Squid and whiting are targeted most by Shinnecock trawlers, followed by scup, fluke, butterfish, bluefish, and weakfish.[53] There are between two and eight clam dredge vessels that harvest surf clam and ocean quahog.[53] There are also three lobster boats; one to two longliners that pursue tuna and swordfish; and four to five gillnetters who pursue monkfish, bluefish, and weakfish.[53] Baymen, who work the back bays using pound nets, fyke nets, gill nets, and shellfish gear, are also in this port area.[53]

Montauk is New York's largest fishing port and is located at the far eastern tip of Long Island. The Montauk fleet consists of approximately 35 to 40 trawlers, 10 to 20 transient trawlers, five tilefish longline vessels, eight tuna and swordfish longliners, five to ten transient longliners, 10-to-15 lobster boats, one-to-three fish pot boats, one-to-two pound net boats, two-to-four gillnetters, one-to-ten shellfish baymen, and a large number of hook and line sportfishing vessels.[53] Trawlers typically fish year round and depending on the season target squid, whiting, fluke, flounder, scup, and butterfish.[53] There are three off-loading facilities at Montauk: Montauk Fish Dock, Gosman's Dock, and Inlet Seafood.[53]

The Mattituck and Greenport, NY fleets are located on the north shore of Long Island on Long Island Sound. These two fleets primarily fish in Long Island Sound and will not be impacted by this offshore wind project. The New York City fleet consists primarily of head boats, which are recreational party fishing vessels and will be considered in a later section of this assessment.

The Belford, New Jersey fleet is composed of gill netters, lobster boats, purse seiners, and otter trawlers.[174] Otter trawlers are dependent on a mixed trawl fishery, meaning they adjust their target fish and fishing with annual migrations of fish.[174] The Point Pleasant, New Jersey fleet has gill netters, otter trawlers, and clam dredges.[174] This fleet primarily fishes in local waters, and the trawlers adjust to annual migrations as the Belford trawlers do.[174] Barnegat Light's fleet has large offshore longliners and scallopers that stay at sea for long periods of time.[174] Smaller inshore gill netters also hail from this port, though they have shorter duration fishing trips than their sister ships at this port.[174] The Atlantic City, New Jersey fishing fleet is solely made up of clam dredges, and focuses on the Atlantic surf clam and ocean quahog fisheries.[174] The Cape May / Wildwood port is the largest port in New Jersey and one of the largest commercial fishing ports on the coast.[174] It is also the center of fish processing and freezing in New Jersey.[174] The fleet is composed of otter trawlers and clam dredges.[174]

Cape May / Wildwood, New Jersey Port ranked number 15 in the nation with 82.9 millions of pounds landed.[171] Atlantic City, New Jersey ranked 24th, with 35.5 millions of pounds landed, followed by Point Pleasant, New Jersey (23.4 millions of pounds), Montauk, New York (11.2 millions of pounds), Barnegat Light, New Jersey (7.2 millions of pounds), and Hampton Bays / Shinnecock, New York (5.0 millions of pounds).[171] These same ports ranked in dollar value indicated Cape May / Wildwood, New Jersey to be fourth, yielding $73.7 million, followed by Atlantic City, New Jersey (29th yielding $24.1 million), Barnegat Light, New Jersey (34th yielding $22.9 million), Point Pleasant, New Jersey (38th yielding $22.1 million), Montauk, New York (50th yielding $14.3 million), and Hampton Bays / Shinnecock, New York (79th yielding $5.7 million).[172]

4.5.2. <u>Impacts to Commercial Fishermen</u>

This section details the commercial fishing grounds in both the New York Bight and the project area. The section focuses on the primary gear types used in the project area and the potential impacts to fishermen. Based on fishing gear size and technique, the greatest impact would likely be to mobile gear types, primarily trawlers, followed by clam and scallop dredges. Fixed gear types would be least impacted, as these are stationary while in use. The following paragraphs provide details on the impacts to commercial fishermen.

4.5.2.1. <u>Commercial Fishing Grounds.</u> The area being considered for wind project development is used in various manners by commercial fishing parties. Federally permitted vessels are required to submit

Fishing Vessel Trip Reports (FVTR) to the National Marine Fisheries Service.[175] These reports were used to determine the dominant gear types used in different fishing grounds. Offshore waters are broken into area codes for reporting purposes. Area codes for New York State waters and the New York Bight are shown in Figure 27. The area codes along the south shore of Long Island and the New Jersey coast are 158, 162, 164, 165, 166, 167, 168, 612, 613, 614, 615, and 616.[175] The project area lies within area code 612. The transmission line would make landfall through area code 158 or 162.

4.5.2.2. Gear Used in the New York Bight. Tables 18 and 19 show the major commercial finfish and shellfish landings by gear type in New York and New Jersey. The bottom otter trawl (large nets used to capture demersal fish) was the gear most used in New York (Table 18).[176] The catch by trawl in pounds and dollars far outnumbered all other gear types used in New York. It should be noted that there was a code in the dataset for "other" that outnumbered all gear types, but contributions to this category were not defined, and thus has not been considered for this evaluation. Dredges (suction devices used to collect shellfish) produced the most pounds of meat and greatest profit in New Jersey waters (Table 19).[177] Otter trawl produced the second greatest yield in pounds and dollars in New Jersey.[177]

Table 20 shows the preliminary results of FVTRs for commercial fishing operations based out of New York and New Jersey that were submitted between 2004 and 2009. The greatest number of trips taken to commercial fishing grounds (37,888 trips) in the New York Bight was for bottom otter trawling for fish (Table 20).[178] The next greatest number of trips were made for sea scallop dredges (32,859), sinking gill net retrieval (21,631), and hand line / rod & reel (12,348).[178] A breakdown of trips made to each area code for New York and New Jersey for each gear type is shown in Appendix B.

Figures 28 and 29 show the top five gear types used in each area code in the New York Bight between 2004 and 2009. the data shows the prevalence of gear types used in the proposed project's area codes compared to surrounding areas. Otter trawl is most frequently used in area codes 612, 613, and 616 (Figure 28).[178] Although the otter trawl was used for the greatest number of trips in area code 612 (13,919 trips), followed by 613 (13,340 trips) and 616 (3,858 trips), it only accounted for 33 percent of the trips to 612, but 56 percent of the trips for 613 and 70% of the trips to 616 (see Figures 28, 29 and Table 20).[178] New Jersey vessels trawled area code 612 over three times as much as New York vessels. New York vessels trawled area code 613 over 25 times as much as New Jersey vessels (Table 20). Area code 613 is farther offshore of New Jersey than 612, lending the greater number of New Jersey vessels trawling in area code 612.

Sea scallop dredge, lobster pot, sinking gill net, and hand line / rod and reel were the next most abundant gear types used in area codes 612 and 613, although in slightly different orders.[178] The area codes off of southern New Jersey were dominated by sea scallop dredges and sinking gill nets (Figures 28 and 29). Sea scallop dredges were used most frequently in area code 615, followed by 612 (Table 20). Both area codes were dominated by New Jersey vessels (Table 20). New Jersey dominated the number of vessels using sinking gill nets in area codes 612, 614, and 615, while New York dominated the vessels using sinking gill nets in area codes 613 and 166 (Table 20).[178]

Otter trawl was used less frequently in New York State waters than New Jersey waters, and was used more heavily in eastern Long Island waters than waters to the west (Figures 30 and 31).[178] Gill nets (mesh that selectively catches fish based on size), pots (fish traps), and hand line / rod and reel were more frequently used in New York State waters than the larger mobile gear (Figures 30 and 31). Hand line / rod and reel were most frequently used in area code 158, at the mouth of New York Harbor (1,732 trips at 62% of the total trips), and area code 167, at the east end of Long Island (3,236 trips at 45 % of the total trips) (Figures 30 and 31). Gill nets were used most frequently toward the center of Long Island.[178]

4.5.2.3. **<u>Gear Used in the Project Area.</u>** The dominant gear used in area 612 (where the project area is located) was the otter trawl, followed by the sea scallop dredge, and the ocean quahog / surf clam dredge (Figures 28 and 29).[178] New Jersey had over three times as many vessel trips to area code 612 than New York did (Table 20). Between 2004 and 2009, New Jersey vessels made 31,609 trips to area code 612, and New York vessels made 10,167 trips. New Jersey vessels most frequent trips to area code 612 were for bottom fish otter trawling (10,878 trips), sea scallop dredging (7,518 trips), lobster pot retrieval (4,626 trips), sinking gill net retrieval (2,372 trips), other dredging (1,753 trips), and ocean quahog / surf clam dredging (1,087 trips) (Table 20).[178] New York vessels fished area code 612 most frequently using the bottom fish otter trawls (3,041 trips), hand line / rod & reel (1,822 trips), lobster pots (1,469 trips), scallop otter trawls (1,038 trips), and sinking gill nets (816 trips) (Table 20).[178]

The dominant gear types used in area code 158 were hand line / rod and reel, followed by fish pots, cast nets, otter trawls, and crab pots (Figures 30 and 31). Hand line / rod and reel far outnumbered the other gear types in number of trips (1,732) and percentage of trips (62 percent) (Figures 30 and 31). Gill netting far outnumbered the number of trips to area code 162 (1,137 trips) than the rest of the gear types, which account for 34 percent or less of the trips (Figures 30 and 31).[178]

4.5.2.4. **<u>Impacts to Commercial Fishermen by Gear Type.</u>** The commercial fishing gear types that offshore wind turbines would pose the greatest restrictions on are the mobile gear types (e.g. dredges and trawls). The usage of these gear types cover large sections of the sea floor as they fish, and structures may limit usable fishing grounds. NYSDEC has indicated a concern about the ability of commercial fishermen to trawl within the project area.[38] Dredges and trawls are the two dominant gear types used in the area code in which the project area is located (see Figures 28 and 29).

4.5.2.4.1. **Trawling.** It is anticipated that the greatest impact will be to otter trawlers, as they cover a large area of sea floor when fishing and the presence of offshore wind turbines will most likely reduce available fishing grounds in the project area. Otter trawls are funnel shaped with a mouth opening approximately 40 to 60 ft wide and eight to ten ft tall.[179] Figure 32 shows a picture of a trawling vessel and gear. Bottom trawls are used to catch demersal fish such as monkfish, fluke, flounder, whiting, and cod.[174,179] Mid-water trawls are used to catch long-finned squid, Atlantic mackerel, and bluefish.[174,179] Otter trawls are heavily used by New York and New Jersey commercial fishing vessels (Tables 18 and 19).[176,177] Some of the top species harvested in New York and New Jersey use the otter trawl (Tables 8,9,18, and 19).[40,41,176,177]

Fishing restrictions would depend on the number and spacing of the turbines. Several offshore wind projects in Europe restricted trawlers from entering the wind project and cable area in order to prevent the gear from catching on the foundations of turbines or excavating the project's electrical cables.[180,181,182,183] Still, the geography of the area and turbine layout determined the use of the project area for other fishing methods. Trawling was banned within a 200 meter buffer zone from the Rødsand and Horns Rev offshore wind projects, while a 50 meter buffer zone was applied at the Rhyl Flats offshore wind project; however, no restrictions were posed at the Burbo Bank offshore wind project in a report on commercial fishing in the project area.[180,182,183,184] Though trawling was banned at Lynn and Horns Rev offshore wind projects, both allow pot and net fishing within the wind project.[181,182] Rhyl Flats offshore wind project also allows static gear fishing within the wind project, but there is a 50 m no-fishing buffer around the base of each turbine for safety reasons.[184]

It is possible that trawling activity may be allowed at the Long Island – New York City Offshore Wind Project. The Cape Wind Final EIS included a risk analysis for squid fishermen using trawling vessels in Nantucket Sound. Assuming the largest vessel and fishing gear scenario (607 ft for the vessel plus net) and a proposed turbine spacing of 0.39 mi by 0.63 mi, it was concluded that squid trawlers would be able to operate safely within the proposed Cape Wind offshore wind project.[128] Nevertheless, trawler operators were recommended to consider safety issues such as weather, currents, wave height, wind, and visibility.[128] Captains may also need to correct their course to avoid wind turbines in their path.[128] The USCG proposed directional travel lanes between turbines to reduce collision risk.[128]

Trawling is the greatest commercial fishing activity that occurs near the project area and long-finned squid was the second most valuable marine species landed in New York from 2006 to 2008 (Table 8).[40,178] Trawl surveys from 2008 show the long-finned squid to be abundant near the project area during the fall months.[7] It is anticipated that long-finned squid are present in the project area, and that commercial fishermen will pursue this species in the project area. It is possible that squid trawlers will be able to operate within the Long Island – New York City Offshore wind project as was proposed for the Cape Wind project. The allowance of trawling in the area may significantly reduce opposition from fishermen to project development.

4.5.2.4.2. **Dredging.** Dredging is another fishing activity that may be impacted by the presence of offshore wind turbines. Dredges are heavily used in this area to harvest Atlantic surf clam, ocean quahog, and sea scallop.[179] Atlantic surf clam is the species with the highest poundage yield of all commercial species in both New York and New Jersey waters from 2006 – 2008 (Tables 8 and 9).[40,41] The Atlantic surf clam beds are generally closer to shore, and the greatest impact to this fishery would be the transmission line route to shore. Sea scallops and ocean quahogs are dredged farther offshore, and sea scallop dredge is used heavily in the area code of the proposed project (although discrete samples indicate that the large sea scallop beds are not within the project area).

4.5.2.4.2.1. **Clam Dredges.** A flourishing surf clam industry operates offshore of New York and New Jersey. New Jersey manages the largest state fishery for Atlantic surf clams.[185] Between 2006 and 2008, Atlantic surf clams produced the greatest yield in pounds harvested for both New York and New Jersey commercial fishing vessels.[177,178]

Atlantic surf clams are harvested by hydraulic-powered clam dredges that scour the clam beds and bring the clams to the surface on a conveyor belt. Figure 32 depicts a clam dredging vessel and gear. Dredging, like trawling, requires open spaces to pull dredges along the sea floor. The hydraulic dredge uses pressurized water to excavate clams from the sea floor. It is 12 ft wide by 22 ft long and penetrates eight-to-ten inches of sediment during harvesting.[146] The dredges are smaller than trawl nets and have more maneuverability than the trawlers, therefore, they may not be as impacted by the presence of wind turbines as trawlers may be.

The gear used on clam dredges—hoses and hydraulic pumps—limits the operations to inshore waters.[174] Atlantic surf clams are generally taken from water 60 to 120 ft deep.[186] Most Atlantic surf clam beds are near shore (see Figures 9 and 10). A substantial fishery is focused within three miles of the New York coastline.[183] Based on the location of the Atlantic surf clam beds and the limitations of the harvesting gear, the greatest impact to the Atlantic surf clam industry would be located in the near shore waters of Long Island where the transmission line would make landfall. The transmission line may have to traverse heavily fished Atlantic surf clam beds. Dense beds and heavily clammed areas should be considered when determining the transmission cable route to avoid damage from dredging equipment.

Atlantic surf clam beds in the vicinity of the transmission route are fairly dense, estimated 0.6 to 1.5 million industry standard bushels (Figure 10); however, portions of the coastal area where the transmission line will make landfall are closed to shellfishing. A stretch of land from Far Rockaway Inlet to Dayton Towers on the Rockaway Peninsula is permanently closed (see Figure 33). No shellfishing is permitted in this area due to bacterial loads. It is highly likely that the transmission line will run through these uncertified waters, reducing some of the overall impact to commercial clammers.

Federal waters are also closed to shellfishing near the mouth of New York Harbor, extending far offshore due to bacterial or contamination loads (Figure 34). There is a six nautical mile radius around the 12 mile dump site (the former dump site for New York City's sewage sludge). This area is closed for shellfishing; however development is not necessarily precluded in this area.[58] If the transmission line traversed federal waters closed to shellfishing, the impact to commercial clammers would be minimized, as these areas are already inaccessible shellfish beds.

Once the cable is in place, it will remain buried and is not expected to impact Atlantic surf clam beds or clam dredgers in the areas of the seabed open to clamming. The hydraulic dredge penetrates eight to ten inches of sediment during harvesting and it is anticipated that the cable will be buried six ft below the sediment surface, protecting it from any surface fishing activity.[139,146] Nevertheless, to safeguard the cable from accidental excavation, there may be an exclusion zone established by the USCG that prohibits fishing and clamming around the cable. Any exclusion zone would be very small compared to the beds located along the south shore.

4.5.2.4.2.2. **Ocean Quahog and Sea Scallop Dredges.** Recent population surveys of both sea scallops and ocean quahogs show their populations to be concentrated farther offshore than the Atlantic surf clam (see Figures 11 and 12).[60,63] Commercial concentrations of the ocean quahog are found at water depths of 75 to 120 ft and commercial concentrations of sea scallops are most abundant at 120 to 300 ft.[58] The proposed project is located in water depths of 70 to 120 ft, which are depths that ocean quahog beds would be found. Data collected within the footprint of the project area indicate that ocean quahogs are present, but not in quantities that warrant commercial harvesting.[50]

Sea scallop dredges are the second most frequently used gear in the project's area code;[178] however, sea scallops are commercially harvested from deeper water than the project area.[58] Based on the above data, sea scallops and ocean quahog may be present in the project area, but are not expected to be present in quantities that draw commercial harvesting. Therefore, ocean quahog and sea scallop dredging activity is not anticipated to be impaired within the project area. If trawls are able to operate within the wind project, it is possible that dredges will be able to operate within the footprint as well, as dredging equipment is smaller (assuming that dredging will not pose a concern for electric cables). This issue will be further investigated during the permitting process.

4.5.2.4.3. Nets and Long Lines. The presence of wind turbines may cause an inconvenience for fisheries that use sinking gill nets and long lines, but the operation will not be impeded. The sinking gill net is heavily used in the area codes of the proposed project and transmission path. Gill nets are most frequently used in the coastal waters where the transmission line may come to shore. Gill nets harvest monkfish, bluefish, weakfish, dogfish, and shad.[174,179] Many of these species are heavily harvested in New York and New Jersey. Sinking gill nets cover a large area of sea floor, but are anchored in place so they are not constantly traveling over the sea floor. Installation of wind turbines and foundations will have less of an impact on anchored gear types than on trawl nets because anchored gear types are not dragged over the sea floor, making avoidance of turbines less of a difficulty during fishing activities.

Purse and Danish seines (weighted fishing nets) are used in the area code where the project area is located. Purse seines are used to catch Atlantic menhaden.[174] Atlantic menhaden is the most prevalent fish caught by weight by New Jersey registered vessels between 2006 and 2008 (Table 9).[41] Purse seines, however, do not appear to be as heavily used in the project area as trawls and dredges (Table 20).[178]

The use of long lines may be restricted within the project area, as large open areas are required by commercial fishing boats to set nets. Long lines consist of long warps of line, with attached lines with hooks, which are set along the sea floor or surface. Long lines, like gill nets, cover a large area of sea floor, but are anchored in place, so they are not constantly traveling over the sea floor. Long line fishermen will not be greatly impacted, as long lines do not appear to be heavily used in the project area.

4.5.2.4.4. <u>Fixed Gear.</u> Fixed gear usage, such as hand line / rod and reel and pots predominate in the coastal waters where the transmission line would make landfall, and are less likely to be impacted by the presence of offshore turbines. Some European wind projects allow fishing within the perimeter of the project area, and the Cape Wind project planned to allow pot fishing within the proposed project area. If a reef effect occurs due to the presence of turbine foundations, fishermen using static gear types may benefit from the additional finfish presence.

4.5.2.5. Mitigation of Impacts to Commercial Fishermen. It will be important to work with fishermen to alleviate concerns about offshore wind turbines. Coordination with fishing cooperatives, which are stationed at the Shinnecock Inlet, New York Port and the Belford and Point Pleasant, New Jersey Ports may be beneficial (Tables 16 and 17).[173,174] Other fishing industries and markets located at the ports also may be an important contacts. Negotiations for economic compensation for the loss of fishing grounds has been suggested in Europe, and may be considered for the present project if deemed necessary.[182]

4.5.3. Impacts to Recreational Fishermen

Although it has not yet been determined if recreational fishing will be allowed in the turbine field, there are not expected to be any negative impacts to development for recreational fishermen. Turbines will be placed far enough apart for recreational vessels and gear to be used within the project area. Fish such as fluke, flounder, black sea bass, scup, cunner, and tautog may even increase in the areas around turbine foundations due to reef effect, drawing recreational fishermen to the area to fish.

Many of the hand line / rod and reel VTRs may be reported as charter boats used for recreational fishing. Rod and reel fishing is heavily conducted in the offshore area code containing the project area and coastal area codes where the transmission cable may make landfall. There are many head boats (charter recreational fishing boats) located throughout New York City that may fish in the coastal waters, and possibly the offshore waters, of the project area. A large fishing fleet, which consists of approximately fifty boats, is located in Sheepshead Bay, Brooklyn, at Rockaway Inlet.[187] Charter and party boats that may fish in the project area are located in Staten Island, Jamaica Bay, Captree (at the eastern tip of Jones Beach), Shinnecock Inlet, Moriches Inlet, Hampton Bays, East Hampton, and Montauk).[187] Boats that hail from New York City or western Long Island are more likely to use the project area than the more easterly located vessels.

Historically, the Cholera Banks were abundant cod fishing grounds.[50] Some recreational fishermen still report visiting the Cholera Banks; however, data are limited for recreational trips. Anecdotal information on recreational fishing in the Cholera Banks was collected as part of the Atlantic Sea Island Group Deep Port Application License. Charter numbers ranged from zero to many each year, though many reported that the Cholera Banks was too far a trip for charter fishing.[50] The fleet that traveled to the Cholera Banks most frequently left from Freeport, NY, and fished for bluefish, sea bass, fluke, and other bottom fish.[50]

The greatest impact to recreational fishermen may be to vessels that troll for game fish. Trolling gear requires setting several lines behind a vessel and towing the lines long distances during the fishing process. The presence of offshore wind turbines may impede the trolling process, as maneuverability is decreased with additional stretches of gear behind a vessel.

4.6. VISUAL RESOURCES

Visual resources may be affected by the development of the proposed project. Temporary visual impact may result from construction activities and permanent visual impact may occur during the life of the project. The visual impact of both the offshore turbines and the installation of the transmission line must be considered.

There are six major components of a visual impact analysis: (1) define the project setting and viewshed, (2) identify key views for visual assessment, (3) analyze existing visual resources and viewer response, (4) depict the visual appearance of project alternatives (i.e. model simulation), (5) assess the visual impacts of project alternatives, and (6) propose methods to mitigate adverse visual impacts. Depending on project particulars, a visual impact assessment may be a required by the New York State Environmental Quality Review Act (SEQR), which can be obtained by filing a Visual Environmental Assessment Form (EAF) Addendum sheet, by including a Visual Resources section as part of an EIS document, or by filing an expanded Part III of a Full EAF. It is also important to investigate local zoning and code restrictions to determine if a visual impact assessment and/or photosimulations are required. Finally, the project may require NYSDOS coastal consistency approval, requiring consistency with the Local Waterfront Revitalization Program planning document that New York City adopted in 1982.[197]

The specific project setting has not yet been defined for the proposed on-shore substation or new transmission lines. The landfall of the transmission line, however, will likely be on the Rockaway Peninsula in Queens County New York. The following section describes the potential visual impact within the regional landscape and outlines the steps for completing a visual impact analysis once project details are better defined.

The first step in a visual impact analysis is to assess existing conditions at the proposed project area and adjacent areas. The assessment should include geographic location, topography, roadways, land use (i.e., residential, industrial, commercial, urban, open space), sensitive areas (i.e., designated historic districts, parks, scenic areas), and dimensions of existing structures. Once existing conditions are known and sensitive areas have been identified, a viewshed can be developed for the proposed project area. A viewshed is comprised of all the surface areas visible from an observer's viewpoint, and includes the locations of viewers likely to be affected by visual changes brought about by the project.

The Rockaway Peninsula is located within the Queens County Borough of New York City. The topographic variation of the Rockaway Peninsula is generally minimal, with the average location being within 10 to 20 ft of sea level; however, microtopography (smaller features) could still be a consideration. The most predominant land use categories within the Rockaway Peninsula are residential, open space/outdoor recreation, and vacant lots.[198] Sensitive areas or roadways within the Rockaway Peninsula that have the potential of being visually impacted by the construction of an on-shore substation and transmission lines are identified in Table 21.

Federal, state, and county refuges, parks, historic districts, historic churches and bike paths that have the potential of being visually impacted by the construction of an on-shore substation and/or transmission lines are identified below. Asterisked (*) areas are located along the southern coastline of the Rockaway Peninsula and should also be considered for the visual impact assessment for the wind project itself (i.e. turbines, see Figure 39). Upon site selection, areas not asterisked should be reassessed for potential impacts.

- Bayswater Point State Park is located northeast of the existing Rockaway Substation.[199]
- Silver Point County Park encompasses the western end of Long Beach/Atlantic Beach and is managed as part private beach club and part Nassau County parkland.[200]
- State designated Historic Districts include Fort Tilden, Jacob Riis Park, and Floyd Bennett.[201] State designated Historic Churches include Russell Sage Memorial Church and Trinity Chapel.[201]
- The National Park Service (NPS) manages the Gateway National Recreation Area; one of three units that comprise this area is the Jamaica Bay Unit. The Jamaica Bay Unit consists of Jamaica Bay Wildlife Refuge, Frank Charles Memorial Park, Canarsie Pier, Bergen Beach, Floyd Bennett Field, Plumb Beach, Jacob Riis Park*, Fort Tilden*, Rockaway Point*, and Breezy Point.
- The designated Rockaway Gateway Greenway Bike Path and Fort Tilden Bike Trails are associated with the NPS Jamaica Bay Unit.[202]
- There are no state designated scenic byways or rivers.[200,203]

New York City Parks and Playgrounds (east to west) that have the potential to be impacted include Beach 9th and 17th Street Playground*, O'Donohue Park*, Playground Mall*, Rockaway Beach and Boardwalk*, Sorrentino Rec. Center, PS215 Playground, Westbourne Playground, Jamaica Bay Park, Michaelis-Bayswater Park, Rockaway Community Park, Edgemere Urban Renewal Park, Conch Playground, Arverne Playground, Thursby Basin Park, Dubos Point Wildlife Sanctuary, Beach 59th Street Playground*, Almeda Playground, Brant Point Wildlife Sanctuary, Terrapeninsula Preserve, Beach Channel Playground, Hammal Playground, Bayside Playground, Seaside Playground, Tribute Park, Flight 587 Memorial Park*, Veterans' Circle, Patricia A. Brackley Park, Beach Channel West.[204]

The above mentioned sensitive areas and roadways may be visually impacted by the construction of an offshore wind project, on-shore substation, and/or transmission lines. Once the on-shore locations have been determined, these locations should be mapped at the center of incremental buffer zones (0-0.25, 0.25-0.5, 0.5-3.0, 3-5, and 5+ mile radii). All of the sensitive areas should be evaluated by photo simulation model and/or field visits to determine if the areas are within the project viewshed. Simulations should test the visibility and degree of view change from different observation heights and angles, in different weather conditions, and in different seasons in order to make visualizations comparable to real-life conditions.[205]

The degree of impact(s) or change(s) to the existing view(s) will need to be assessed, including an analysis of viewer sensitivity and exposure. Viewer sensitivity is defined as the viewers' concern for scenic quality and response to the change in view as a result of the proposed project. Viewer sensitivity is assessed by conversing with community groups and by researching local publications and planning documents. Viewer exposure is also important to characterize and involves measuring the number of viewers exposed to the proposed changed view. Potential viewers of concern include recreation users (i.e. cyclists, sunbathers, runners, boaters, etc.) and local residents. If viewer sensitivity is great and viewer exposure is significant, design alternatives or possible mitigation measures may be considered by agency reviewers. Since one of the dominant land uses for the Rockaway Peninsula is open space / recreation, the degree of visual impact will likely vary seasonally. During the summer months, when tourists and residents are most active outdoors, both viewer sensitivity and exposure will likely increase.

The height of the onshore substation seems to be the most critical factor in determining adverse impacts in urban environments. The predominant zoning in the Rockaway Peninsula is low and medium density residential housing, which have maximum building height restrictions of 40 to 70 ft.[206] With the assumption that the on-shore substation will be large in scale, it is likely to alter the visibility of viewers to some degree. Due to the general topographic uniformity of the Rockaway Peninsula, the visibility of project structures will not be significantly influenced by hills or valleys, as these features are not present. Thus, viewshed determination will likely be most influenced by the position and dimension of the proposed structures in relation to existing structures. The presence of existing buildings will likely reduce visibility of the new structures from sensitive areas and from viewers on ground level, thus decreasing the likelihood of adverse visual impact; however, the affected view change for viewers within existing buildings is still a potential concern (i.e. a top-floor corner office view).

Because the Rockaway Peninsula is a residential urban environment that values open space areas and seasonal recreation, visual impact from the proposed project is likely. Project dimensions and site selection will determine the severity of the visual impact and if mitigation is required.

Section 5

5. IMPACTS OF OBJECTS AND ACTIVITIES ON OFFSHORE WIND PROJECT SITING

Objects and activities in the New York Bight region may affect the siting of an offshore wind project. The waters and sea floor in the New York Bight are used for habitat enhancement projects, storm damage mitigation, heavy marine navigation between ports, military training, material disposal sites, and offshore energy facilities. Both pre-existing uses and competing interests must be considered when siting the project. Many of the competing uses of the sea floor will be addressed in the BOEM Leasing Process.

5.1. ARTIFICIAL REEFS

In an effort to create suitable habitat for fish that associate with structure, artificial reefs have been built offshore. Artificial reef structures provide hard surface for encrusting organisms and habitat for fish and invertebrates not normally encountered on open sand substrates. Fish seek shelter among the structure and feed on epibenthic colonizers of the habitat. Artificial reefs provide sources of food and shelter for a wide variety of organisms, as confirmed by the popularity of reefs for recreational and commercial fisherman and divers. Common finfish that colonize reefs are tautog, cunner, black sea bass, scup, red hake, silver hake, grey triggerfish, ocean pout, bluefish, summer flounder, striped bass, and Atlantic cod.

The NYSDEC has set up an artificial reef program. It has placed large artificial reefs along the south shore of Long Island. These reefs are inshore of the offshore project area; however, several may fall in the path of the transmission route. As the exact transmission route has not yet been identified, the impact is not definite. The largest artificial reefs reported by the NYSDEC are: shown in Figure 35, along with the distance from shore, acreage, and depth of water.[188,189]

The reef with the greatest potential to be in the transmission route is the Atlantic Beach Reef, located 3.0 nautical miles south of Atlantic Beach, New York. It is 413 acres in size and in 55 to 64 ft of water.[188,189] Depending on the transmission pathway, the Rockaway Artificial Reef Site, south of Rockaway Beach; the Fishing Line Reef Site, south of Long Beach; or the Hempstead Town Reef Site, south of Jones Beach State Park may also be impacted. Once the transmission pathway has been determined, detailed studies of the route will be necessary in order to prevent damage to jet plowing equipment and to make sure the cable will be entirely buried during installation.

5.2. PROPOSED OFFSHORE SAND BORROW AREAS

The BOEM has identified several potential offshore sand borrow areas south of Long Island and east of New Jersey to be used on beaches for storm damage mitigation (see Figure 36). All of the BOEM proposed sand borrow areas are in federal waters, outside of the three mile state jurisdiction line.[4] The major sand resource areas are located south of Long Beach and Jones Beach, New York and seaward of Sea Girt, New Jersey.[4]

The USACE-NYD has proposed storm damage mitigation for the barrier beaches on the south shore of Long Island. Several proposed sand borrow areas are located approximately 1.5 miles offshore in Atlantic waters, between Coney Island and Montauk Point.[190] The Rockaway Borrow Area is located south of the Rockaway Peninsula and the Long Beach Borrow Area is located at the eastern end of Long Beach (Figure 37). The Rockaway Borrow Area has the greatest chance of being in the transmission route than the other proposed sand borrow areas.

These sand sources in Atlantic waters south of Long Island are landward of the project area for the turbines, but may pose an issue for transmission pathway. Sand would be dredged from the borrow site and transported to beaches. Because sand is physically being removed from the seabed, the transmission line should not traverse any sand borrow areas, as removal of sand could excavate submerged transmission lines.

5.3. INLETS AND NAVIGATION

Inlets form thoroughfares (passageways) between the open ocean and the sheltered backbay areas. Caution should be used with construction near inlets due to heavy usage by boats. Any construction involving the placement of structures in navigable waters must be cleared through the Army Corps of Engineers (Section 10 of the Rivers and Harbors Act). High concentrations of animals near inlets, including endangered and threatened species, are another important consideration for construction. Fish, birds, sea turtles, and marine mammals congregate near inlets because food sources from nursery grounds in the backbays filter through these channels. Rare plants are also concentrated on inlet beaches. All of New York and New Jersey’s inlets are designated by the USFWS as significant water habitats.[2] Breeding colonies of endangered and threatened birds are often established near inlets, and although the wind turbines will be far offshore and should not affect the colonies overall, the placement of transmission corridors should be considered, as installation may disturb nesting birds.

The wind turbines may pose a hazard to navigation, as New York Bight waters are heavily used by commercial and recreational vessels. The project is proposed between the Ambrose to Nantucket and Hudson Canyon to Ambrose Traffic Lanes (see Figure 1). These are two heavily traveled commercial shipping lanes. The Waterways Management Coordinator of the US Coast Guard, Sector New York has indicated that exclusion zones should be incorporated between the turbine fields and the shipping lanes.[191] In order to protect both the turbines and navigation safety, NAVAIDs (electronic aids to navigation) including foghorns, yellow paint on the transition pieces between the towers and foundations, marine lanterns, radar reflectors, and battery back-ups have been used within offshore wind projects in Europe.[192] Vessels have been permitted to travel within the offshore wind projects in Europe, and risk assessments indicate that the greatest risk of collision would be from ships that are adrift (without steering or propulsion).[180,181,182,183,184,193] Collision risk would probably be similar within the New York Bight, and the use of NAVAIDs would help reduce collision risk. Collision risk could be further mitigated if vessels frequenting the wind project's waters (e.g., fishing vessels) are kept informed of project maintenance happening in the region. A Harbor Operations Committee has established an Alternate Energy Sub-committee to review offshore wind projects and facilitate communication between agencies for navigation.[191] This committee should be consulted during the permitting process.

Military use of the New York Bight may influence project siting. Multiple weapons training areas (WTAs) have been designated by the U.S. Coast Guard within the Bight. These WTAs are defined circles with radii of three or five nautical miles. There are three WTAs that partially overlap the proposed project area. The presence of WTAs may not preclude wind development within the project area, but it is likely that wind turbine siting may be affected. Therefore, coordination with the U.S. Coast Guard will be necessary when determining the project layout.

5.4. DUMP SITES

There are several dump sites located in the New York Bight that were used to dump dredge materials, construction materials, and sewage sludge. These sites are shown in Figure 38.[194,195] The Mud Dump, a 2.2 square mile New York Bight Dredged Material Disposal Site, is located approximately 6.0 miles offshore from Highlands, New Jersey off the southern portion of Sandy Hook Peninsula.[194] This site is part of the US Army Corps of Engineers Historic Area Remediation Site (HARS), a 15.7 square nautical mile active dredge material dump site. The water depth at this site is approximately 60 to 70 ft.[194,195] The Twelve-Mile Dump Site, a former sewage sludge dump site for New York City, is located approximately 12 miles seaward of Highlands, New Jersey with a water depth of about 100 ft.[194,195] Cellar Dirt dump site is located east of the Mud Dump and consists of construction debris from the building of New York City's subway system.[194,195] Acid Grounds dump site is located 15 miles east of Long Branch, New Jersey. Water depths are approximately 90 to 100 ft, and the site is not in use today.[194,195] The Wood-Burning Dump is located 18 miles east of Mantoloking, New Jersey. It is not active, and was historically used to dump ashes of burnt wood.[194,195] Industrial waste and sewage sludge were dumped approximately 100 miles offshore of New Jersey at the 106 Mile / Deepwater Dump in several thousand feet of water. This site is too far offshore to be of concern for the construction of offshore wind turbines. None of these sites are within the footprint of the project area or proposed transmission route; however, investigation in the project area is recommended before construction, as any site that was used for dumping would typically have large mounds of unconsolidated material that may pose obstacles to turbine foundations.

5.5. LIQUEFIED NATURAL GAS FACILITIES

Two LNG facilities are proposed within the New York Bight. These LNG Facilities are offshore docking stations that would receive, store, and transport natural gas in the liquefied from. Natural gas takes up one six-hundredth of its space in liquid form, but must be cooled to -260 °F in order to become a liquid.[196] Liquefied gas obtained at LNG facilities is transported in special containers to keep it in the liquid form.[196] The two projects proposed for the New York Bight are Blue Ocean Energy by ExxonMobil and Safe Harbor Energy by Atlantic Sea Island Group.

5.5.1. Blue Ocean Energy

Blue Ocean Energy is ExxonMobil's proposed floating LNG terminal. It would be located 20 miles east of New Jersey and 30 miles south of New York in 150 ft of water.[196] Ships will bring the liquefied natural gas to the floating LNG terminal and the gas will be stored on the terminal. It will then be returned to gas form and distributed to New York and New Jersey through subsea pipelines.[196] The location of the floating LNG facility is south of the project area, however, LNG vessels are anticipated to visit the terminal twice a week, which may induce heavy vessel traffic near the proposed project.[196] If the LNG facility is permitted, this traffic must be considered for the siting and construction of this project. The undersea pipelines must also be considered.

5.5.2. Safe Harbor Energy

Safe Harbor Energy is Atlantic Sea Island's proposal to create an artificial island on the Cholera Banks to be used as an LNG facility. An island will be created as a deepwater port approximately 13.5 miles south of Long Beach, New York and 23 miles southeast of the New York Harbor Entrance in 60 – 70 ft of water.[50] The island will be built between the Ambrose to Nantucket and Hudson Canyon to Ambrose Shipping Lanes in BOEM Lease Block 6655.[50] This proposed facility does not fall within the footprint of the proposed wind project. Figure 8 shows that the location of the BOEM Lease Block 6655 is west of the northwest corner of the Long Island – New York City Offshore Wind Project. LNG vessels will approach the island through the existing shipping channels and offload their liquefied natural gas. This material will be returned to gas form and transported to New York and New Jersey through undersea pipelines. If they are both permitted, buffer zones must be created to prevent vessel collision with the turbines.

Section 6

6. REGULATORY APPROVALS

This section gives an overview of the permits that may be required for this project. The distance from the shoreline where the wind turbines will be built, and placement of cables, will dictate the specific permits that are required. Waters inside the three(3) nautical mile line are in New York State jurisdiction, while waters beyond that line are on the Offshore Continental Shelf (OCS) and are governed by the BOEM. Therefore, specific water related information and data requirements for the environmental permits and/or approvals necessary for the proposed project are presented below.

6.1. FEDERAL LEASES, PERMITS, AND CONSULTATIONS

6.1.1. Bureau of Ocean Energy Management, Regulation, and Enforcement OCS Leasing Process

The BOEM is the lead agency for projects constructed on the OCS. The BOEM has a competitive process upon which leases are granted for blocks on the OCS. Figure 40 shows a flow diagram of the leasing process. The BOEM has the authority to "grant leases, easements, and rights-of-way (ROW) for renewable energy project activities on the OCS, as well as certain previously unauthorized activities that involve the alternate use of existing facilities located on the OCS; and to establish the methods for sharing revenues generated by this program with nearby coastal states. These regulations will ensure the orderly, safe, and environmentally responsible development of renewable energy on the OCS."[207]

The BOEM may grant two types of leases, commercial or limited. A commercial lease is for full power development and lasts for 30 years. There is a six month preliminary phase, a five year site assessment phase, and a 25 year operational phase. It is for a project that will be used to produce, sell, and deliver power to the market.[207] The limited lease is for resource assessment and technology testing and is a five year lease. There is a six month preliminary phase and a five year operational phase. This lease does not result in the production of product for sale.[207] The Long Island – New York City Offshore Wind Project will need to obtain a commercial lease.

The leasing process will follow a competitive track unless BOEM determines that there is no competitive interest. The competitive process begins with a call for information and nominations. For BOEM initiated leases, the BOEM informs the public of the area up for lease and awaits comments from all interested parties. Unsolicited applications may also be posed to BOEM at this time. Following this, BOEM opens the site up for competition.[207] BOEM will then determine the geographic area for environmental analysis. Lease compliance documents must be submitted by interested parties once the geographic area is identified. Within 60 days of issuance of the lease, a Site Assessment Plan (SAP) must be submitted by the lease holder, which will include site characterization activities and survey results. BOEM or a BOEM contractor will prepare National Environmental Policy Act (NEPA) documentation and Coastal Zone Management Consistency Determination. The sale notice is then proposed to the public and opened up for comments.

There is then a final sale notice, a bid evaluation , and the issuance of the lease to the bid winner.[207] Within five years of the lease, the lessee must submit Construction and Operation Plans (COP), which include a Facility Design Report and a Fabrication and Installation Report.[207]

There will also be several bonds and fees associated with the leasing process. There is a $100,000 bond for the lease and an additional bond with the SAP. There will also be an additional $300,000 bond with the COP and leases for the Right of Way (ROW) for the transmission line and Right of Use and Easement (RUE) for the transmission facility (substation).[207] Once power generation begins, there will be an operating fee for commercial leases and a decommissioning fee.[207]

There may be other federal permits or consultations required for development. Below is a list of anticipated permits and consultations that may be required.

6.1.2. Joint USACE / NYSDEC Permit Application

The Joint Application is an application to both the US Army Corps of Engineers and the New York State Department of Environmental Conservation for projects that are proposed to impact streams, waterways, water bodies, wetlands, coastal areas, and sources of water supply in New York State. The USACE and NYSDEC permits included within are discussed below.

6.1.3. USACE: Section 404 of the Clean Water Act

Section 404 of the Clean Water Act regulates the placement of dredged or fill material in navigable waters. Activities requiring a 401 Permit from USACE include the placement of a pier, wharf, bulkhead or jetty, and work, including dredging, disposal of dredged material, filling excavation or other modification of a navigable water.

6.1.4. USACE: Section 10 of the Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act (33 U.S.C. 403) prohibits the obstruction or alteration of navigable waters of the United States without a permit from the Army Corps of Engineers.

6.1.5. U.S. Fish and Wildlife Service (USFWS)

All proposed actions that have any federally listed threatened or endangered species or proposed critical habitat on-site must be discussed with the USFWS. This consultation is required as part of the Endangered Species Act and the Fish and Wildlife Coordination Act.

6.1.6. National Marine Fisheries Service (NMFS)

Essential Fish Habitats, the Marine Mammal Protection Act, and the Endangered Species Act, Section 7 will require the involvement of the NMFS.

6.1.6.1. Essential Fish Habitat Assessment (EFH). Any federal agency that authorizes, funds, or conducts activities that may adversely affect essential fish habitat (EFH) is required to consult with NMFS to minimize damage to EFH. This is outlined in section 303(a)(7) of the amended Magnuson-Stevens Fishery Conservation and Management Act.

The Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), set forth several new mandates for the U.S. Department of Commerce (USDOC), NOAA, NMFS, as well as regional fishery management councils and other federal agencies, to identify and protect important marine and anadromous fish habitat. Although the concept of EFH is similar to "critical habitat" under the Endangered Species Act of 1973, measures recommended to protect EFH are advisory, rather than prescriptive.

NMFS Mid-Atlantic Fishery Management Council has identified and delineated EFH in their fishery management plan. EFH is defined in the Magnuson-Stevens Act as "…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."[13] Additionally, the EFH includes associated physical, chemical, and biological properties used by fish and necessary to support a managed level of fish biomass production. The main goal of the EFH is to ensure a sustainable harvest of fisheries resources.[13]

Federal and State agencies that fund, permit, or carry out activities that may adversely impact EFHs are required to consult with NMFS regarding the potential effects of their actions on EFHs. The contents of an EFH assessment should include:[13]

- A description of the proposed action;
- Analysis of the effects (including cumulative) of the proposed action on EFHs, the managed fish species, and major prey species;
- The federal agency's views regarding the effects of the action on EFHs;
- Proposed mitigation, if applicable, and
- On-site inspection, views of experts on the habitat, literature review, analysis of alternatives of the proposed action, and other relevant information, if appropriate.

Potential impacts to EFHs will need to be conducted during site-specific evaluations of the project.[122] It will be necessary to conduct consultations with NMFS and USFWS, as directed in the Endangered Species Act, to identify impacts to possibly threatened or endangered species in the project area.[122] The consultations will also include measures to reduce potential impact to listed species.[122]

6.1.6.2. Marine Mammal Protection Act (MMPA). Marine mammals are protected under the MMPA, which prohibits the take of marine mammals by US citizens and in US waters, with certain exceptions, and the importation of marine mammals and projects into the US.[22] As the project may impact these mammals, it is recommended that project proponents discuss permitting needs with NMFS' Office of Protected Resource Permits, Conservation, and Education Division.[22]

6.1.6.3. <u>Endangered Species Act, Section 7 Consultation.</u> Under Section 7 (a)(2) of the Endangered Species Act, any federal agency authorizing, funding, or carrying out an action is required not to jeopardize the continued existence of any endangered or threatened species. Any action as part of this wind project that would impact fish, marine mammals, and/or sea turtles would require consultation, permits, authorizations, leases, easements, and rights of way issued by the USACE and BOEM.[22]

It should be noted that at this time the Atlantic sturgeon receives no protection under the ESA, however, a decision on the federal status is anticipated in the fall of 2010, and conservation actions are recommended along with obtaining the updated status of the species from NMFS prior to submittal of any applications.[22]

6.1.7. Federal Aviation Administration (FAA)

A consultation should be conducted with the FAA to determine any aviation conflicts with the project. Initial consultation with the FAA's Eastern Terminal Operations indicated that there were no immediate FAA issues with the project.[191]

6.1.8. United States Coast Guard (USCG)

A consultation should be conducted with the USCG to determine any navigation conflicts with the project. The Waterways Management Coordinator of the USCG, Sector New York, indicated that navigation channels and separation zones should be considered exclusion zones for the project.[191]

6.1.9. Harbor Operations Committee

The Harbor Operations Committee has established an Alternate Energy Sub-committee to review offshore wind projects and facilitate communication between agencies for navigation.[191] This committee should be consulted during the permitting process.

6.2. STATE PERMITS AND CONSULTATIONS

6.2.1. NYS Public Service Commission: Article VII Application for Transmission Lines

The Article VII Application is a certification review process for major electric and fuel gas transmission facilities. Transmission lines of 100 kV[2] extending 10 miles or more, or a line of 125 kV extending one mile or more are covered under this process. This application enables the public to take part in the review process. This application process establishes a single forum for reviewing need and impact of major electric and gas transmission facilities.

6.2.2. NYSDEC: Tidal Wetlands Permit

The guidelines for determination for tidal wetlands are contained in Article 25, Environmental Conservation Law - Land Use Regulation 6NYCRR, Part 661. Tidal wetlands include all tidal waters of the state and tidal marshes, flats and shorelines. The Tidal Wetlands Act permit program regulates activities in tidal wetlands and their adjacent areas. These adjacent areas extend 300 ft inland from the wetland boundary. A permit will be required from NYSDEC for almost any activity that will alter wetlands or the adjacent areas.

6.2.3. NYSDEC: Protection of Waters Program

Under Article 15, Title 5 of the Environmental Conservation Law, the NYSDEC regulates certain activities on water bodies throughout New York State. Specifically, the regulations cover construction, reconstruction and expansion of piers, wharfs or breakwaters in navigable waters of the State. The regulations also apply to dredging, excavation or placement of fill in navigable waters. Protection of Waters permits will apply to some of the sites described below.

6.2.4. NYSDEC: Water Quality Certification Program 6 NYCRR Part 608

Pursuant to Section 401 of the Clean Water Act, activities requiring a 401 permit include the placement of a pier, wharf, bulkhead or jetty and work, including dredging, disposal of dredged material, filling excavation or other modification of a navigable water. The water quality certificate is a determination that the discharge will comply with established New York water quality standards.

6.2.5. NYSDEC: Article 34 - Coastal Erosion Hazard Areas

If the project area lies within a mapped coastal erosion hazard area, a Coastal Erosion Management Permit will be required. This program is often managed on the local level. Excavation, grading, dredging or mining in a nearshore erosion zone requires a permit. Nevertheless, permits for dredging may be issued for constructing or maintaining navigation channels. Any deposition of clean sand or gravel in a nearshore zone will require a management permit. A permit is also required for new construction, modification, or restoration of docks, piers, wharves, jetties, groins, seawalls, bulkheads, breakwaters, and artificial beach nourishment. Docks, piers, or structures built on floats, columns, open timber, piles or similar open-work supports having a top surface area of 200 square ft or less are exempted from this permit requirement.

A Coastal Erosion Management Permit for deposition of material on beaches will be issued only for expansion or stabilization of beaches. Clean sand or gravel of a slightly larger grain size must be used.

6.2.6. NYS Department of State (NYSDOS): Consistency Review

The NYSDOS requires the permittee to comply with the Coastal Zone Management (CZM) Consistency Determination pursuant to Section 307 (c) (1) of the Coastal Zone Management Act. The NYSDOS defines the coastal zone as New York's coastal waters and adjacent shore lands to approximately one thousand ft inland. This includes, but is not limited to, the East River, Harlem River, Long Island Sound and the Atlantic Ocean, including their connecting water bodies, bays, harbors, shallows, and marshes. The project area lies within the CZM jurisdiction and must be addressed during the permitting process.

6.2.7. NYS Office of General Services: Grants of Underwater Lands

This is an application for the use of land underwater pursuant to Article 2 Section 3 Subdivision 2 of the Public Lands Law. It is a petition for an easement for pipelines, cables, docks, wharves, moorings, and permanent structures underwater.

6.2.8. NYS Historic Preservation Office (SHPO): Environmental Consultation

Under Section 106 of the national Historic Preservation Act and Section 14.09 of the New York State Historic Preservation Act, SHPO ensures that impacts on eligible and listed properties are considered and avoided or mitigated during the environmental planning process. The consultation process has two stages: during the first, the property is assessed by the National Register Unit to determine if it is listed or eligible for listing. If the property is listed or eligible, the Technical Services Unit determines the impact on the property. There is also a Cultural Resource Survey Guide for Wind Projects in New York State, which includes a survey of historic buildings, archaeological survey, and electronic data survey.

6.3. PERMIT APPLICATION PROCESS

Generally, the permit application process involves selection of the permits to be acquired, negotiation with the responsible agencies, collection and acquisition of all relevant data needed to support the application, and filling out of the application. While the process sounds straightforward, experience shows that this is rarely the case. The data may be incomplete, field programs may need to be planned and implemented, agency conflicts over jurisdiction of data interpretation may arise, and intervener groups can complicate the process. After submission, the applications are reviewed and sometimes returned as incomplete with requests for more data. Depending on the permit involved, public hearings also may need to be held.

Section 7

7. POTENTIAL NATURAL RESOURCE FIELD STUDIES

This section addresses the potential natural resource field studies that may be required to support a NEPA EIS for the proposed wind project. Potential avian future studies have been addressed in a corresponding report for this project, *Pre-Development Assessment of Avian Species for the Proposed Long Island – New York City Offshore Wind Project Area*. Therefore this projection is for all other biological natural resources that could be impacted by construction and operation of the wind project.

It is important to note that this is a projection; the actual field studies will be defined during the EIS Scoping Process. The Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEM) – formerly Minerals management Service (MMS) – will be responsible for specifying the field programs required. BOEM will, in turn, be guided with input from federal agencies such as the United States Fish & Wildlife Service (USF&WS), National Marine Fisheries Service (NMFS), the Army Corps of Engineers (ACOE) and possibly other federal agencies.

On the state level, agencies become involved for the transmission cable segment from the three-mile boundary to the planned onshore substation—presumably in New York. Primary responsibility lies with the New York State Department of Public Service (DPS), with the developer preparing an Article VII Application that is on a separate regulatory path but analogous to an EIS. In turn, the DPS will consult with the Department of Environmental Conservation (DEC), the Department of State (DOS), and possibly other agencies.

7.1. POTENTIAL FEDERALLY MANDATED STUDIES

Predicting the nature and depth of future natural resource studies is an educated guess until the scoping process is completed. Even then, other elements can be added at a later date. Nevertheless, the BOERME has prepared a Programmatic EIS (PEIS) for offshore wind projects (details can be found at http://ocsenergy.anl.gov/). The PEIS discusses natural resource inventories and impact analyses that might be used for new projects. It does not, however, mandate the details of any particular studies.
Guidance can be also found from the experience of two U.S. offshore wind projects: Cape Wind in Massachusetts, and the Long Island Offshore Wind Park in New York. Cape Wind is still under development, while the Long Island Offshore Wind Park is not.

Another very important resource is the extensive databases collected, collated and analyzed by the numerous wind projects constructed in European waters. The environmental documents prepared for those projects explored in detail virtually every conceivable natural resource impact from construction and operation of offshore wind farms. In summary, these databases show that offshore wind farms have only minimal impact on the non-avian natural resources. The conclusion drawn might be well used to guide the extent and duration of proposed studies for future U.S. based wind projects.

BOERME does provide some guidance: “Lessees shall evaluate marine mammal use of the proposed project area and design the project to minimize and mitigate the potential for mortality or disturbance. The amount and extent of ecological baseline data required will be determined on a project basis” (MMS PEIS, 2007). Based on this, it would seem that as a minimum there should be a census of marine mammals and threatened and endangered sea turtles. This type of survey need not be a dedicated one, as it could be done in conjunction with avian surveys that will almost certainly be required.

There is, however, a caveat: in 2007 the New Jersey Department of Environmental Protection (NJDEP) contracted Geo-Marine Incorporated to conduct baseline surveys. The objective of the surveys was to conduct baseline studies in waters off New Jersey’s coast to determine the current distribution and use of this area by ecological resources. The NJDEP stated that: “The spatial and temporal distribution of marine mammal and sea turtle baseline data for these studies were determined during the 18 month avian baseline study. Three sampling techniques were used to determine the distribution of and behavior of marine mammals in the study area and included aerial line transects, boat line transects and acoustic sampling” (NJDEP, 2009). Since this data is relatively recent and applicable it may be used directly in the planned EIS, possibly even replacing the need for conducting additional field programs. That will depend on the outcome of the scoping processes.

The Cape Wind environmental studies included extent and species composition of benthic community in the project area. These studies are useful because the species composition gives an accurate assessment of the overall habitat health.

Since the planned wind farm construction will provide hard surface habitat where none (or little) is at present, this provides opportunity for growth of epibenthic species that can attach and grow on such surfaces. This is also known as the artificial reef effect. The encrusting organisms provide food for a variety of finfish species and would become a resource for recreational fisherman much as artificial reefs and shipwrecks are used. Colonization plates can be set in place on site and retrieved at a later date to determine the types of colonizing organisms expected for the wind farm structures.

In summary then, the most likely non-avian field programs for federal waters would be:

- Surveys for marine mammals
- Surveys for threatened and endangered sea turtles
- Benthic invertebrate species composition and abundance
- Epibenthic colonization plate survey

The above projections are conservative because the existing mammal and sea turtle census data may prove sufficient.

7.2. POTENTIAL STATE MANDATED STUDIES

For the shoreline to the three-mile boundary, the marine mammals and sea turtles would be assessed as a continuation of the federal surveys as would benthic communities. In addition, a surf clam (a commercial resource) survey would likely be needed for the clam beds immediately offshore of the Rockaway Peninsula.

Assuming the transmission cable crosses the Rockaway Peninsula and continues under Jamaica Bay, there would need to be a botanical and wildlife study of the crossing zone. In Jamaica Bay, benthic invertebrate community composition and abundance will need to be surveyed along the planned route. In the event that the route is proposed through the intertidal marshes (as opposed to channel waters), a detailed marsh study would be needed as would a mitigation plan for loss or alteration of wetlands. Natural resource impacts along the shoreward route to the substation would likely be negligible since the area (Brooklyn) is so densely urbanized.

In summary then, the most likely non-avian field programs for state waters would be:

- Surveys for marine mammals
- Surveys for threatened and endangered sea turtles
- Benthic invertebrate species composition and abundance
- Surf clam assessments
- Peninsula crossing zone botanical and wildlife surveys.

Section 8

8. CONCLUSIONS

The natural resources assessment did not identify any major barriers or fatal flaws that are currently likely to preclude development of an offshore wind project within the proposed project area southeast of Rockaway Peninsula, Long Island. Nonetheless, the natural resources in the area are sensitive and should be carefully considered when siting and constructing the project. The assessment discussed the natural resources that may be found in the project area and determined the possible impacts that might occur to these natural resources. The anticipated impacts to natural resources in the New York Bight are partially based on impacts observed from research at European offshore wind projects.

The greatest impacts would be during the construction process, which would be short term. Pile driving during the construction phase would likely induce the greatest impact, and noise related injury may occur to marine mammals and fish in the area. Jet plowing for cable installations, vessel strikes, and transmission landfall in sensitive habitats may also impact natural resources in the area. Mitigation measures, such as the implementation of exclusion zones, no-work windows during critical times of the year, and environmentally-sensitive construction methodologies (e.g., HDD) may reduce impacts.

The potential long lasting impacts of project development would include noise and EMF generated by the operation of the turbines, the presence of turbines and foundations in fishing areas, and visual impacts to nearby communities. Noise will be continuous and may be perceived by fish, sea turtles, and marine mammals outside of the proposed wind project area. EMF may impact migration of some species and disorient movements.

The presence of turbines in fishing grounds may or may not significantly impact commercial fishing. The level of impact will depend on the limitations placed on fishermen in the area. The most common type of gear used in the area is otter trawl, which is dragged across the sea floor. Trawl fishing may be impacted if this type of gear is not allowed within the project area following development. A positive result of development for fishing communities would be the artificial reef structures created by the turbine foundations and scour protection. The introduction of hard substrate into an otherwise flat, sandy bottomed area may cause the colonization of organisms around foundation structures. These organisms may serve as food for fish, creating a localized habitat, similar to an offshore reef. The reef habitat would benefit recreational fishermen if fishing is permitted within the wind project.

An evaluation of existing uses of the New York Bight indicated the presence of multiple WTAs that overlap the proposed project area. Although the presences of these WTAs may not preclude wind development within the project area, turbine siting may be affected.

Although the data reviewed and summarized for this report is representative of known natural resources in the vicinity of the project area, further data collection and analysis will be necessary should the project proceed to the permitting and development phase. Site specific field studies will be defined during the EIS scoping process by the BOEM, with input from other federal agencies, and by applicable New York State agencies (e.g., Department of State, Department of Environmental Conservation, Department of Public Service) as well. Natural resource (non-avian) field studies likely to be required by both federal and State agencies during the environmental impact review process include, but are not limited to, surveys for marine mammals, threatened and endangered sea turtles, and benthic invertebrate species composition and abundance. Additionally, federal agencies may require epibenthic colonization plate surveys and state agencies may require surf clam assessments and peninsula crossing zone botanical and wildlife surveys.

Section 9

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APPENDIX A

FIGURES

Figure 1
Long Island – New York City Offshore Wind Collaborative Project Area

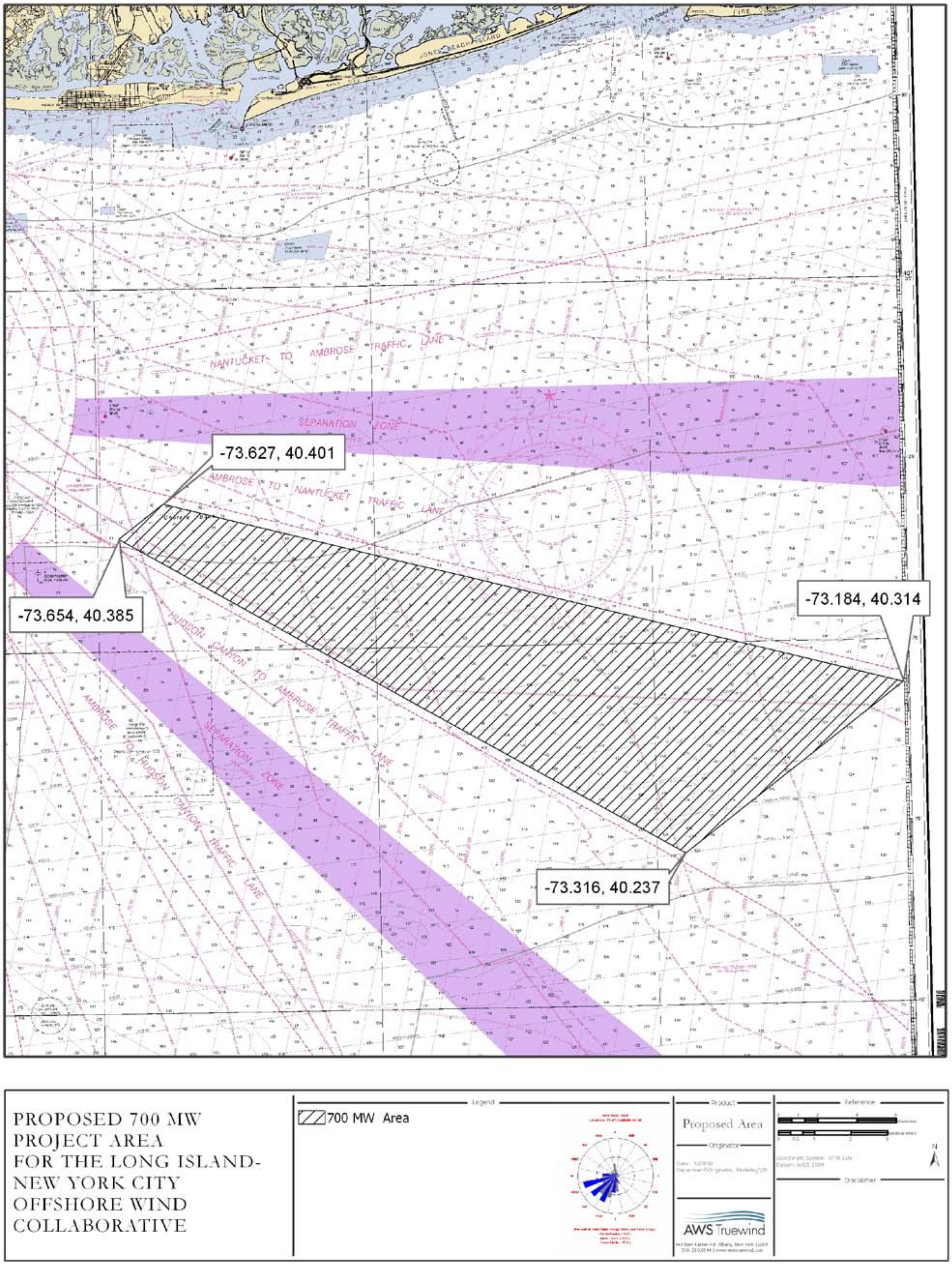
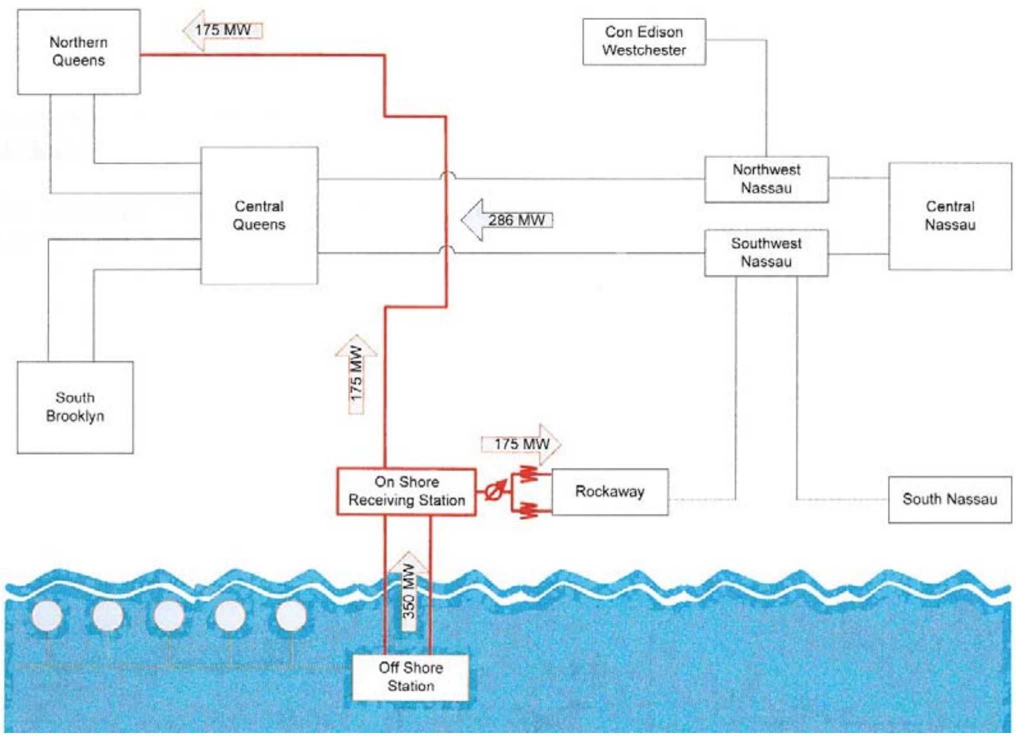
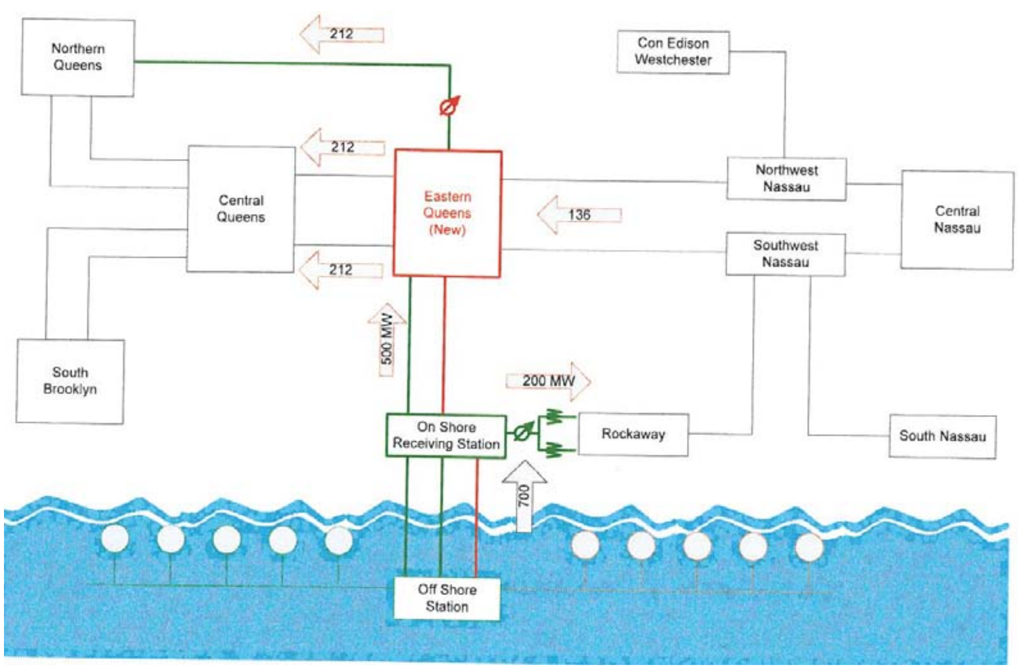


Figure 2
Substation Locations

Figure 3
Phased Transmission System



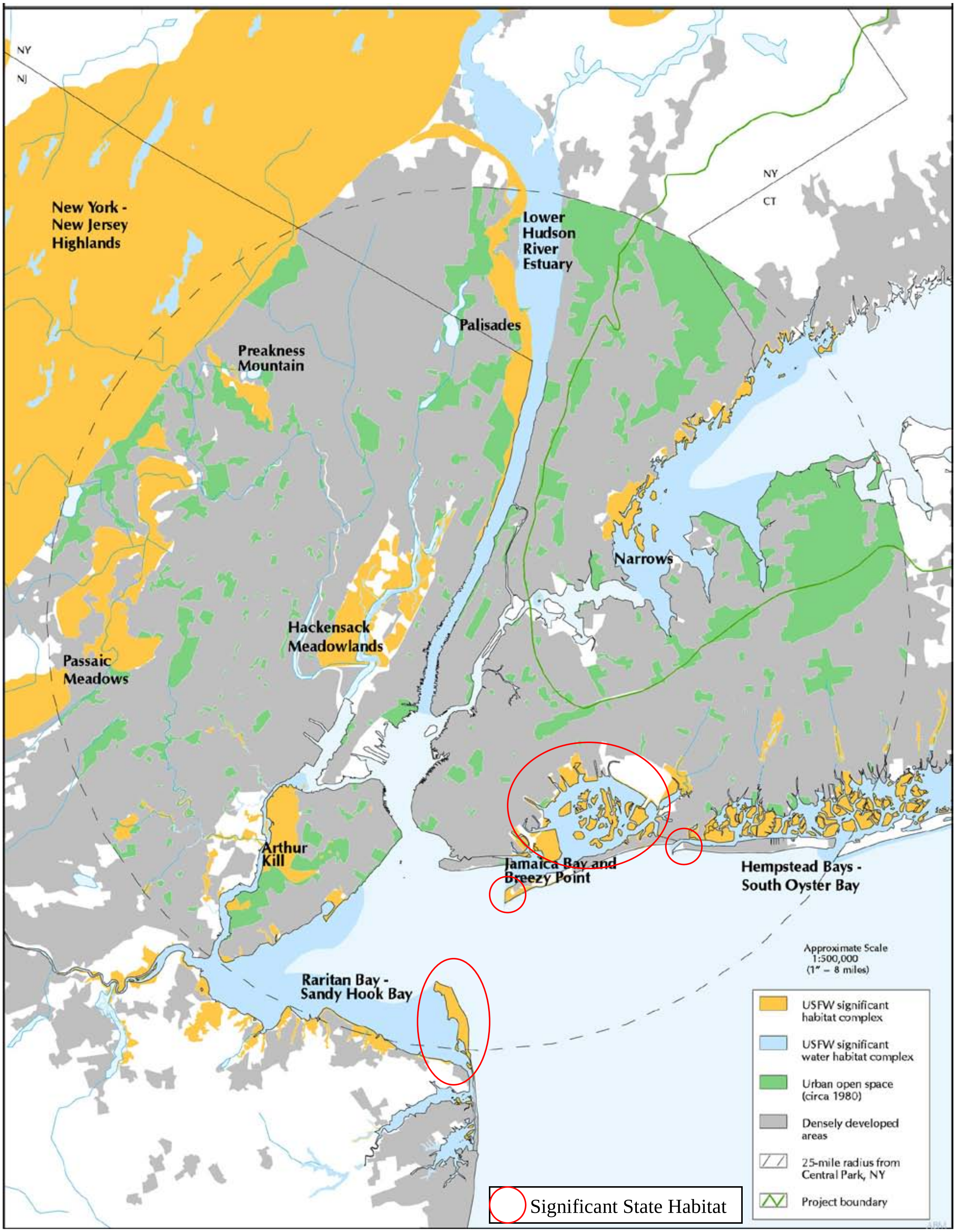
Phase I



Phase II

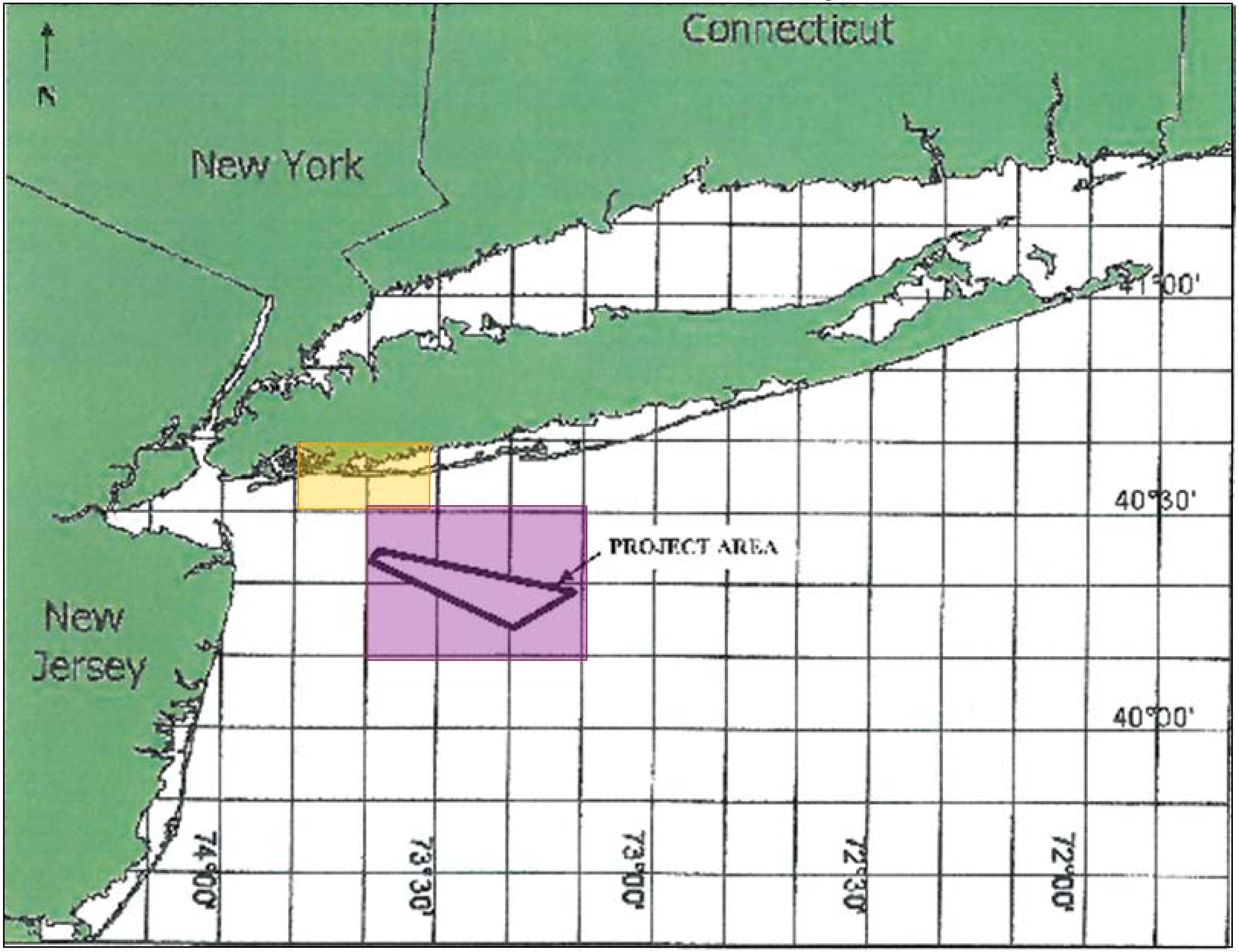
Source: ConEdison and LIPA. 2009. Joint Con Edison – LIPA Off-Shore Wind Power Integration Project Feasibility Assessment (Draft). March 20, 2009.

Figure 4
Significant Habitat Complexes in the New York – New Jersey Harbor Area



Source: US Fish and Wildlife Service. 1997. Significant Habitats and Habitat Complexes of the New York Bight Watershed.

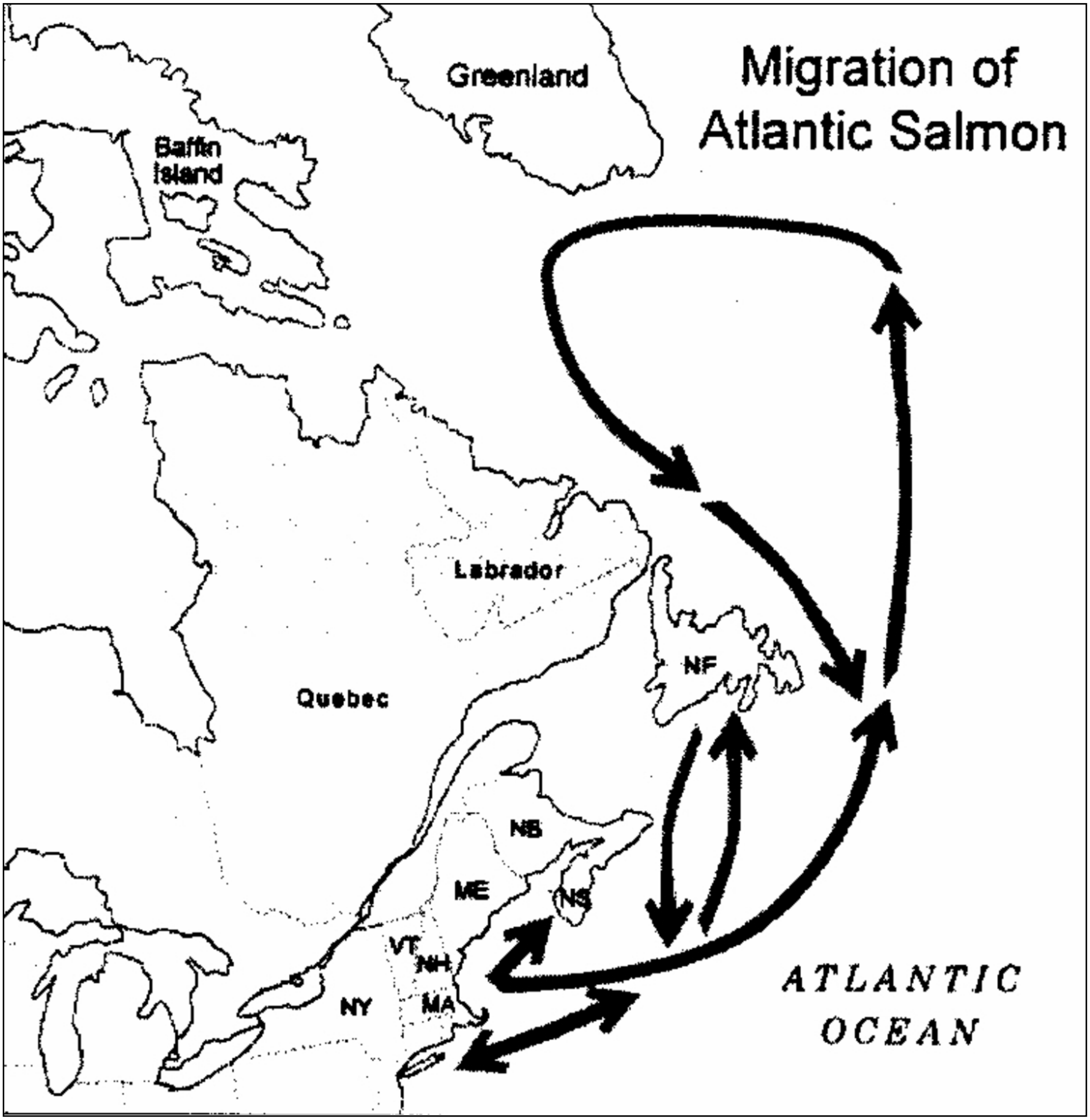
Figure 5
Essential Fish Habitat Grids for Project Area



Source: Summary of Essential Fish Habitat (EFH) Designation. National Marine Fisheries Service Web Page. http://www.nero.noaa.gov/hcd/webintro.html Accessed 04/05/10.

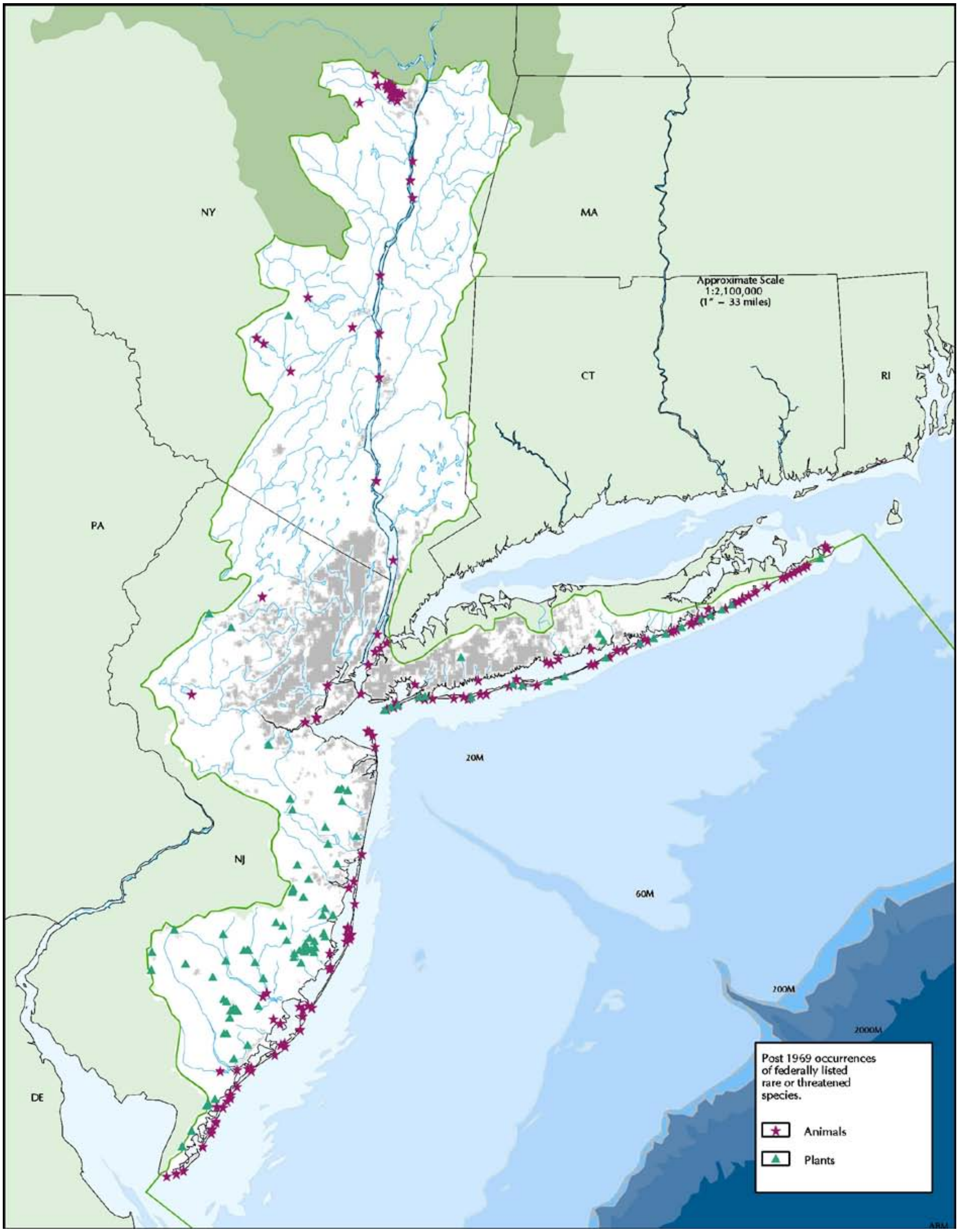
■	Possible Cable Route Grids
■	Target Area Grids

Figure 6
Migration Routes of Atlantic Salmon



Source: National Marine Fisheries Service. 2010. Office of Protected Resources. Atlantic Salmon Web Page. Accessed 03/01/2010.

Figure 7
Federally Endangered and Threatened Species Along New York Bight Coastline



Source: US Fish and Wildlife Service. 1997. Significant Habitats and Habitat Complexes of the New York Bight Watershed.

Figure 8
BOEMRE Lease Blocks in Project Area

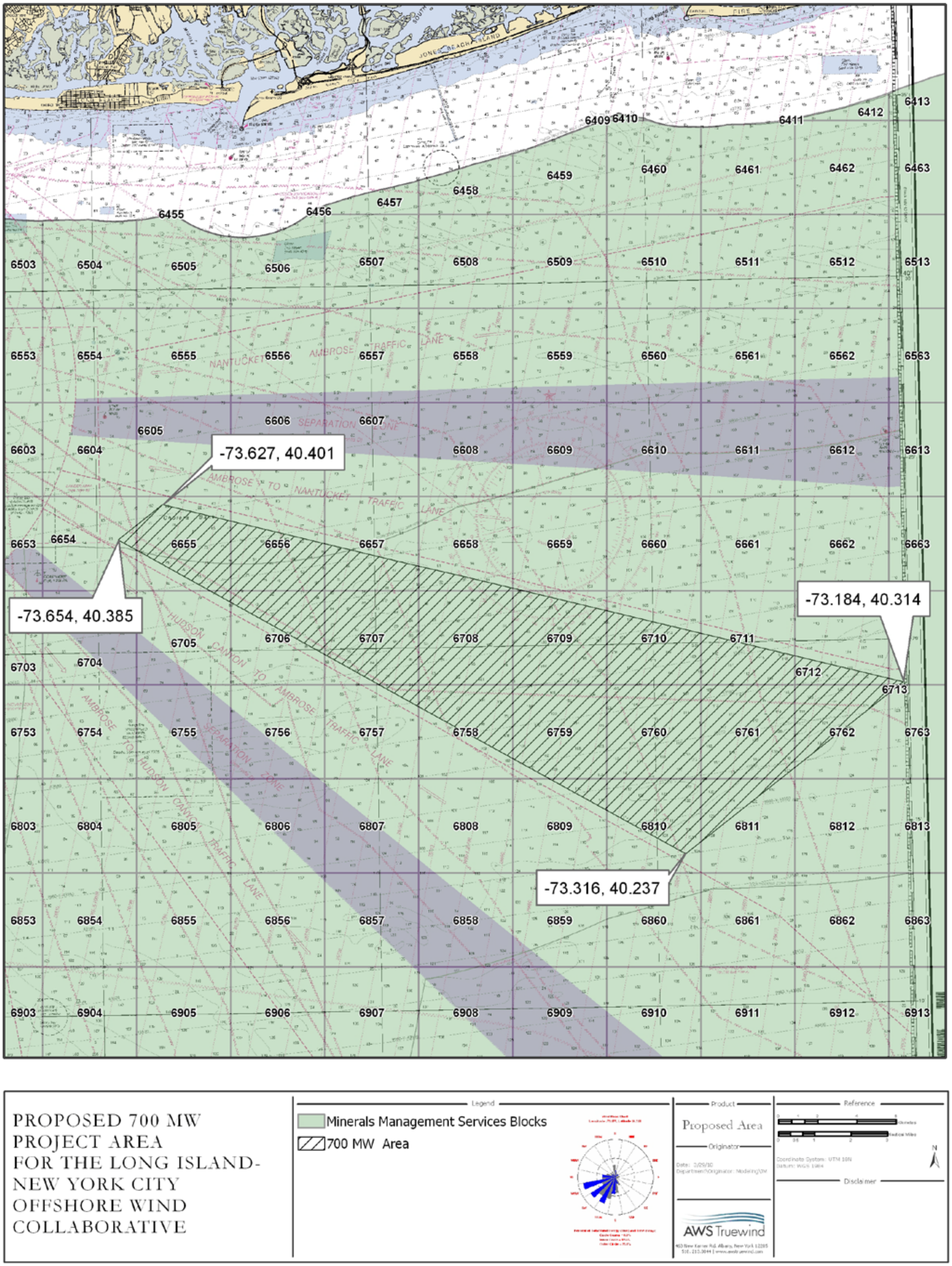
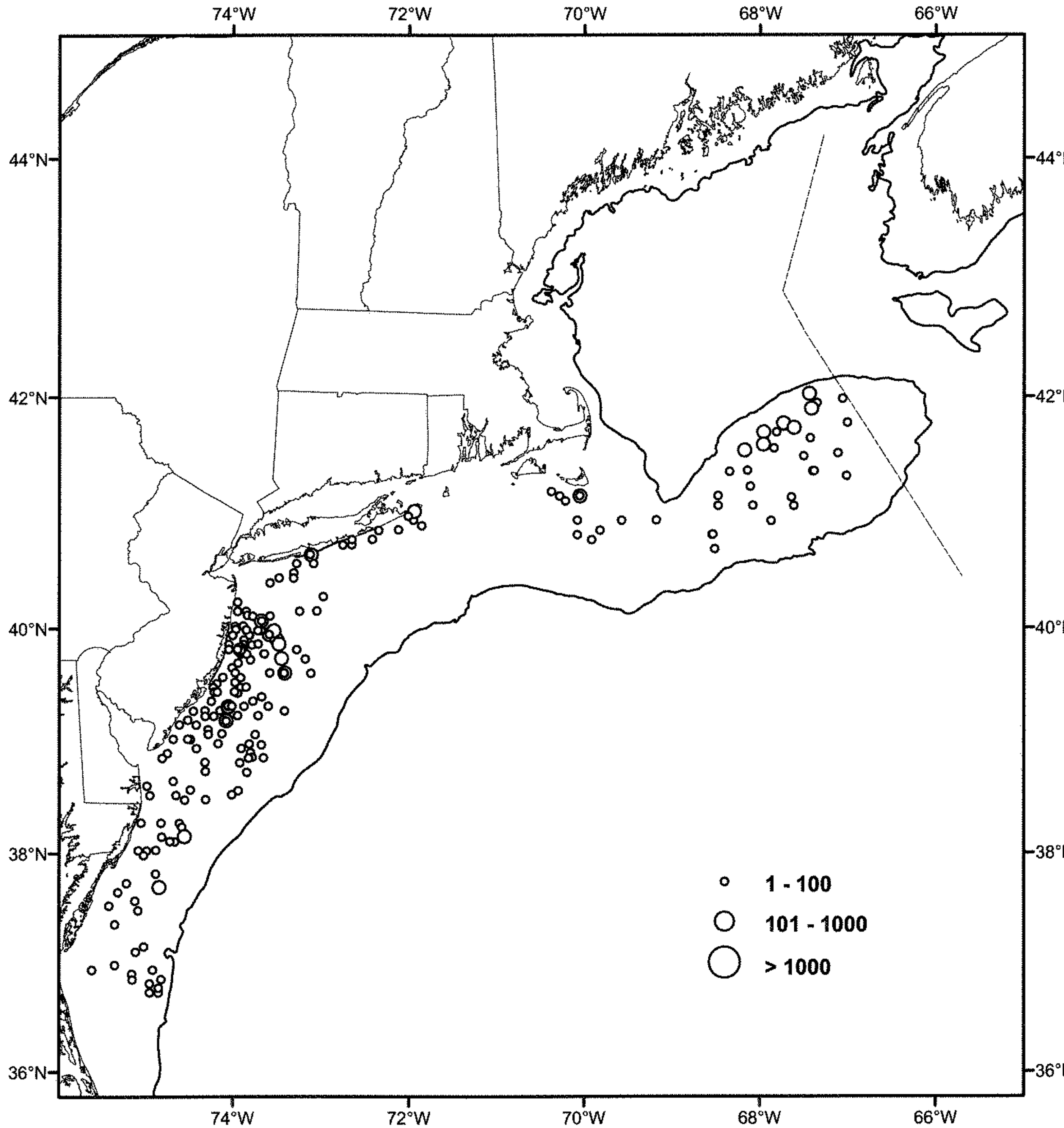
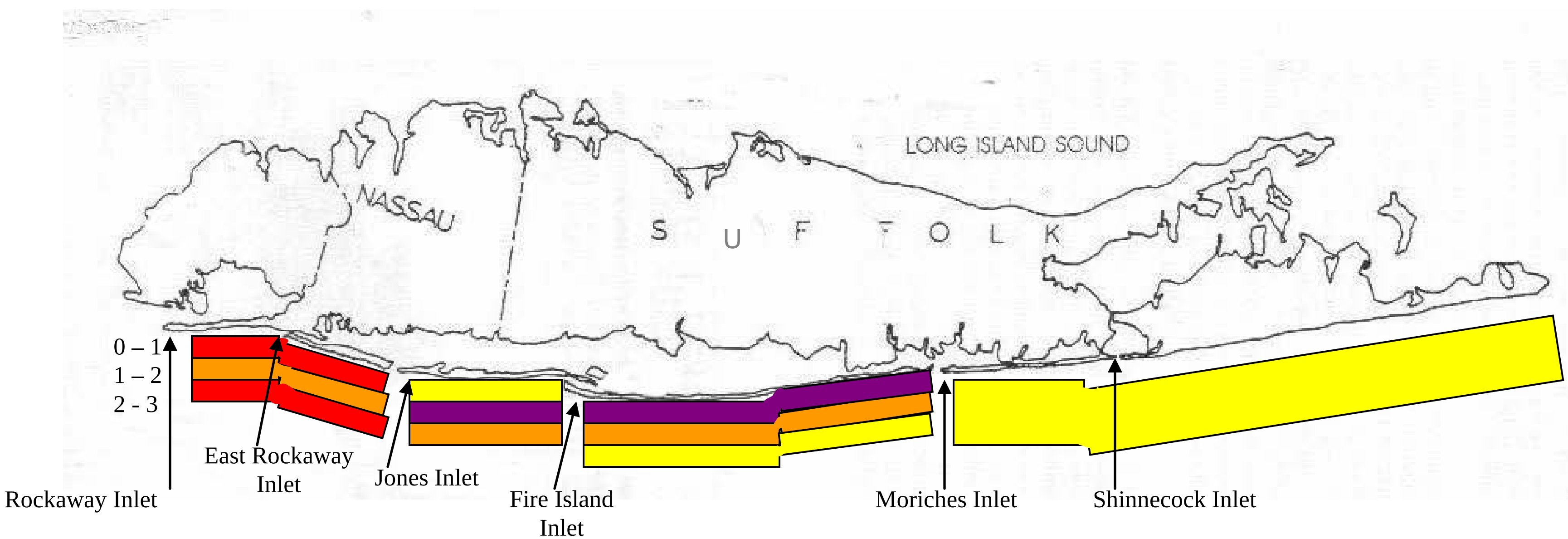


Figure 9
Atlantic Surf Clams Collected During 2008 NMFS Survey



Source: National Marine Fisheries Service. 2008. Resource Survey Report. Surfclam / Ocean Quahog. Delmarva Peninsula – Georges Bank. June 30 – August 07, 2008.

Figure 10
Population Estimates of Atlantic Surf Clams
South Shore of Long Island, NY



Key:
(Surf clam population estimate in millions of industry standard bushels)

0 – 0.5

0.6 – 1.0

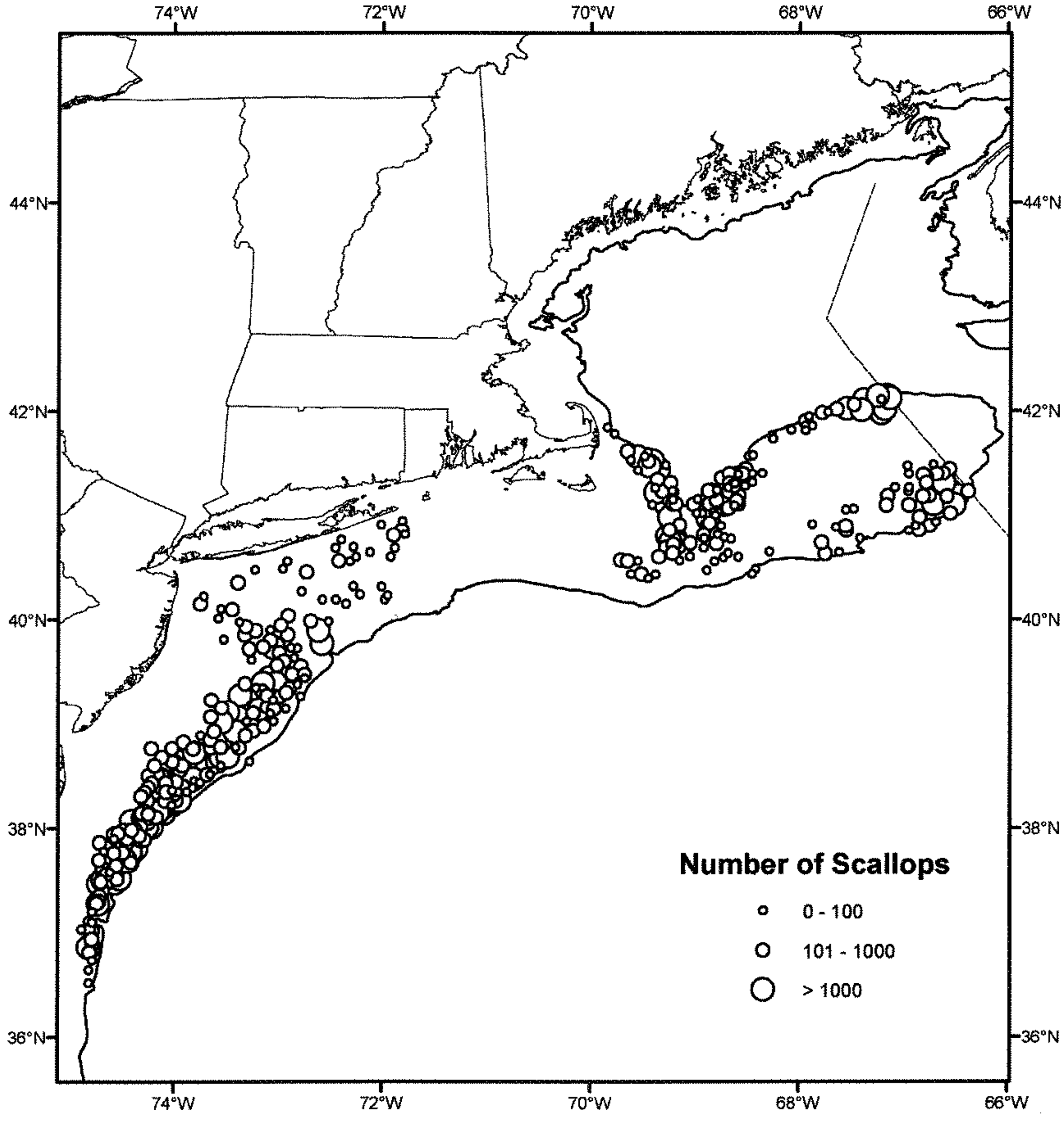
1.1 – 1.5

1.5 and greater

Stock assessments are made along three strata:
0 – 1 mile offshore
1 - 2 miles offshore
2 - 3 miles offshore

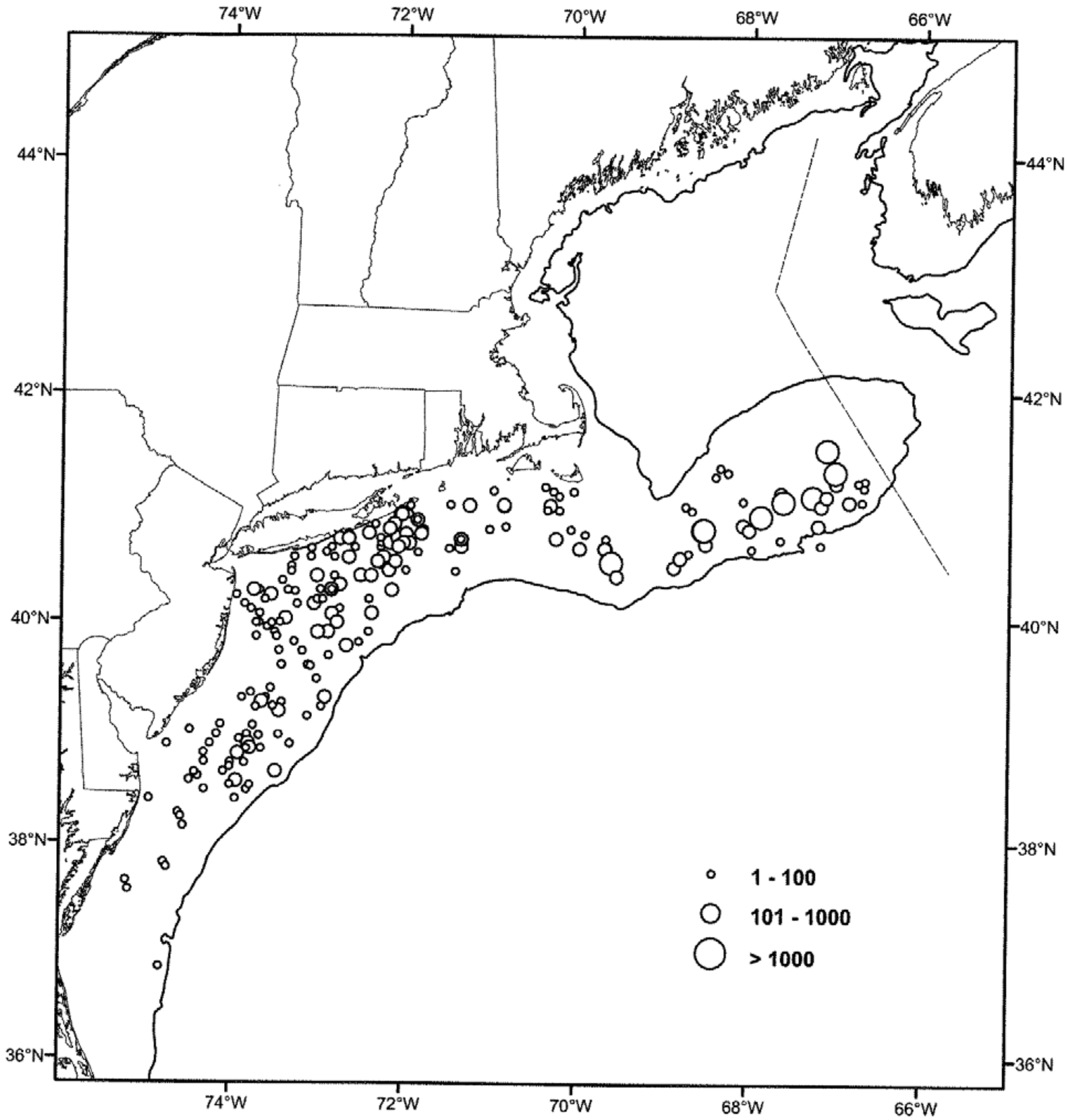
Source: New York State Department of Environmental Conservation. 1999. Draft NY Surf Clam Stock Assessment

Figure 11
Sea Scallops Collected During 2008 NMFS Survey



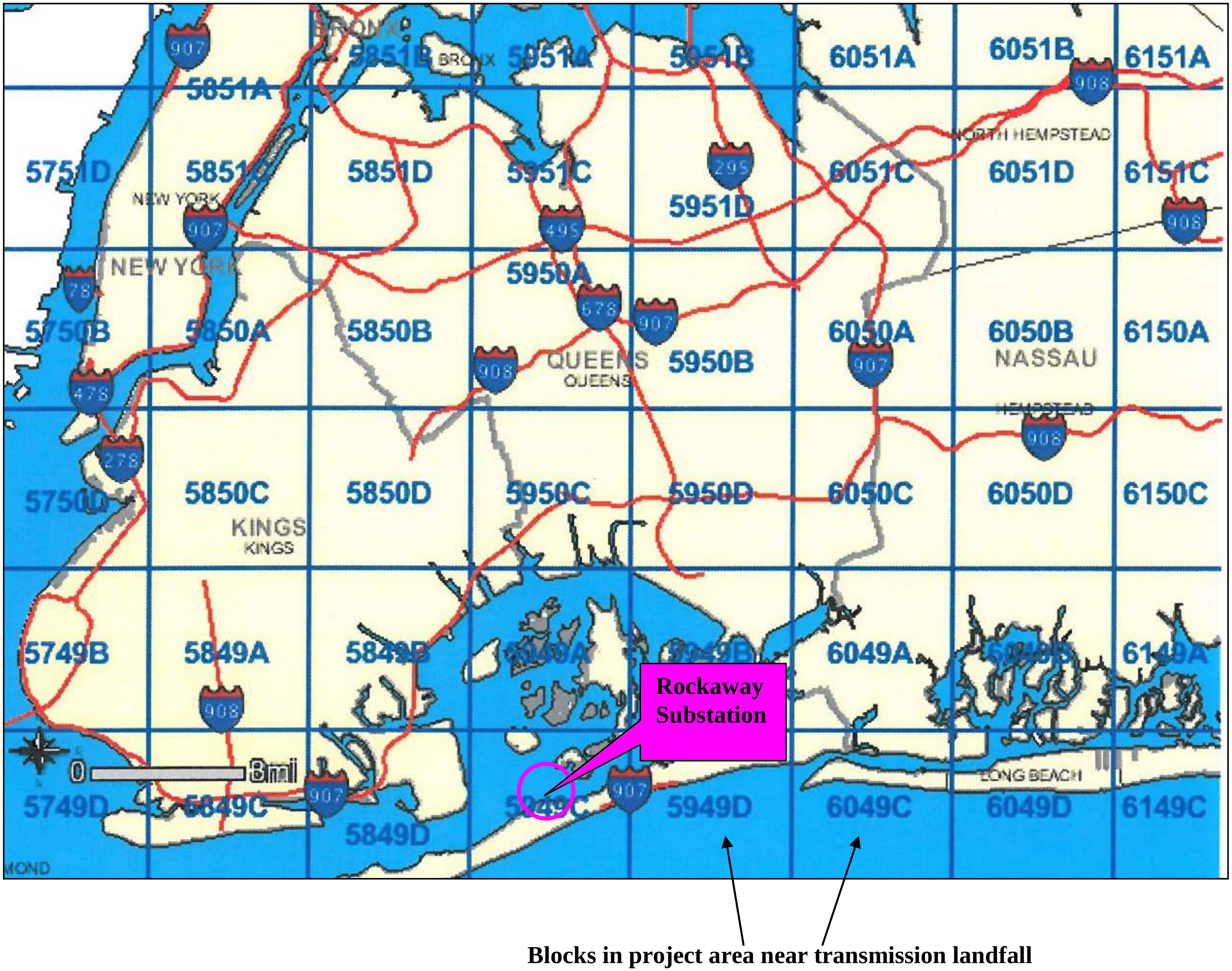
Source: National Marine Fisheries Service. 2008. Resource Survey Report. Sea Scallop Survey. Cape Hatteras – Georges Bank. June 22 – August 06, 2008.

Figure 12
Ocean Quahogs Collected During 2008 NMFS Survey



Source: National Marine Fisheries Service. 2008. Resource Survey Report. Surfclam / Ocean Quahog. Delmarva Peninsula – Georges Bank. June 30 – August 07, 2008.

Figure 13
New York State Breeding Bird Atlas Survey Blocks



Source: New York State Department of Environmental Conservation. 2010. New York State Breeding Bird Atlas. http://www.dec.ny.gov/imsmaps/bbatlas/viewer.htm Accessed 03/17/10.

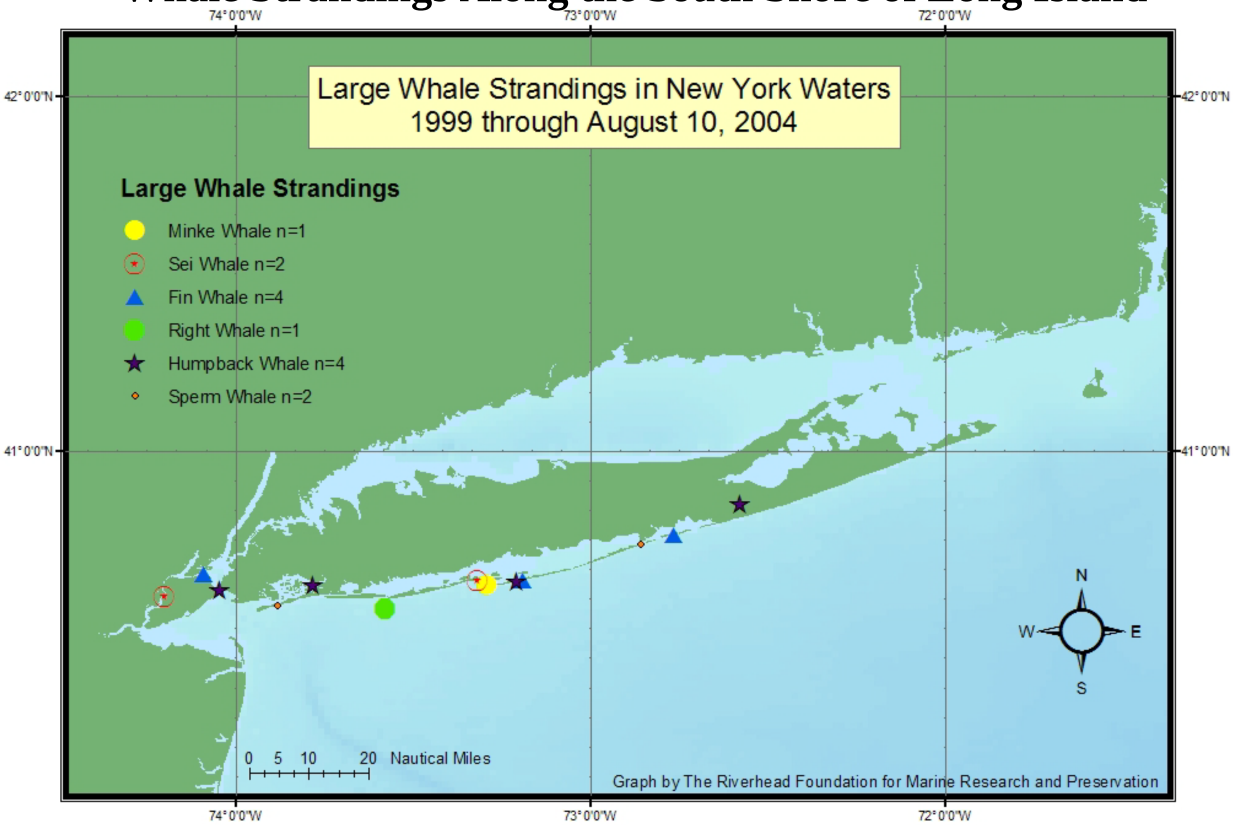
Figure 14
NYSDEC Long Island Colonial Waterbird and Piping Plover Survey Sites

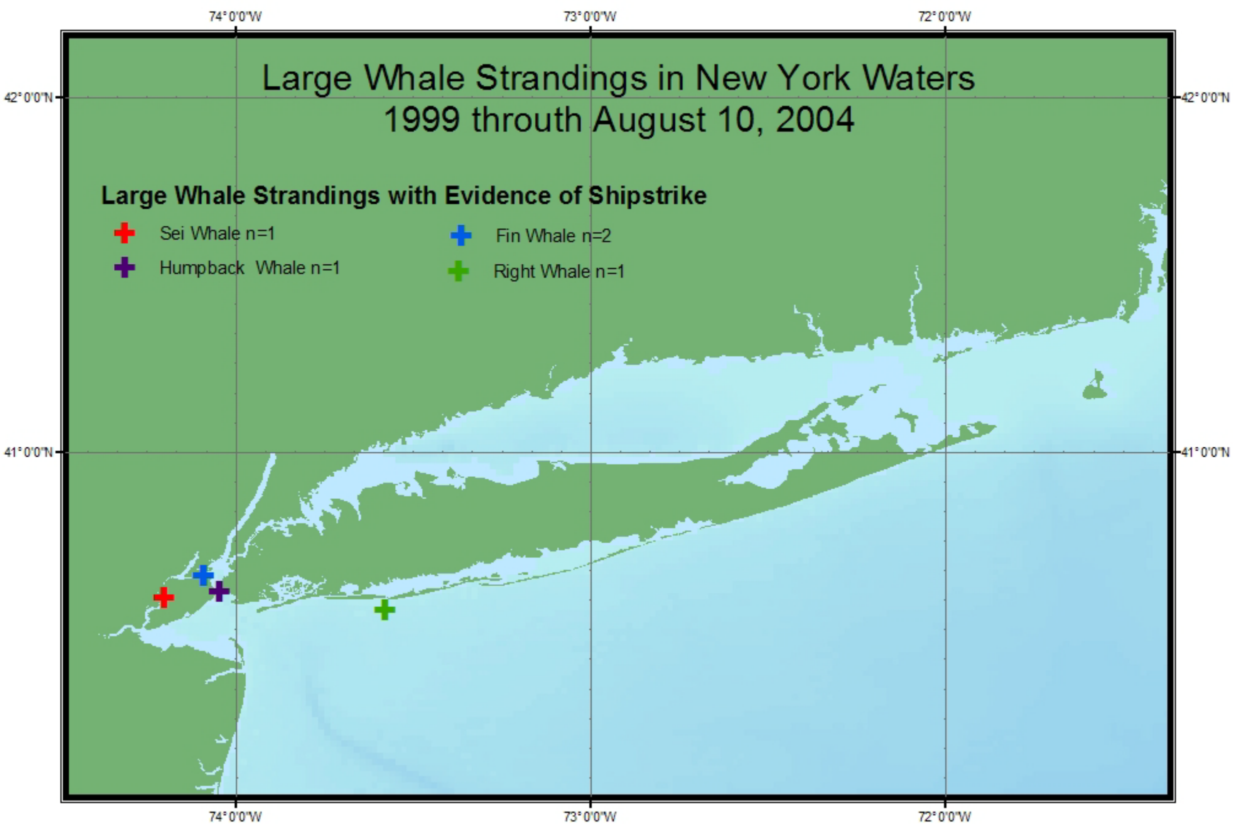
Source: New York State Department of Environmental Conservation, Division of Fish, Wildlife, and Marine Resources. 2002-2008. Long Island Colonial Waterbird and Piping Plover Survey Results.

Figure 15
Potential Habitat for Protected Species

Sources: New York State Department of Environmental Conservation, Division of Fish, Wildlife, and Marine Resources. 2002-2008. Long Island Colonial Waterbird and Piping Plover Survey Results.
New York City Department of Housing Preservation and Development. October 2003. Final Environmental Impact Statement for the Arverne Urban Renewal Area. CEQR #: 02 HPD 004 Q.

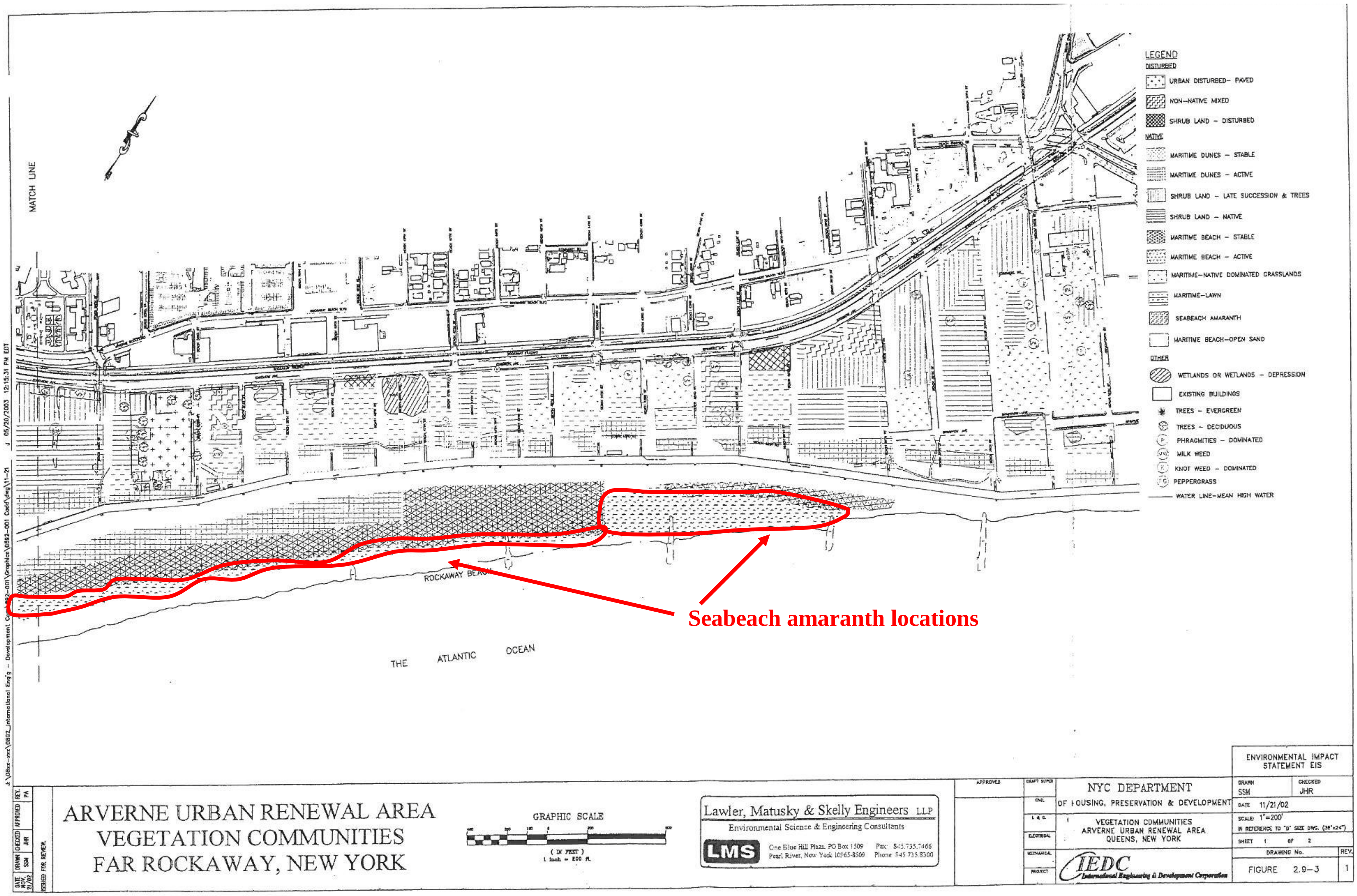
Figure 16
Whale Strandings Along the South Shore of Long Island





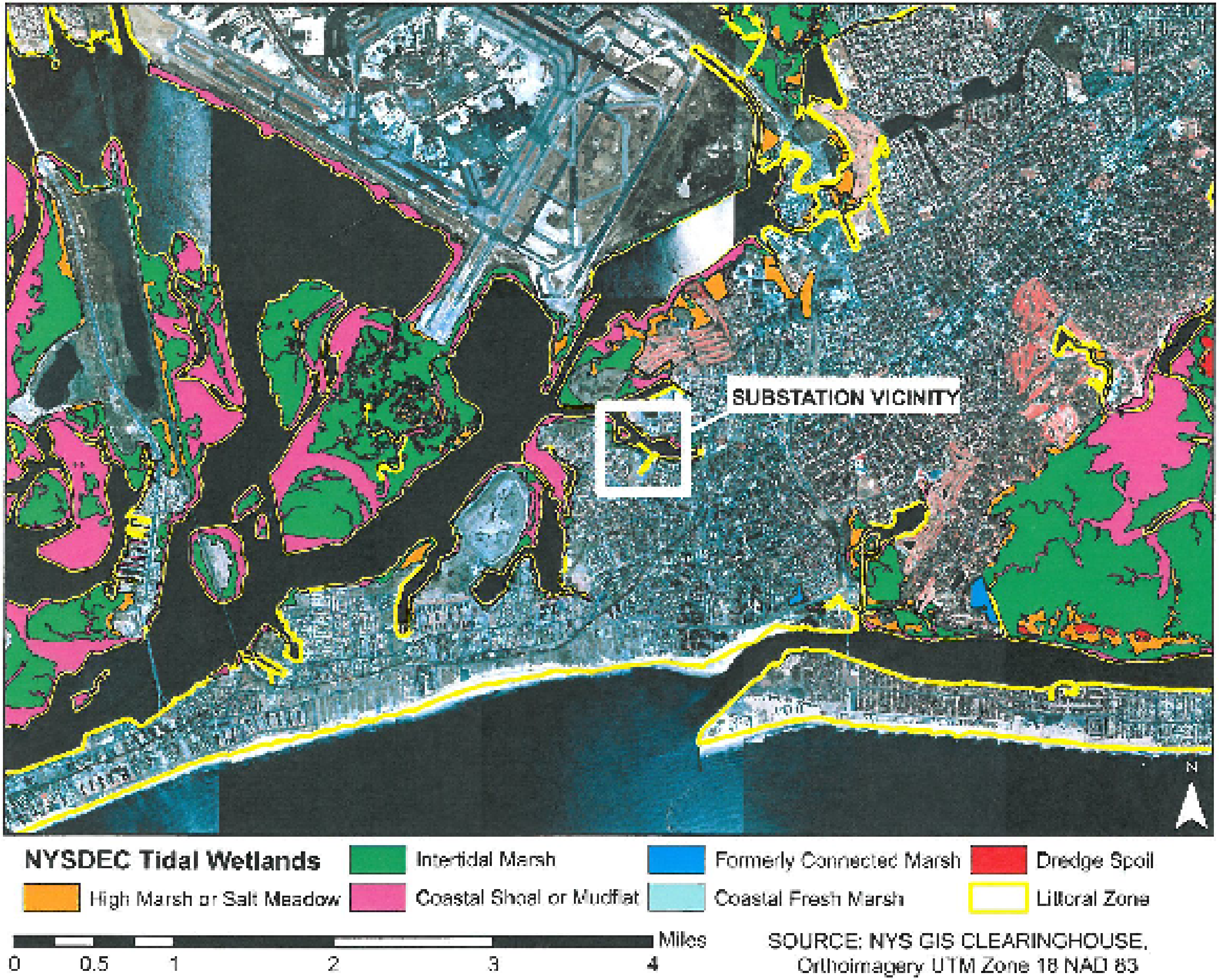
Source: The Riverhead Foundation for Marine Research and Preservation. Whale Strandings. Riverhead Foundation Web Page. http://www.riverheadfoundation.org/research/content.asp?code=Large%20Whale%20Strandings Accessed 03-08-10.

Figure 17
Terrestrial Vegetation at Far Rockaway



Source: New York City Department of Housing Preservation and Development. October 2003. Final Environmental Impact Statement for the Arverne Urban Renewal Area. CEQR #: 02 HPD 004 Q.

Figure 18
New York Department of Environmental Conservation Tidal Wetland Map



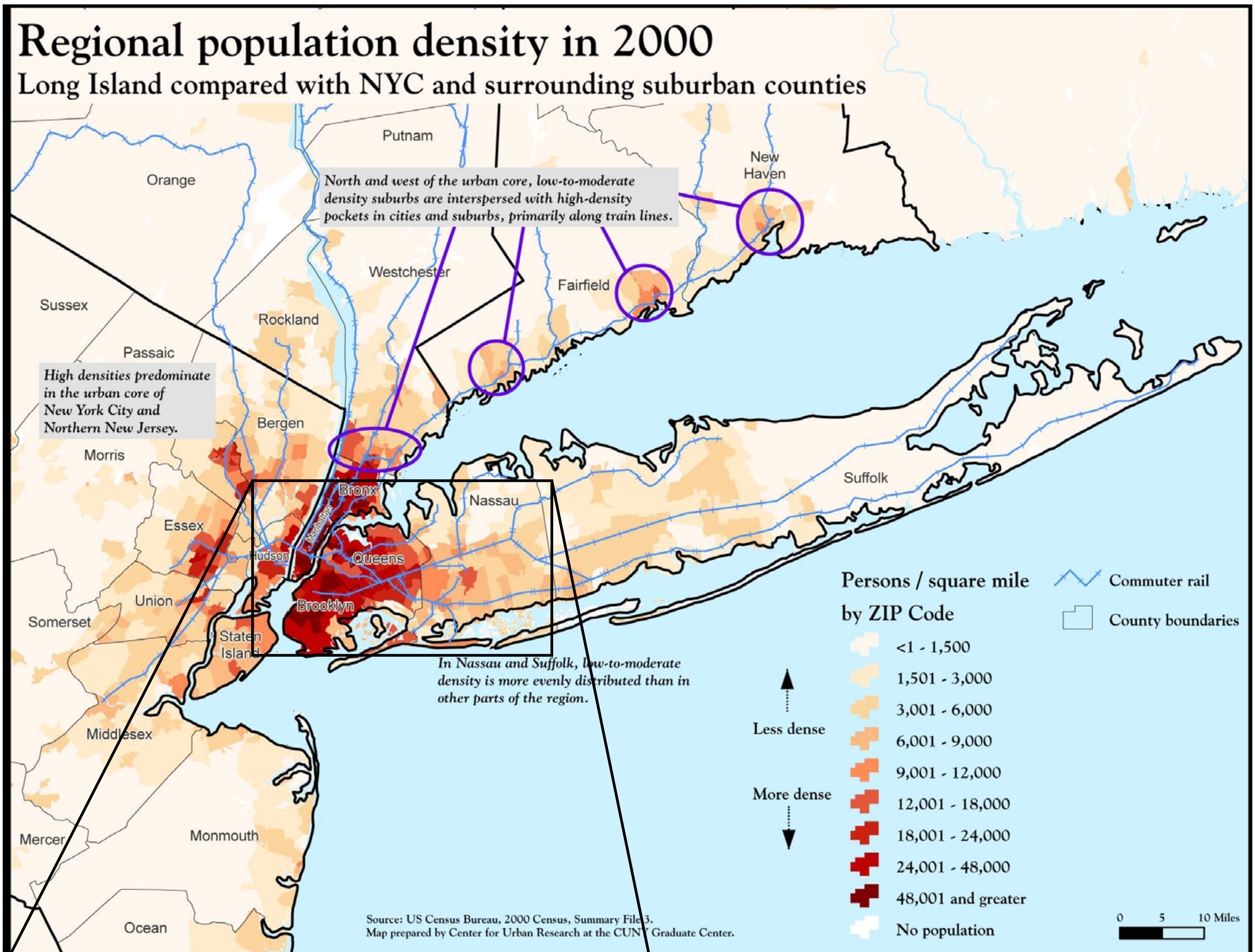
Sources: New York State Department of Environmental Conservation. Tidal Wetland Map.
NYS GIS Clearinghouse. Orthoimagery UTM Zone 18 NAD 83.

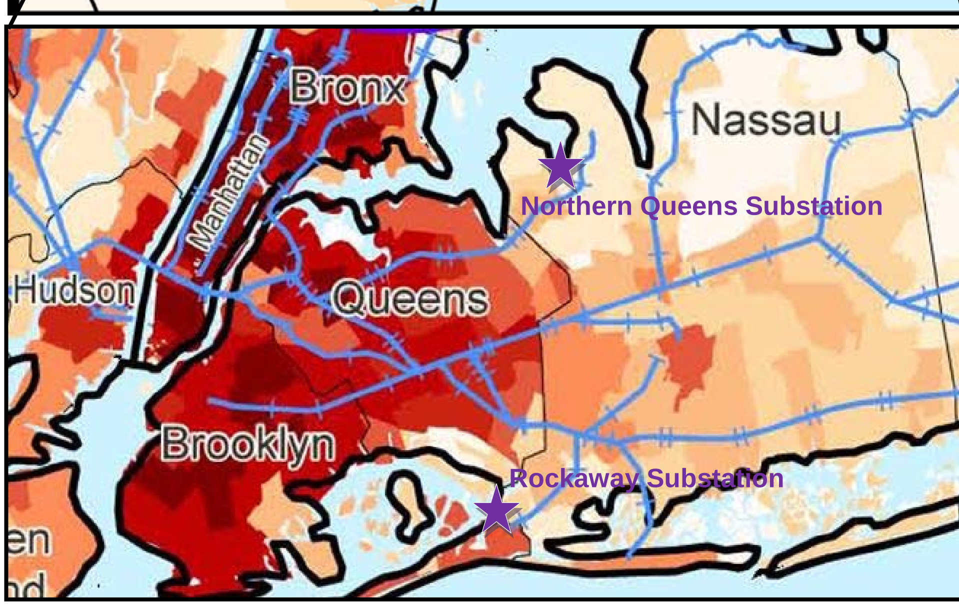
Figure 19
New York City and Western Nassau County Parks Near Transmission Landfall

Figure 20
Sandy Hook Region of the New Jersey Coastal Heritage Trail Route

Source: National Park Service. New Jersey Coastal Heritage Trail Route. Maps. http://data2.itc.nps.gov/parks/neje/ppMaps/Saho%20map00%2EPDF Accessed 03/19/10.

Figure 21
Long Island Land Use Maps

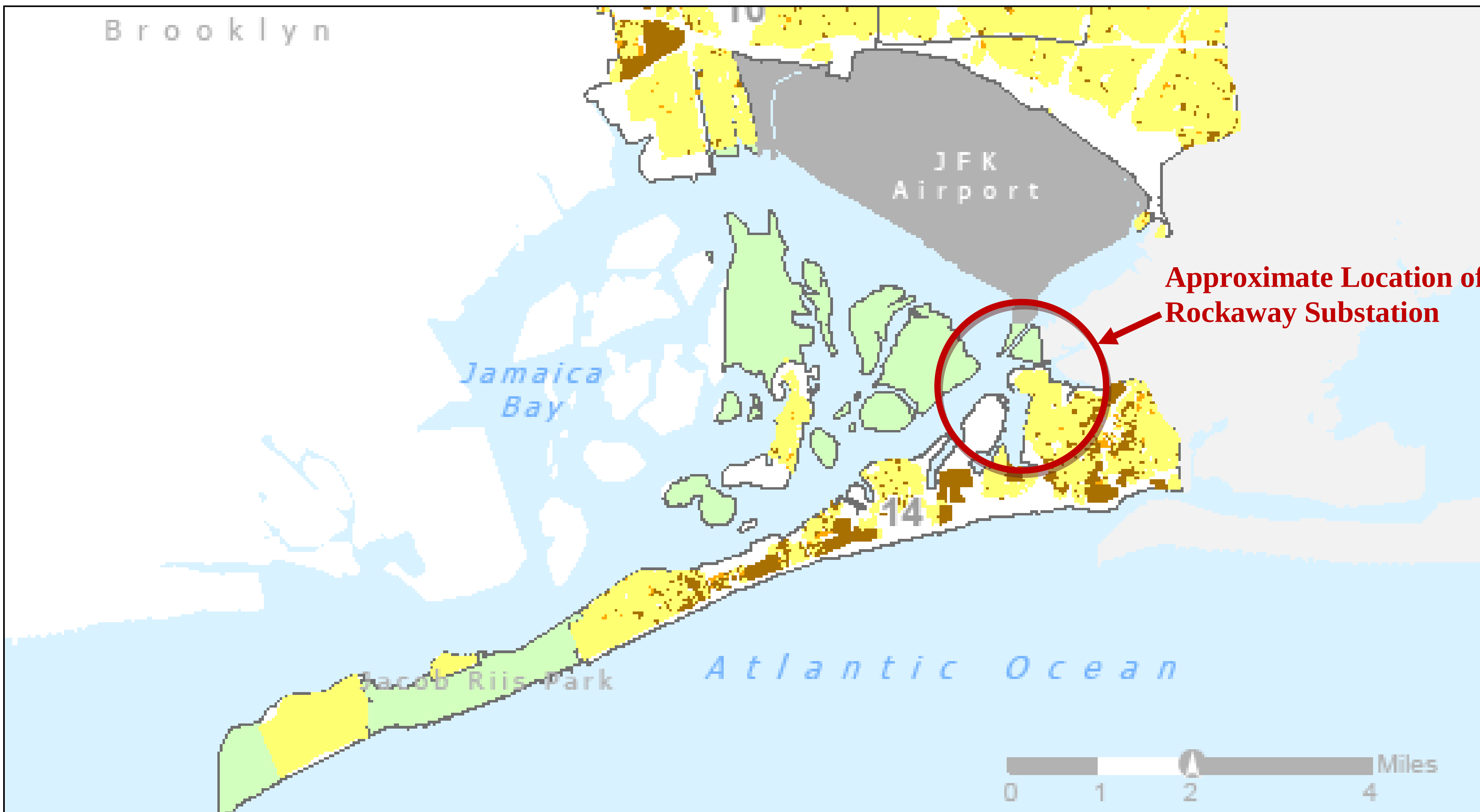




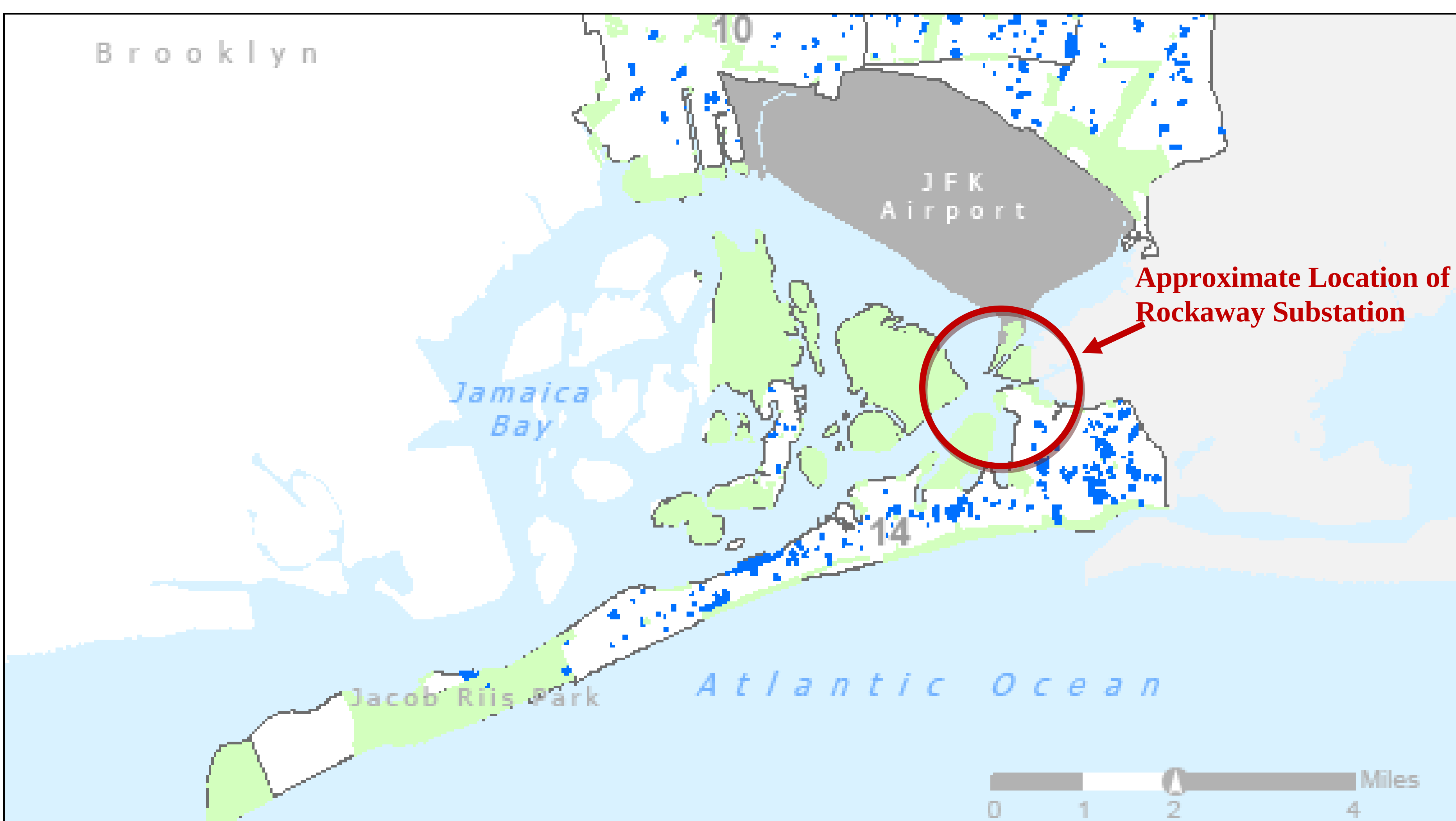
Source: Long Island Index. Long Island Maps. From USGS Census Bureau 2000. Mapped by Center for Urban Research. CUNY Graduate Center. http://longislandindex.org/long_island_maps.html Accessed 03/17/10

Source: Long Island Index. 2004. 2004 Land Use in Nassau and Suffolk Counties. http://longislandindex.org/land_use_analysis.html Accessed 03/19/10

Figure 22
Queens Land Use Maps



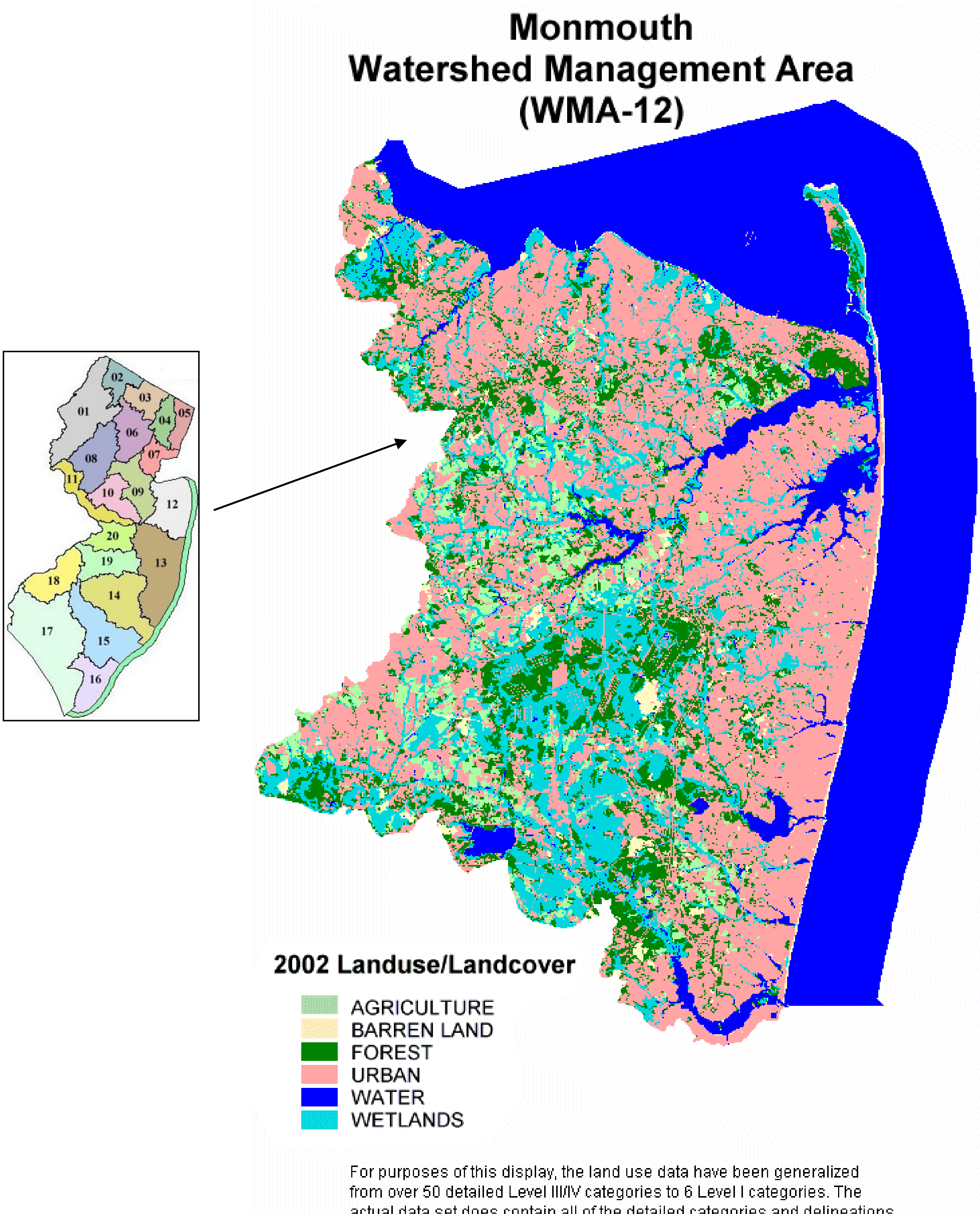
Use	Lot Area in Acres	Percentage of Borough
One and Two Family	19,187.5	36.1%
Multi-Family	5,694.3	10.7%
Mixed-Residential / Commercial	846.2	1.6%



Use	Lot Area in Acres	Percentage of Borough
Open Space / Recreation	10,450.7	19.7%
Public Facilities / Institutions	2,380.2	4.5%

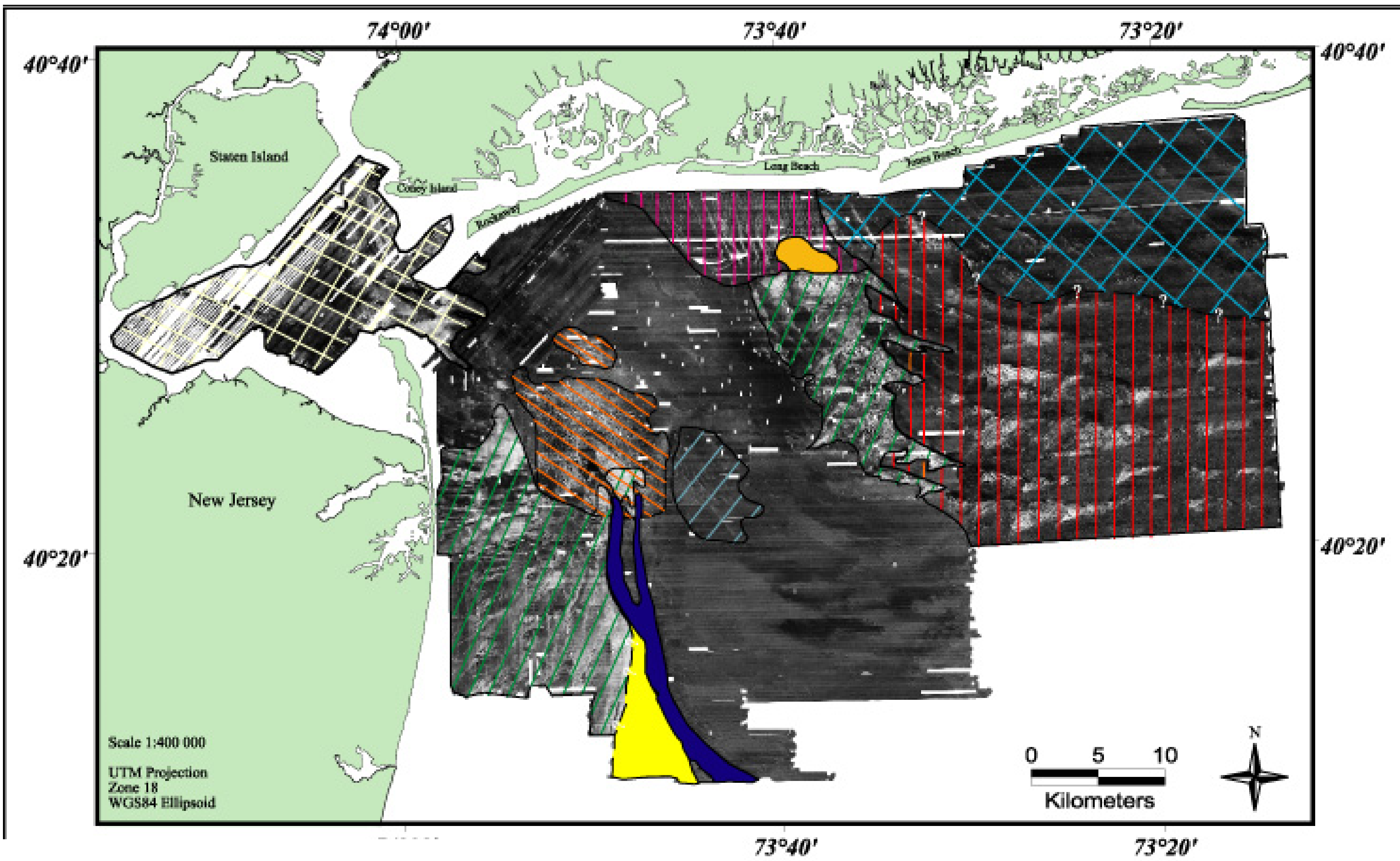
Source: New York City Department of City Planning. New York City Land Use.
http://www.nyc.gov/html/dcp/html/landusefacts/landusefactsmaps.shtml Accessed 03/17/10

Figure 23
Monmouth County Land Use Map



Source: New Jersey Department of Environmental Protection. 2002. Land Use / Land Cover by Watershed Management Area (WMA). http://www.state.nj.us/dep/gis/lulc02cshp.html Accessed 03/19/10

Figure 24
Side Scan SONAR of the New York Bight Sea Floor



Explanation

- High-backscatter, outcropping, early Tertiary/late Cretaceous coastal plain strata and associated reworked gravelly lag deposits. Low-backscatter, reworked Quaternary deposits are common (see Figure 10).
- High-backscatter Pleistocene gravelly sand deposits.
- Pleistocene fluvioglacial gravelly sands reworked into a series of low-amplitude, fine sand, transverse bedforms. Gravelly sand forms the high-backscatter lineations and fine sand is displayed as low-backscatter (see Figure 6).
- Low-backscatter Holocene sand ridges (find sand) with reworked, high-backscatter early Tertiary/late Cretaceous coastal plain strata and associated reworked gravelly lag deposits exposed in the troughs (see Figure 12).
- Low-backscatter, low-amplitude, Holocene sand ridges (fine sand) with reworked, high-backscatter Pleistocene coarse sand exposed in the troughs.
- Low-backscatter Holocene fine sand.
- High-backscatter Holocene coarse sand.
- Holocene deposit in Raritan Bay. Sediment textural data for this area are not available.
- Holocene sand waves (see Figure 15).
- Anthropogenic disposal material (dredge spoils and construction refuse) (see Figure 13).
- Holocene (modern) silty deposit.
- Contact
Long dash with question mark approximate location

Source: US Geological Survey. 2000. Seafloor Characterization Offshore of the New York – New Jersey Metropolitan Area Using Sidescan Sonar.

Figure 25
Locations of New York's Major Commercial Fishing Ports

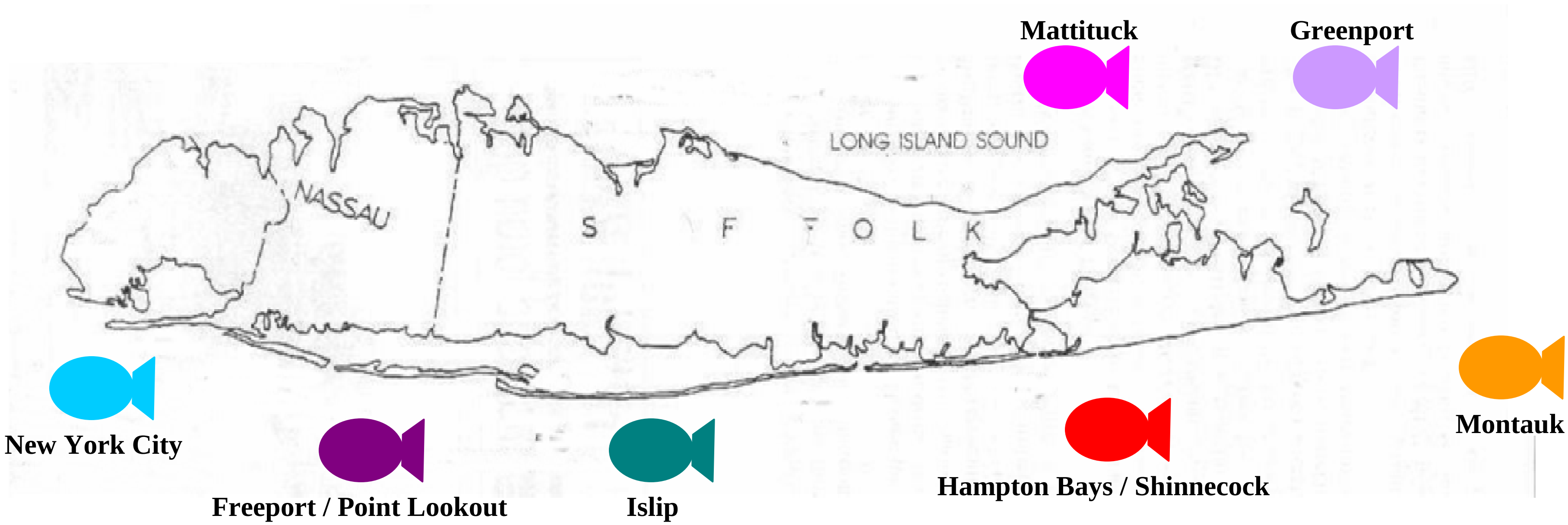


Figure 26
Locations of New Jersey's Major Commercial Fishing Ports

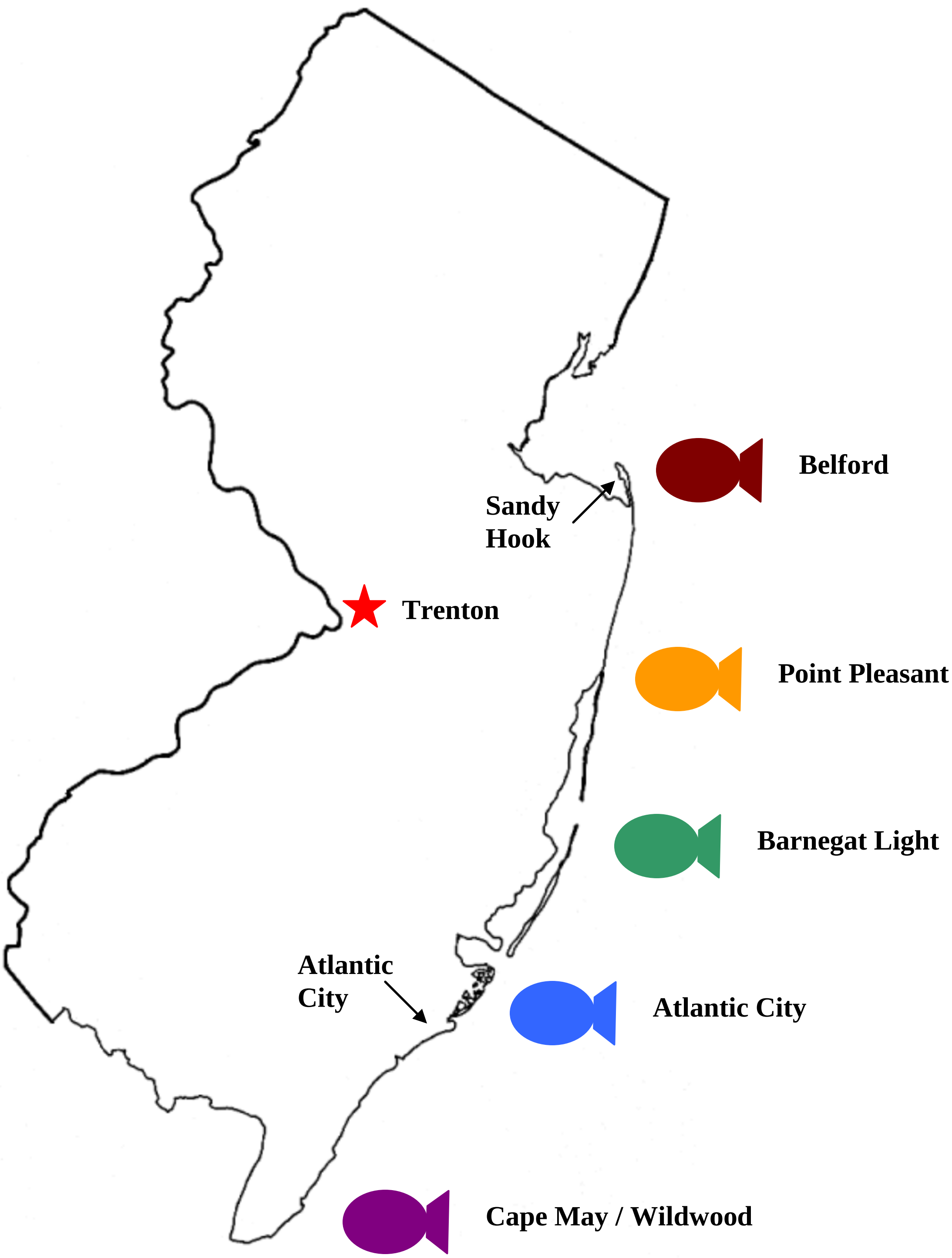
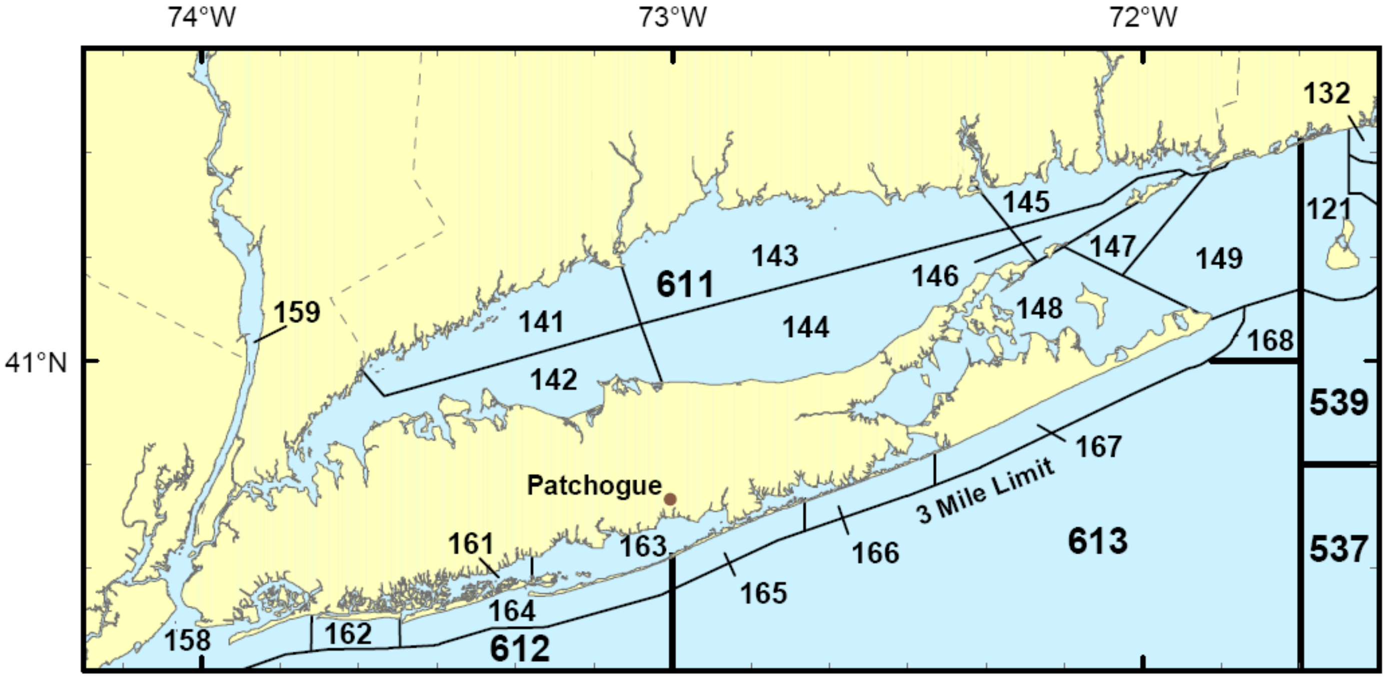
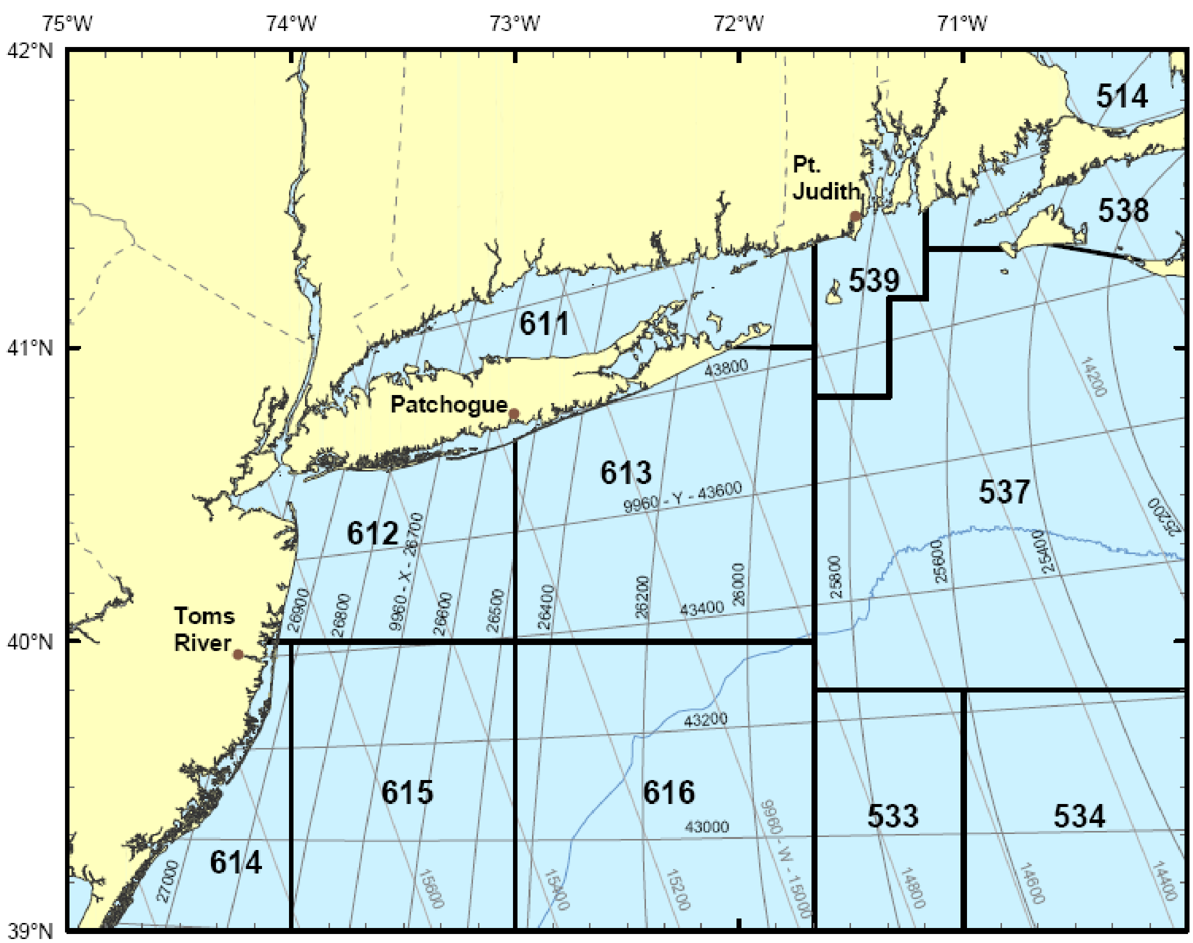


Figure 27
Area Codes for Fishing Vessel Trip Reports



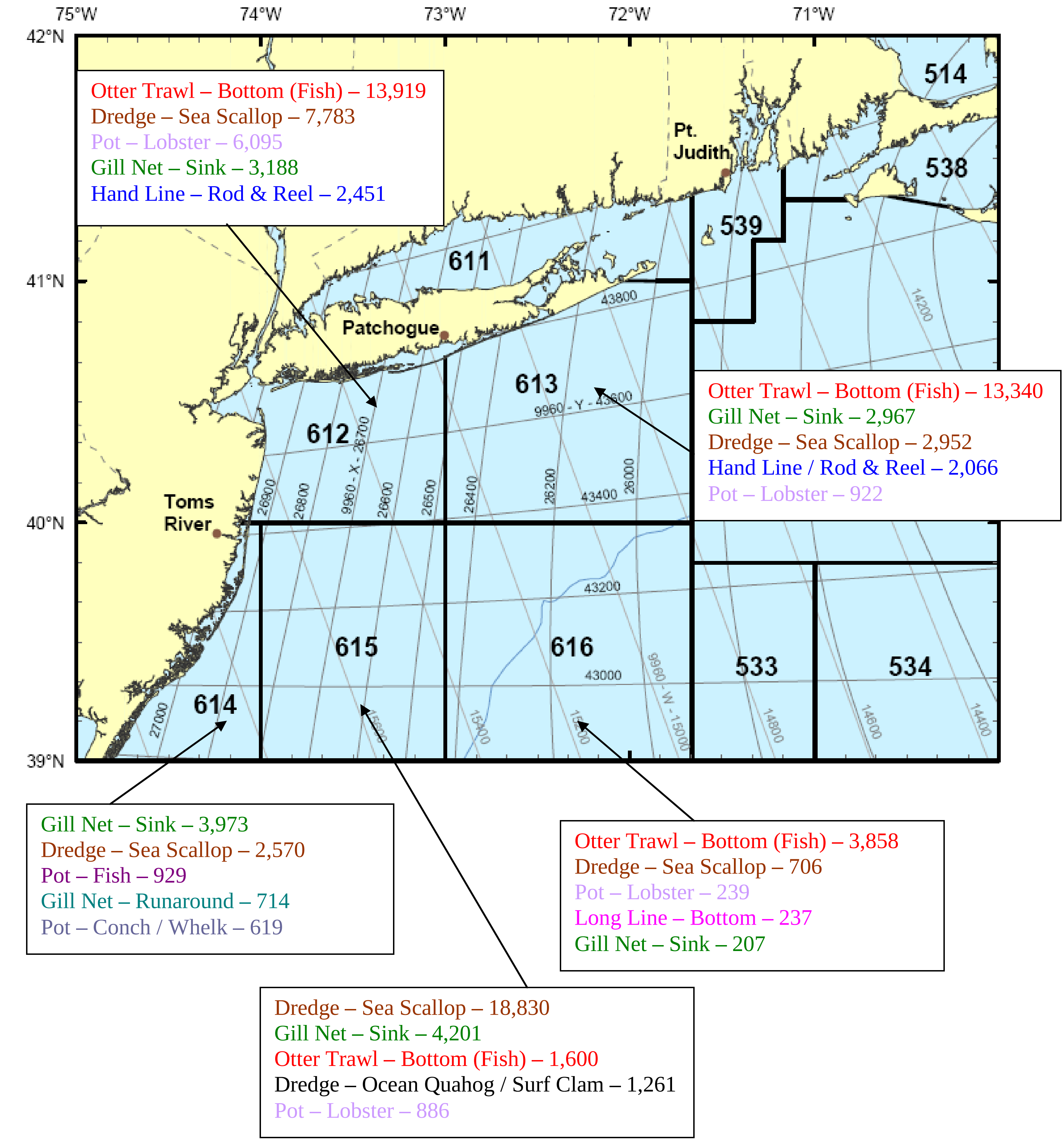
New York State Waters



New York Bight

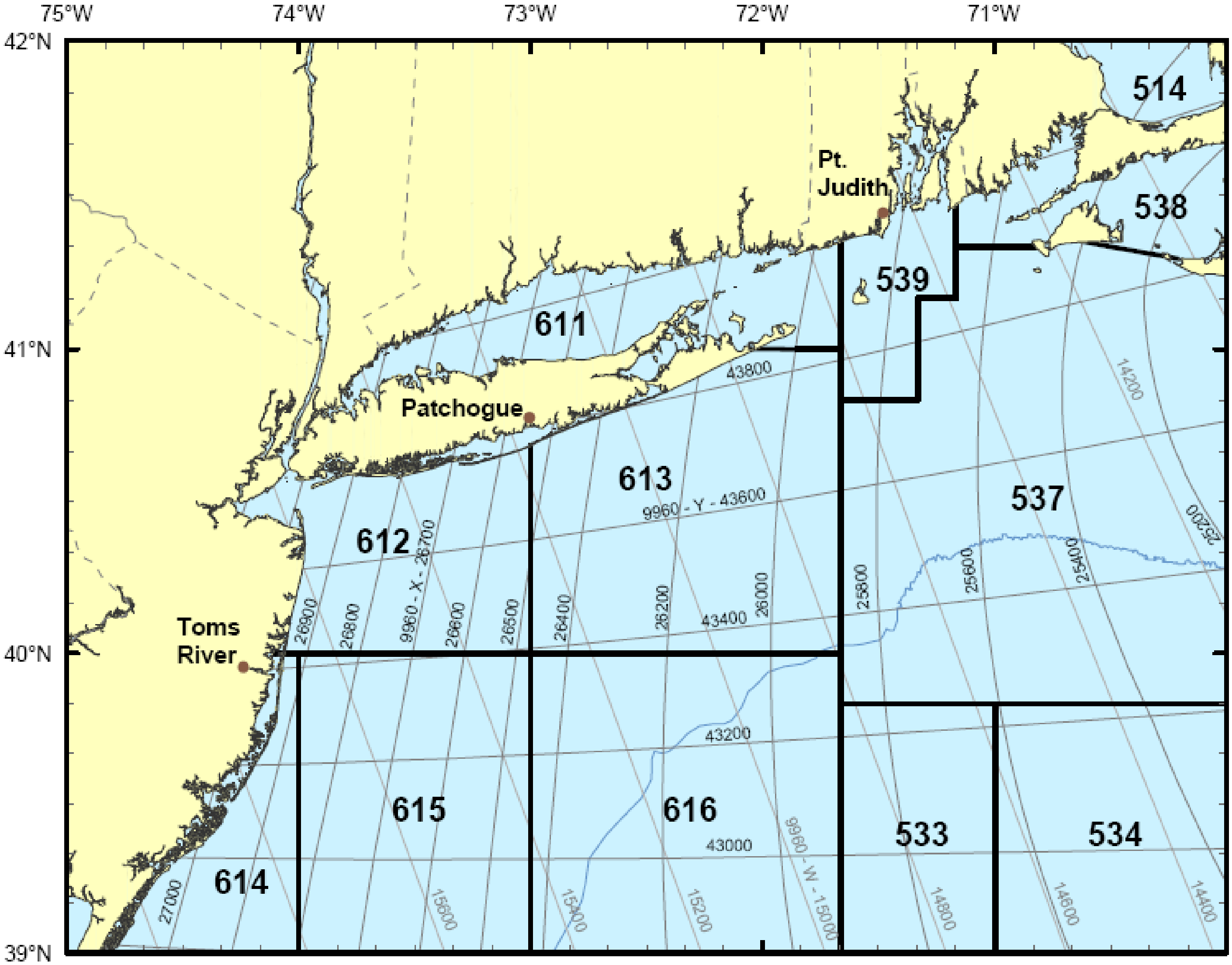
Source: National Marine Fisheries Service. "Fishing Vessel Trip Report" Reporting Instructions.

Figure 28
Fishing Vessel Trips to Offshore Area Codes for Top Five Gears
2004 - 2009



Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 - 2009.

Figure 29
Fishing Vessel Trips to Offshore Area Codes by Percentage of Total Trips Made
2004 - 2009



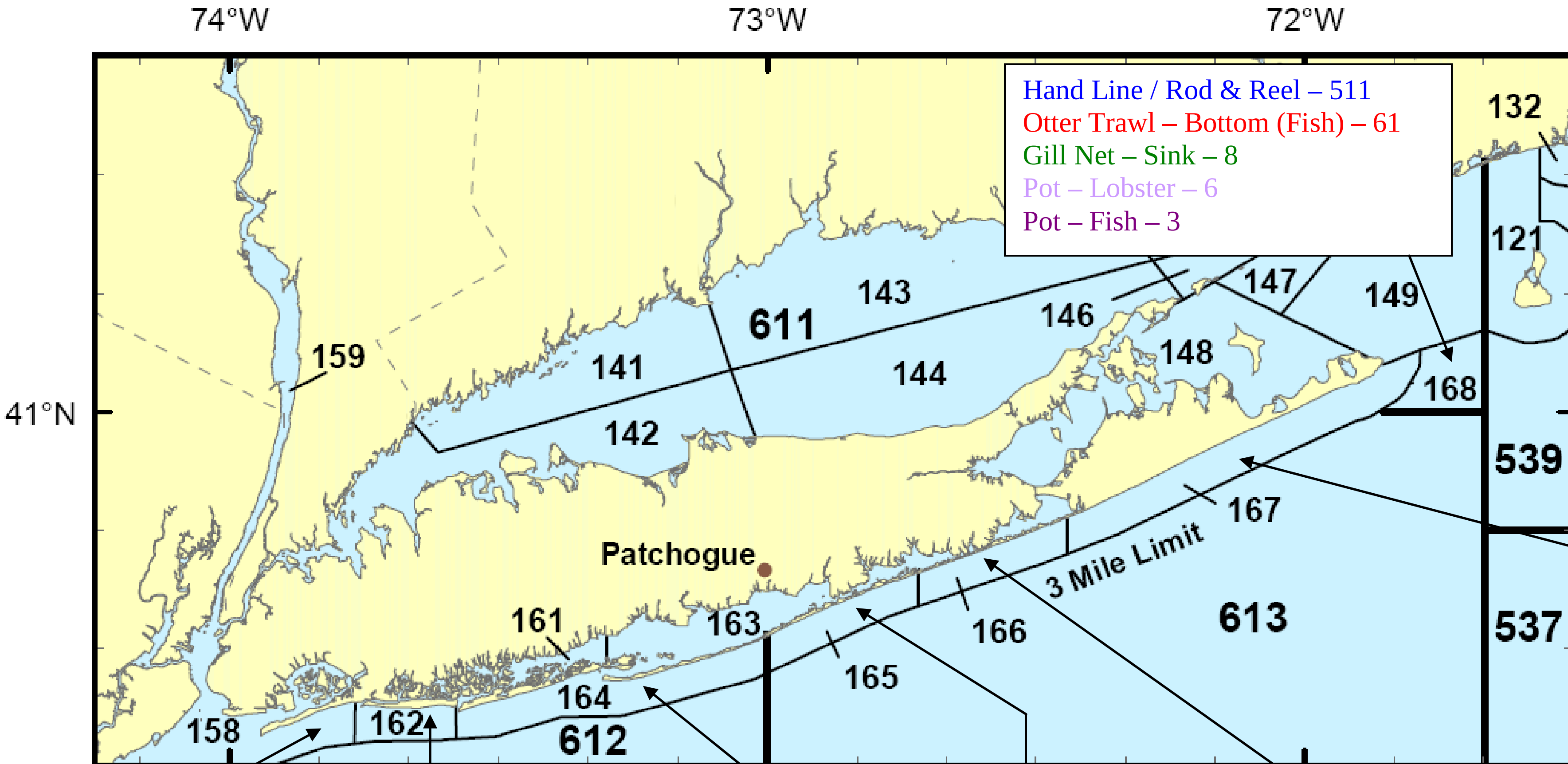
Gill Net – Sink – 35%
Dredge – Sea Scallop – 23%
Pot – Fish – 8%
Gill Net – Runaround – 6%
Pot – Conch / Whelk – 6%

Otter Trawl – Bottom (Fish) – 70%
Dredge – Sea Scallop – 13%
Pot – Lobster – 4%
Long Line – Bottom – 4%
Gill Net – Sink – 4%

Dredge – Sea Scallop – 65%
Gill Net – Sink – 15%
Otter Trawl – Bottom (Fish) – 6%
Dredge – Ocean Quahog / Surf Clam – 4%
Pot – Lobster – 3%

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 - 2009.

Figure 30
Fishing Vessel Trips to Inshore Area Codes for Top Five Gears
2004 - 2009



Hand Line / Rod & Reel – 1,732
Pot – Fish – 386
Cast Net – 297
Otter Trawl – Bottom (Fish) – 159
Pot – Crab – 138

Gill Net – Sink – 1,182
Hand Line / Rod & Reel – 527
Otter Trawl – Bottom (Fish) – 304
Dredge – Ocean Quahog / Surf Clam – 302
Pot – Fish – 35

Gill Net – Sink – 2,793
Otter Trawl – Bottom (Fish) – 1,738
Hand Line / Rod & Reel – 460
Otter Trawl – Beam – 182
Gill Net – Drift (Large Mesh) – 31

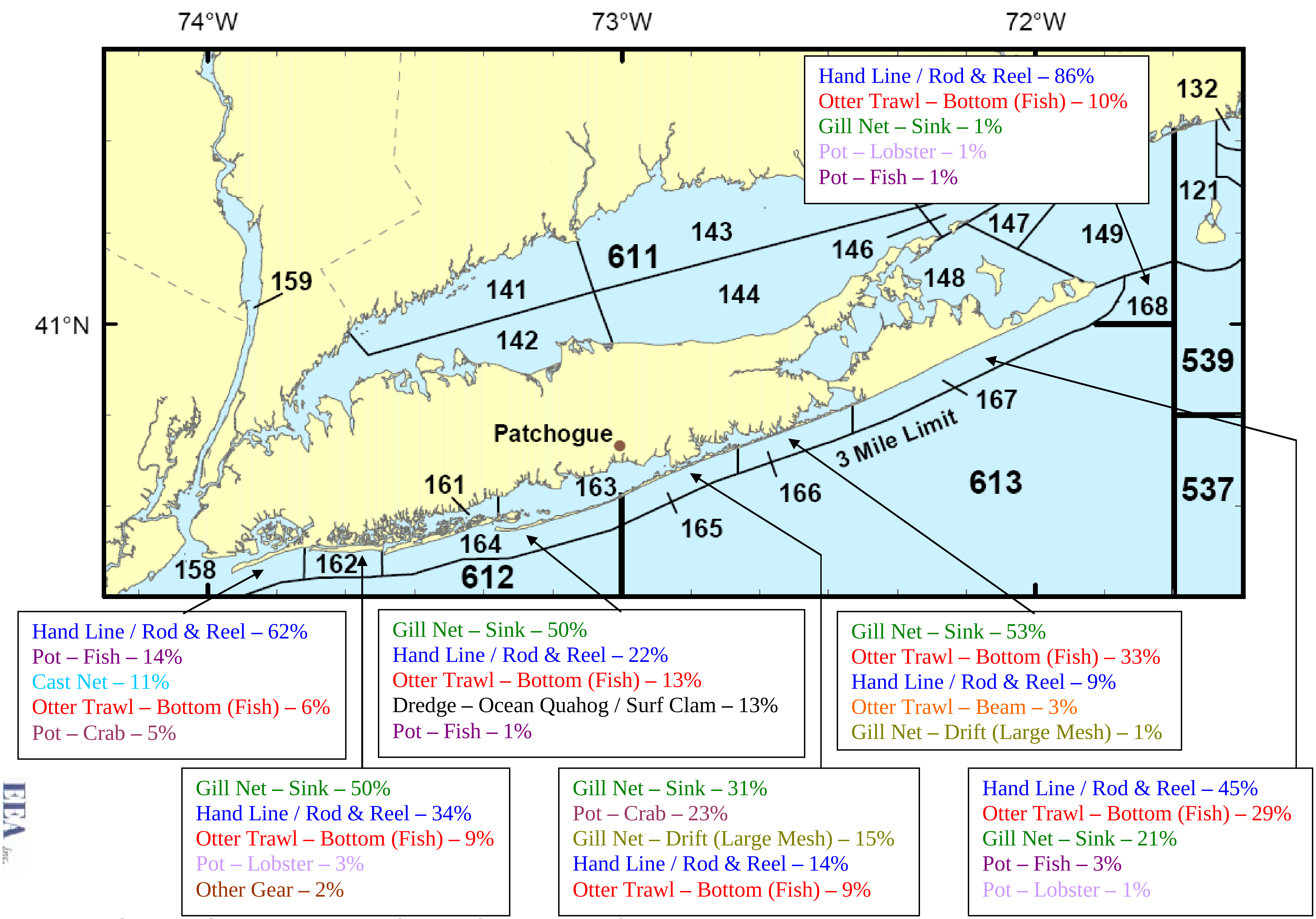
Gill Net – Sink – 1,137
Hand Line / Rod & Reel – 778
Otter Trawl – Bottom (Fish) – 216
Pot – Lobster – 74
Other Gear – 37

Gill Net – Sink – 639
Pot – Crab – 490
Gill Net – Drift (Large Mesh) – 309
Hand Line / Rod & Reel – 291
Otter Trawl – Bottom (Fish) – 184

Hand Line / Rod & Reel – 3,236
Otter Trawl – Bottom (Fish) – 2,068
Gill Net – Sink – 1,485
Pot – Fish – 225
Pot – Lobster – 77

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 - 2009.

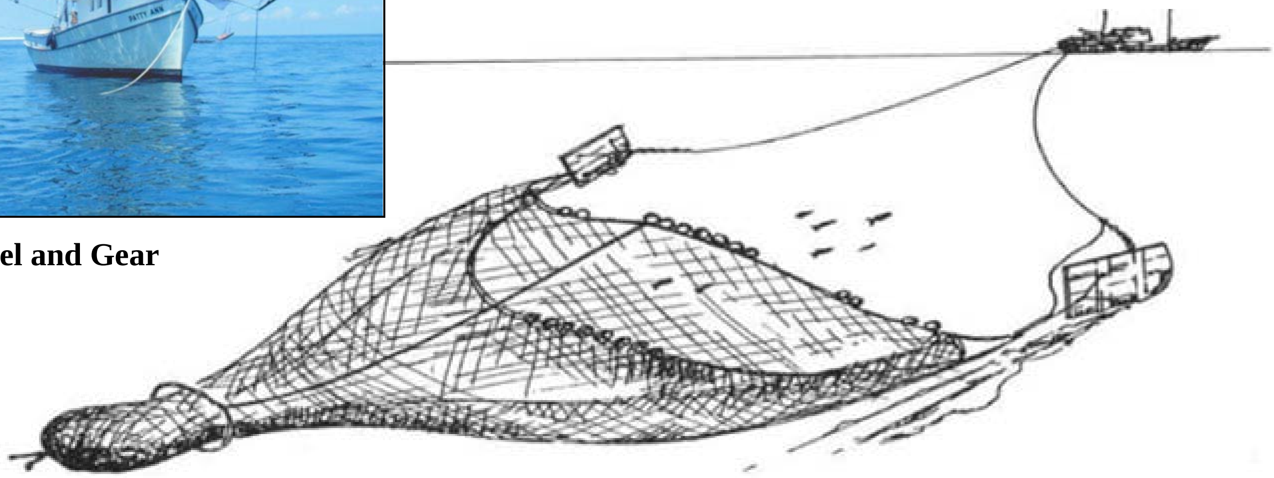
Figure 31
Fishing Vessel Trips to Inshore Area Codes by Percentage of Total Trips Made
2004 - 2009



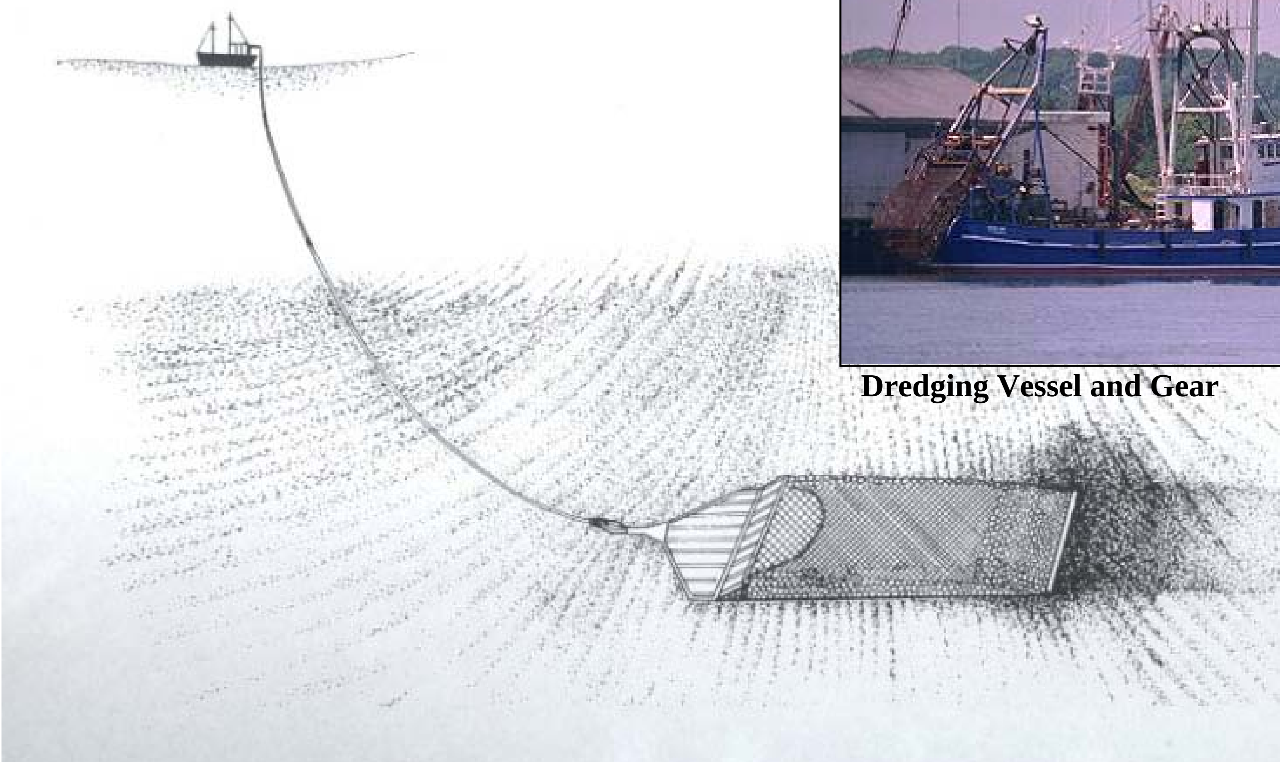
Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 - 2009.

Figure 32
Trawling and Dredging Vessels and Gear

Trawling Vessel and Gear

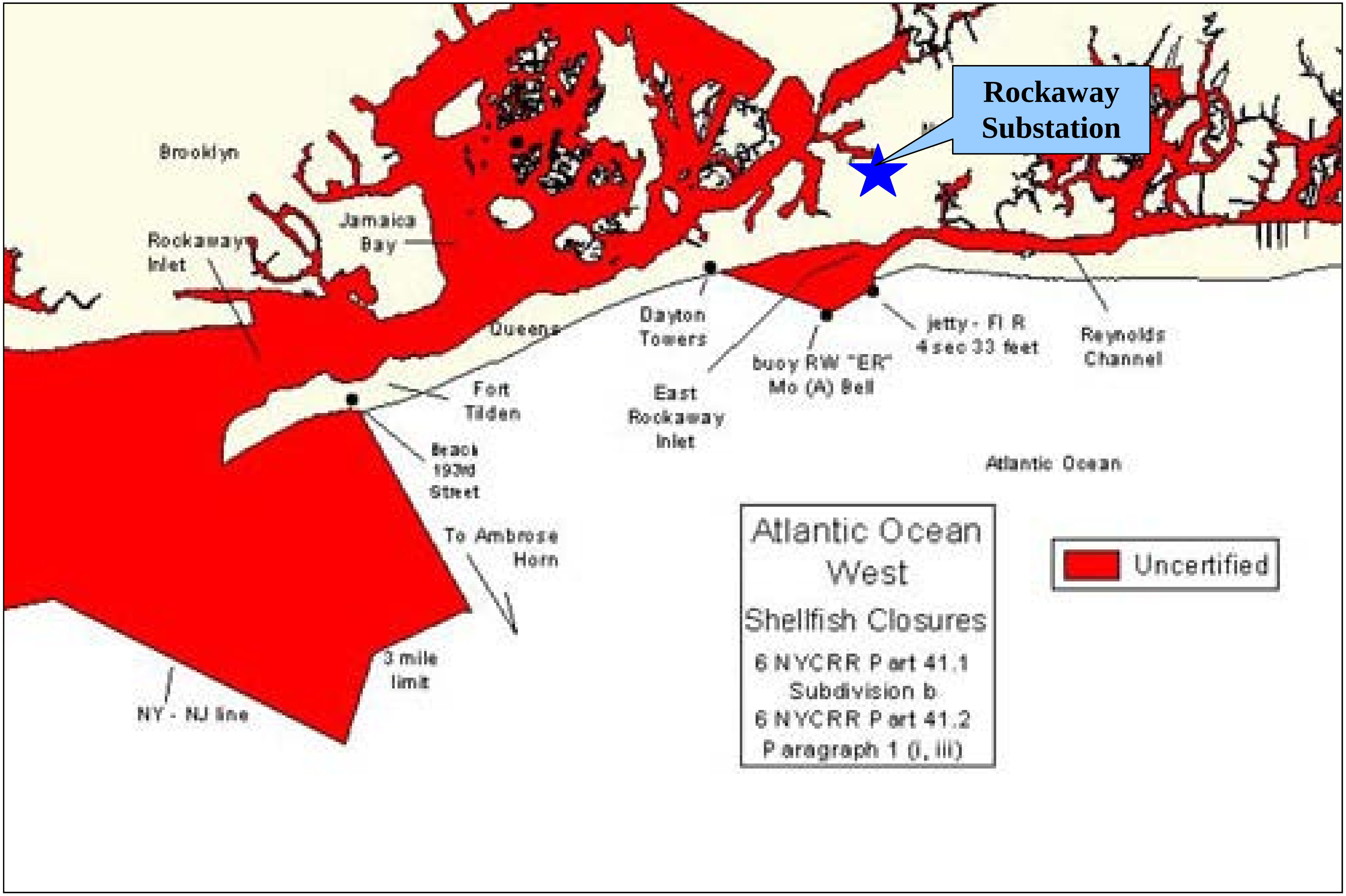


Dredging Vessel and Gear



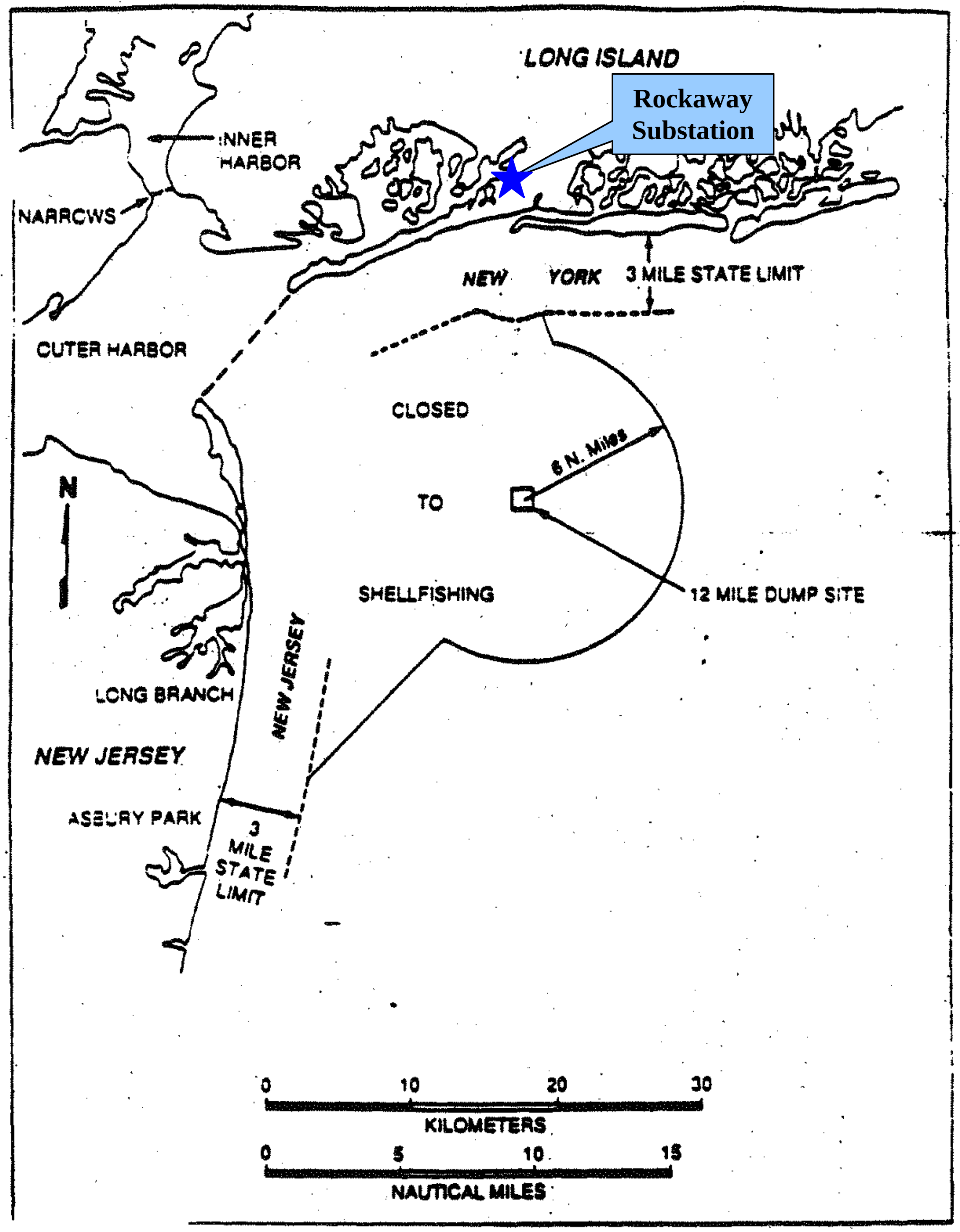
Sources: Marine Buzz Web Page. http://www.marinebuzz.com/marinebuzzuploads/96d0603f7047_7CFF/typical_trawl.jpg Accessed 03/30/10
Environmental Research Letters Web Page http://images.iop.org/objects/erw/talkingpoint/2/8/1/ERWsky7_08_08.jpg Accessed 03/30/10
Gulf of Maine Area Web Page. http://app2.iris.usm.maine.edu/gulfofmaine-censusdev/wp-content/images/Technology/STPCOImage10b.jpg Accessed 03/30/10
United Clam Lovers of America Web Page. http://www.weloveclams.com/images/catch-1.jpg Accessed 03/30/10

Figure 33
State Shellfish Closures in New York Bight



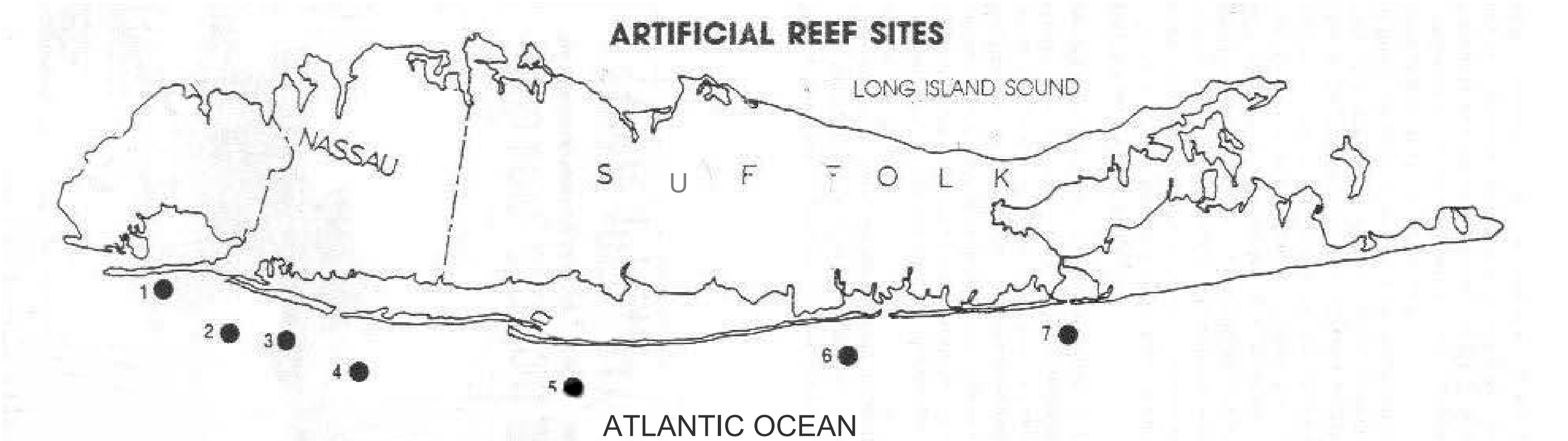
Source: New York State Department of Environmental Conservation. Part 41: Sanitary Condition of Shellfish Lands. http://www.dec.ny.gov/regs/4014.html#12837 Accessed 03/22/10

Figure 34
Federal Shellfish Closures in New York Bight



Source: Sullivan, J.K. 1991. Fish and Wildlife Populations and Habitat Status and Trends in the New York Bight. A Report to the Habitat Work Group for the New York Bight Restoration Plan.

Figure 35



1) Rockaway Artificial Reef Site
    - 1.6 nautical miles south of Rockaway Beach
    - 413 acres
    - 32 – 40 feet of water

2) Atlantic Beach Reef Site
    - 3.0 nautical miles south of Atlantic Beach
    - 413 acres
    - 55 – 64 feet of water

3) Fishing Line Reef Site
    - 2.8 nautical miles south of Long Beach
    - 115 acres
    - 50 – 53 feet of water

4) Hempstead Town Reef Site
    - 3.3 nautical miles south of Jones Beach State Park
    - 744 acres
    - 50 – 72 feet of water

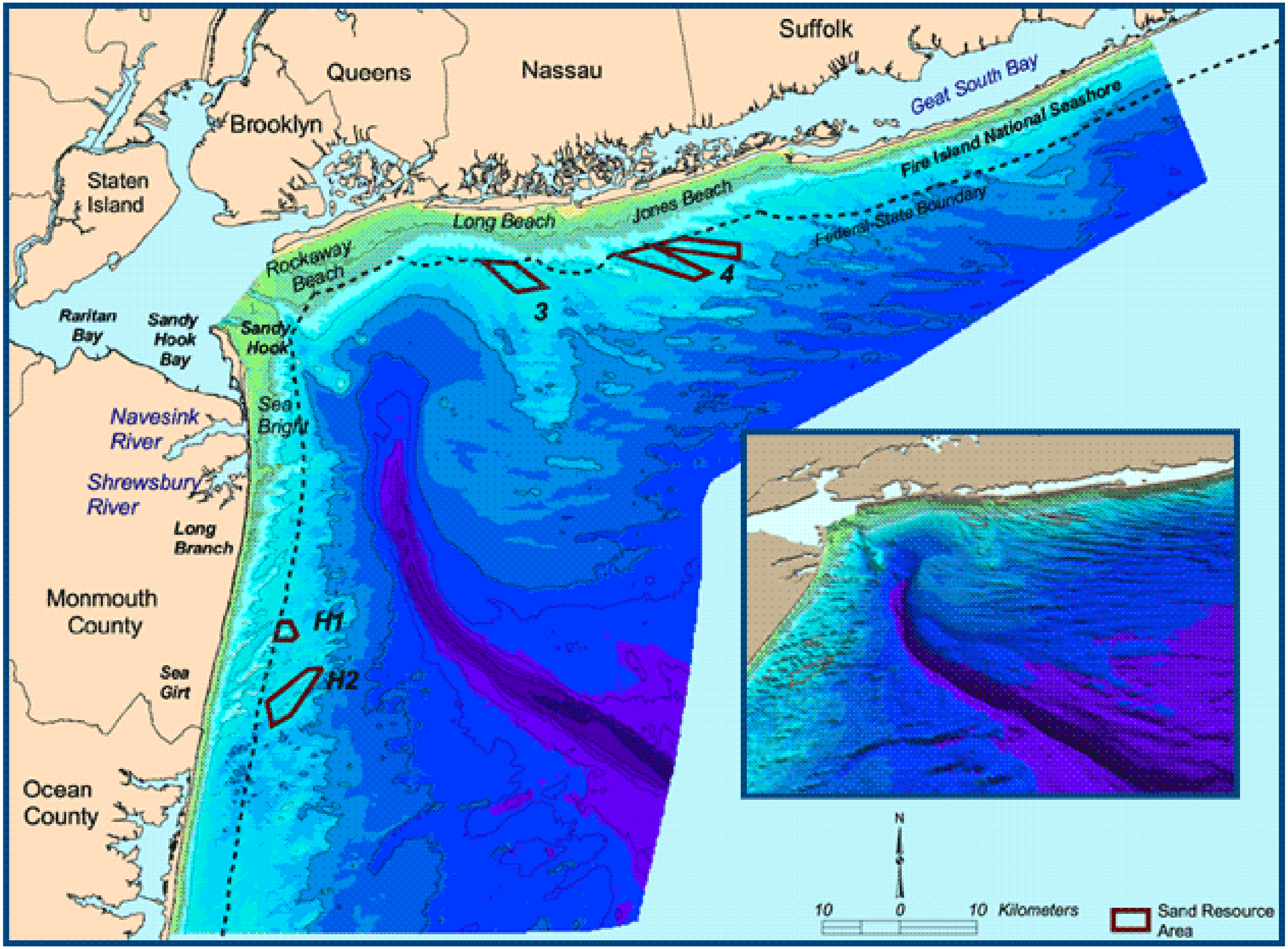
5) Fire Island Reef Site
    - 2.0 nautical miles south of the Fire Island Lighthouse
    - 744 acres
    - 62 – 72 feet of water

6) Moriches Reef Site
    - 2.4 nautical miles SSW of Moriches Inlet
    - 14 acres
    - 70 – 75 feet of water

7) Shinnecock Reef Site
    - 2.0 nautical miles south of Shinnecock Inlet
    - 35 acres
    - 79 – 84 feet of water

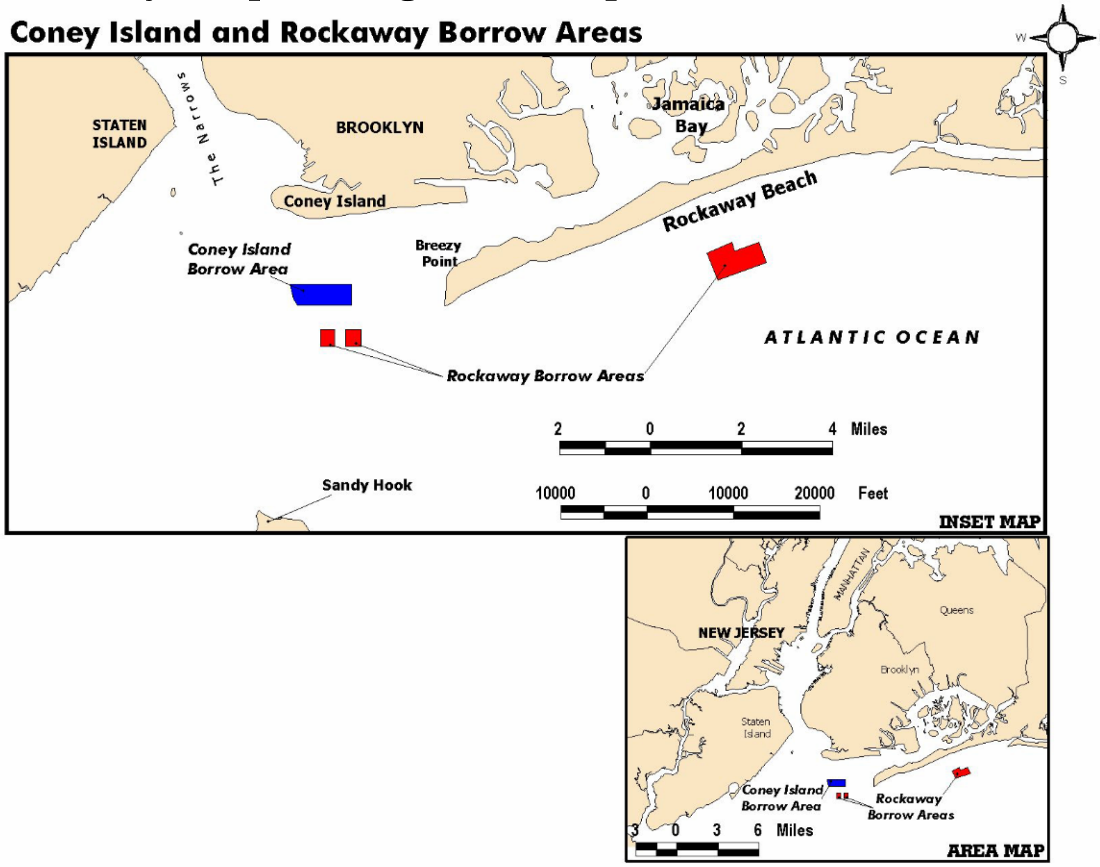
Source: New York Department of Environmental Conservation.
Long Island Artificial Reefs Map and Loran Guide.

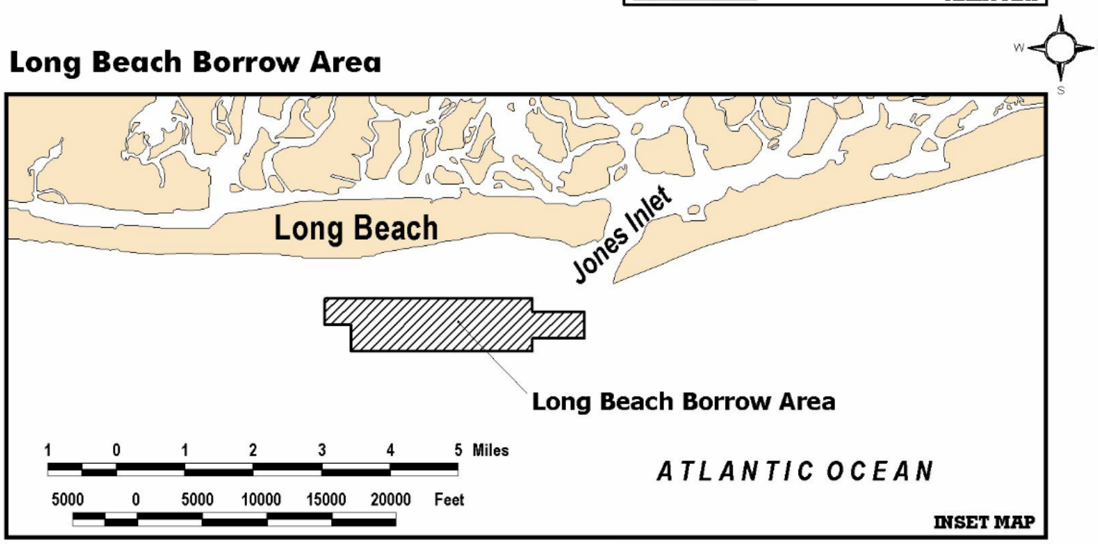
Figure 36
BOEMRE Proposed Sand Borrow Areas

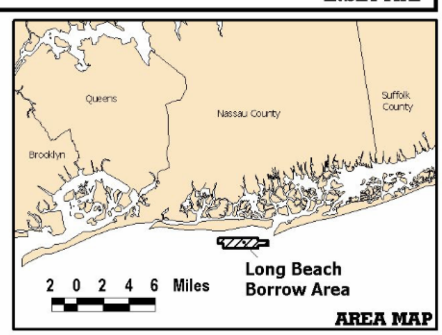


Source: Minerals Management Service. 2004. Environmental Surveys of Potential Borrow Areas Offshore North Jersey and Southern New York and the Environmental Implications of Sand Removal for Coastal and Beach Restoration. Final Report. OCS Study MMS-2004-044. Prepared by Applied Coastal Resource and Engineering Inc.

Figure 37
US Army Corps of Engineers Proposed Sand Borrow Areas



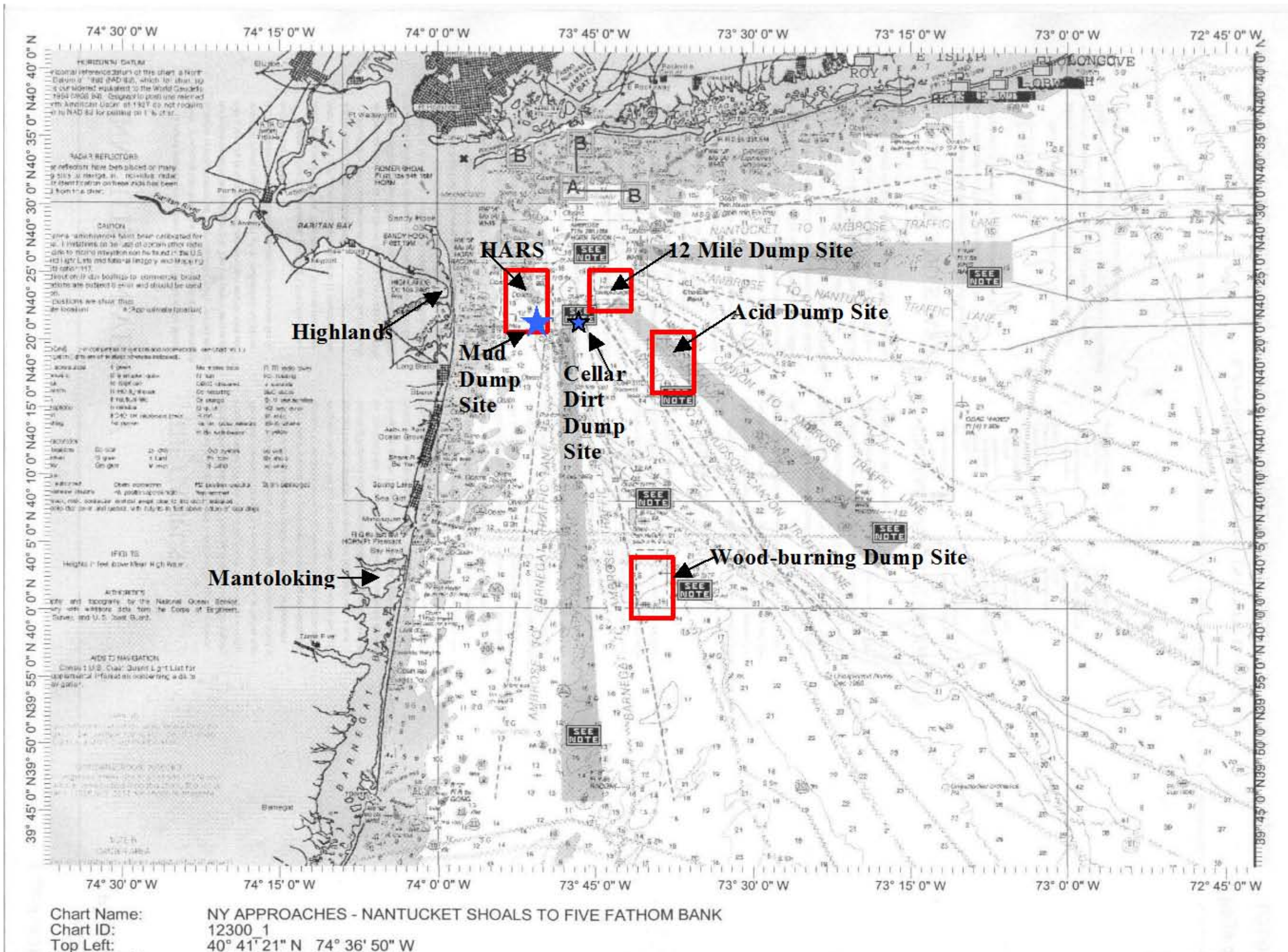




Source: United States Army Corps of Engineers. Fire Island Inlet to Montauk Point Reformulation Study. Figure Courtesy of USACE, New York District.

Figure 38
Offshore Dump Sites

GPS Coordinates of Dump Sites off New Jersey



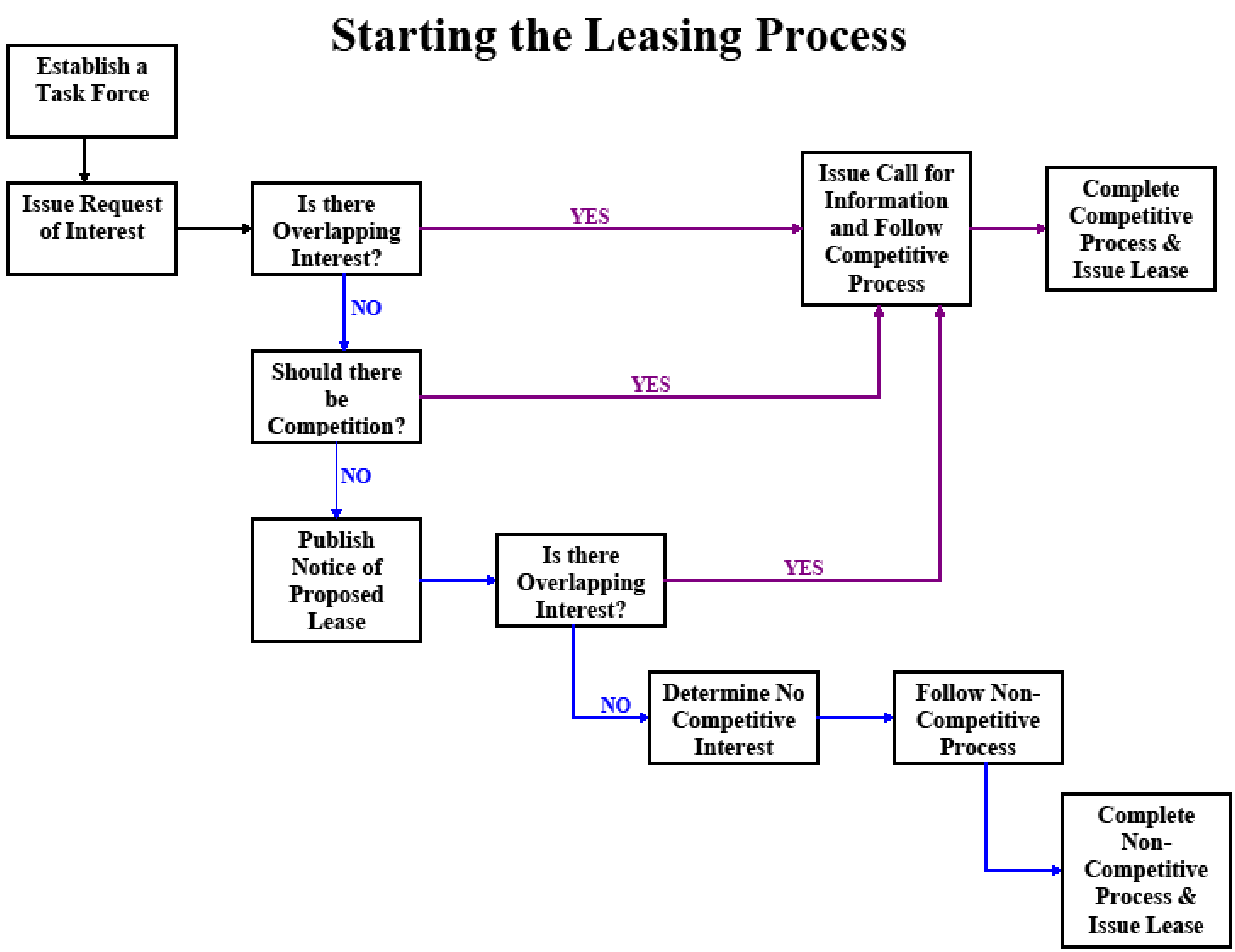
Dump Site	Approximate Location	Size	Water Depth	Corner	Lattitude	Longitude	Notes
Historic Area Remediation Site (HARS)	6 miles offshore of Highlands	15.7 square nautical miles	50' - 100'	NW corner	40 25.641'	73 53.905'	Active dredge material dump site
				NE corner	40 25.706'	73 48.986'	
				SE corner	40 21.386	73 48.958	
				SW1 corner	40 21.365'	73 52.443'	Not a perfect rectangle
				SW2 corner	40 21.881'	73 52.527'	SW corner projects
				SW3 corner	40 21.988'	73 53.820'	inward
Mud Dump Site	6 miles offshore of Highlands	2.2 square miles	50' - 100'	Located	within	HARS	New York Bight Dredged Material Disposal Site
12 Mile Dump Site	12 miles offshore of Highlands	NR	70' - 90'	NW corner	40 25.083'	73 44.967'	Former dump site for New York City's sewage sludge
				NE corner	40 25.040'	73 41.763'	
				SE corner	40 22.655'	73 41.623'	
				SW corner	40 22.655'	73 44.939'	
Cellar Dirt Dump Site	Just east of Mud Dump Site	NR	NR	Not	Charted		Construction debris NYC Subway system
Acid Dump Site	15 miles east of Long Branch	NR	70' - 90'	NW corner	40 20.032'	73 40.021'	Dump site for National Lead Company of South Amboy
				NE corner	40 20.096'	73 36.001'	
				SE corner	40 16.115'	73 36.001'	
				SW corner	40 16.136'	73 39.993'	
Wood-burning Dump Site	18 miles east of Mantoloking	NR	90' - 120'	NW corner	40 04.343'	73 41.117'	Dump site for ashes of burnt wood
				NE corner	40 04.429'	73 38.222'	
				SE corner	40 00.022'	73 38.194'	
				SW corner	40 00.044'	73 41.061'	

Sources: New Jersey Scuba Diver. Dumping Grounds. http://njscuba.net/biology/misc_bottom.html#dumps Accessed 03/15/10. MAPTECH Inc. NY Approaches – Nantucket Shoals to Five Fathom Bank.

Figure 39
Sensitive Areas Identified within the Project Region to be Considered during the Visual Impact Assessment

Source: NYC Oasis. Community Maps for NYC. http://www.oasisnyc.net/ Accessed 03/24/10.

Figure 40
BOEMRE Service Leasing Process



Source: Minerals Management Service. Minerals Management Service. Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf. 30 CFR Parts 250, 285, and 290. MMS-2008-OMM-0012.

Figure 41
Monopile and Jacket Foundations

Monopile Foundation

Jacket Foundation

Sources: TurboSquid Web Page.
http://files.turbosquid.com/Preview/Content_2009_07_14__03_53_46/thumb1.png539f1677-56fe-4014-ba38-1b632025e9eaLarge.jpg
Offshore Wind net Web Page. http://offshorewind.net/Images/Deepwater/OWEC_Foundation_Beatrice.jpg

APPENDIX B

TABLES

Table 1
EFH Designations in Project Footprint Area

EFH Designations in Target Area Footprint

Species		Life Stage			
Common Name	**Scientific Name**	**Eggs**	**Larvae**	**Juveniles**	**Adults**
Fish					
Atlantic Butterfish	*Peprilus triacanthus*			X	
Atlantic Mackerel	*Scomber scombrus*	X	X		
Atlantic Sea Herring	*Clupea harengus*		X	X	X
Black Sea Bass	*Centroptistus striata*		X	X	X
Bluefish	*Pomatomus saltatrix*	X	X	X	X
Cobia	*Rachycentron canadum*	X	X	X	X
Haddock	*Melonogammus aeglefinus*		X		
King Mackerel	*Scomberomorus cavalla*	X	X	X	X
Monkfish	*Lophius americanus*	X	X	X	X
Ocean Pout	*Macrozoacres americanus*	X	X	X	X
Red Hake	*Urophycis chuss*	X	X	X	
Scup	*Stenotomus chrysops*			X	X
Spanish Mackerel	*Scomberomorus maculatus*	X	X	X	X
Spiny Dogfish	*Squalus acanthias*			X	X
Summer Flounder	*Paralicthys dentatus*	X	X	X	X
Whiting	*Merluccius bilinearis*	X	X	X	
Windowpane Flounder	*Scopthalmus aquosus*	X	X	X	X
Winter Flounder	*Pleuronectes americanus*	X	X	X	X
Witch Flounder	*Glyptocephalus cynoglossus*	X	X		
Yellowtail Flounder	*Pleuronectes ferruginea*	X	X	X	X
Highly Migratory Species					
Basking Shark	*Cetorhinus maximus*				X
Blue Shark	*Prionace glauca*		X	X	X
Bluefin Tuna	*Thunnus thynnus*			X	X
Common Thresher Shark	*Alopias vulpinus*		X	X	X
Dusky Shark	*Charcharinus obscurus*		X	X	
Sand Tiger Shark	*Odontaspis taurus*		X		
Sandbar Shark	*Charcharinus plumbeus*		X	X	X
Shortfin Mako Shark	*Isurus oxyrhyncus*		X	X	X
Skipjack Tuna	*Katsuwonus pelamis*				X
Tiger Shark	*Galeocerdo cuvieri*		X	X	
White Shark	*Charcharadon chacharis*			X	
Invertebrates					
Long Finned Squid	*Loligo pealei*			X	X
Ocean Quahog	*Artica islandica*			X	X
Surf Clam	*Spisula solidissima*			X	X

Source: Summary of Essential Fish Habitat (EFH) Designation. National Marine Fisheries Service Web Page. http://www.nero.noaa.gov/hcd/webintro.html Accessed 04/05/10.

Table 2
EFH Designations in Possible Cable Routes

EFH Designations in Possible Cable Entry Routes

Species		Life Stage			
Common Name	**Scientific Name**	**Eggs**	**Larvae**	**Juveniles**	**Adults**
Fish					
Atlantic Butterfish	*Peprilus triacanthus*	X	X	X	X
Atlantic Mackerel	*Scomber scombrus*	X	X	X	X
Atlantic Salmon	*Salmo salar*				X
Atlantic Sea Herring	*Clupea harengus*			X	X
Black Sea Bass	*Centropristus striata*			X	X
Bluefish	*Pomatomus saltatrix*			X	X
Cobia	*Rachycentron canadum*	X	X	X	X
King Mackerel	*Scomberomorus cavalla*	X	X	X	X
Little Skate	*Raja erinacea*			X	X
Monkfish	*Lophius americanus*	X	X		X
Pollock	*Pollachius virens*			X	
Red Hake	*Urophycis chuss*	X	X	X	
Scup	*Stenotomus chrysops*			X	X
Spanish Mackerel	*Scomberomorus maculatus*	X	X	X	X
Summer Flounder	*Paralicthys dentatus*			X	X
Whiting	*Merluccius bilinearis*	X	X	X	
Windowpane Flounder	*Scophthalmus aquosus*	X	X	X	X
Winter Flounder	*Pleuronectes americanus*	X	X	X	X
Winter Skate	*Raja ocellata*			X	X
Highly Migratory Species					
Blue Shark	*Prionace glauca*				X
Dusky Shark	*Charcharinus obscurus*		X		
Sand Tiger Shark	*Odontaspis tyaurus*		X		
Sandbar Shark	*Charcharinus plumbeus*		X	X	X
Tiger Shark	*Galeocerdo cuvieri*		X		
Invertebrates					
Long Finned Squid	*Loligo pealei*			X	

Source: Summary of Essential Fish Habitat (EFH) Designation. National Marine Fisheries Service Web Page. http://www.nero.noaa.gov/hcd/webintro.html Accessed 04/05/10.

Table 3
Essential Fish Habitat Information for Species Managed by the Mid-Atlantic Fishery Management Council

Species	Life Stage	EFH Geographic Extent	Habitat	Notes
Finfish				
Summer Flounder	Eggs	Coast - 200 miles offshore	Pelagic waters Seagrass beds	Most within 9 miles of shore 9 - 110 isobath
	Larvae	Coast - 200 miles offshore	Pelagic waters Seagrass beds	12 - 50 mi. offshore, 10 - 70 m isobath Temperature 9 - 10 C, Salinity 23 - 33 ppt
	Juveniles	Coast - 200 miles offshore	Demersal waters Estuaries, bays, seagrass beds	0.5 - 5 m isobath Temperature > 11 C, Salinity 10 - 30 ppt
	Adults	Coast - 200 miles offshore	Demersal waters Coast to the Continental Shelf	Summer - coastal waters Winter - offshore to 500 ft.
Scup	Eggs	None designated offshore	Pelagic waters	< 30 m isobath Temperature 13 - 23 C, Salinity > 15 ppt
	Larvae	None designated offshore	Pelagic waters Near shore	< 20 m isobath Temperature 13 - 23 C, Salinity > 15 ppt
	Juveniles	Coast - 200 miles offshore	Demersal waters Sand / mud bottom, shell / eelgrass beds	0 - 38 m isobath Temperature > 7 C, Salinity > 15 ppt
	Adults	Coast - 200 miles offshore	Demersal waters Sand / mud bottom, shell / eelgrass beds	Adults winter offshore, 2 185 m isobath Temperature > 7 C, Salinity > 15 ppt
Black Sea Bass	Eggs	None designated offshore	Pelagic waters	0 - 200 m isobath
	Larvae	Coast - 200 miles offshore	Pelagic waters Coasts / estuaries / sponge beds	< 100 m isobath Temperature 11 - 26 C, Salinity 30 - 35 ppt
	Juveniles	Coast - 200 miles offshore	Demersal waters Rough bottom / shell beds / artificial reefs	Winter offshore, 1 - 38 m isobath Temperatures > 6 C, Salinity > 18 ppt
	Adults	Coast - 200 miles offshore	Demersal waters Artificial reefs / sand / shell bottom	Winter offshore, 20 - 50 m isobath Temperatures > 6 C, Salinity > 20 ppt
Bluefish	Eggs	Coast - 200 miles offshore	Pelagic waters Mid-Continental shelf	Mid-shelf depths Temperature > 18 C, Salinity > 31 ppt
	Larvae	Coast - 200 miles offshore	Pelagic waters Mid-Continental shelf	> 15 m isobath Temperature > 18 C, Salinity > 30 ppt
	Juveniles	Coast - 200 miles offshore	Pelagic waters Mid-Continental shelf to estuaries	Temperature 19 - 24 C, Salinity 23 - 36 ppt
	Adults	Coast - 200 miles offshore	Pelagic waters Mid-Continental shelf to estuaries	Highly migratory Temperature 14 - 16 C,Salinities > 25 ppt
Atlantic Mackerel	Eggs	Coast - 200 miles offshore	Pelagic waters Continental shelf to estuaries	0 - 15 m isobath Temperature 5 - 23 C, Salinity 18 - > 30 ppt
	Larvae	Coast - 200 miles offshore	Pelagic waters Continental shelf to estuaries	10 - 130 m isobath Temperature 6 - 22 C, Salinity > 30 ppt
	Juveniles	Coast - 200 miles offshore	Pelagic waters Continental shelf to estuaries	0 - 320 m isobath isobath Temperature 4 - 22 C, Salinity > 25 ppt
	Adults	Coast - 200 miles offshore	Pelagic waters Continental shelf to estuaries	0 - 360 m isobath isobath Temperature 4 - 16 C, Salinity > 25 ppt
Butterfish	Eggs	Coast - 200 miles offshore	Pelagic waters Continental shelf to estuaries	0 - 1829 m isobath Temperature 11 - 17 C, Salinity 25 - 33 ppt
	Larvae	Coast - 200 miles offshore	Pelagic waters Continental shelf to estuaries	10 - 1829 m isobath Temperature - 19 C C, Salinity 604 - 37 ppt
	Juveniles	Coast - 200 miles offshore	Pelagic waters Continental shelf to estuaries	10 - 365 m isobath Temperature 3 - 28 C, Salinity 3 - 37 ppt
	Adults	Coast - 200 miles offshore	Pelagic waters Continental shelf to estuaries	10 - 365 m isobath Temperature 3 - 28 C, Salinity 4 - 26 ppt
Spiny Dogfish	Juveniles	Coast - 200 miles offshore	Pelagic waters Continental shelf to estuaries	10 - 390 m isobath Temperature 3 - 28 C
	Adults	Coast - 200 miles offshore	Pelagic waters Continental shelf to estuaries	10 - 450 m isobath Temperature 3 - 28 C, Salinity 30 - 32 ppt
Invertebrates				
Atlantic Surfclam	Juveniles	Coast - 200 miles offshore	Throughout substrate to depth of 3 ft. below sediment / water interface	0 - 60 m isobath, Temperature 2 - 30 C Fewer in water deeper than 38 m
	Adults	Coast - 200 miles offshore	Throughout substrate to depth of 3 ft. below sediment / water interface	0 - 60 m isobath, Temperature 2 - 30 C Fewer in water deeper than 38 m
Ocean Quahog	Juveniles	Coast - 200 miles offshore	Throughout substrate to depth of 3 ft. below sediment / water interface	8 - 245 m isobath Temperature < 18 C, salinity > 25 ppt
	Adults	Coast - 200 miles offshore	Throughout substrate to depth of 3 ft. below sediment / water interface	8 - 245 m isobath Temperature < 18 C, salinity > 25 ppt
Long-Finned Squid	Pre-Recruits	Coast - 200 miles offshore	Pelagic waters Continental shelf to shore	0 - 213 m isobath Temperature 4 - 27 C, Salinity 31 - 34 ppt
	Recruits	Coast - 200 miles offshore	Pelagic waters Continental shelf to shore	0 - 305 m isobath Temperature 4 - 28 C

Sources: NMFS. Summary of Essential Fish Habitat Description and Identification for Mid-Atlantic Fishery Management Council Managed Species: Summer Flounder, Scup, Black Sea Bass, Bluefish, Atlantic Surfclam, Ocean Quahog, Atlantic Mackerel, Loligo, Butterfish, and Dogfish.
NMFS. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species.

Table 4
Essential Fish Habitat Information for Species Managed by the New England Fishery Management Council

Species	Life Stage	EFH Geographic Extent	Habitat	Notes
Finfish				
Atlantic Salmon	Eggs	Rivers from CT to ME	Bottom habitats Gravel / cobble riffle	30 - 31 cm Temperatures < 10 C, Salinity - Fresh
	Larvae	Rivers from CT to ME	Bottom habitats Gravel / cobble riffle	Above or below a pool in rivers Temperatures < 10 C, Salinity - Fresh
	Juveniles	Rivers from CT to ME NE estuaries and tributaries	Bottom Habitats Cobble / gravel substrate	10 - 61 cm Temperatures < 25 C, Salinity - Fresh to Oceanic
	Adults	Rivers from CT to ME NE estuaries and tributaries	Pelagic waters DO > 5ppm	HPAC - 11 Rivers in Maine Temperatures < 10 C, Salinity 29 - 34 ppt
	Spawning Adults	Rivers from CT to ME NE estuaries and tributaries	Bottom habitats Gravel / cobble riffle	30 - 61 cm Temperatures < 10 C, Salinity - Fresh
Atlantic Sea Herring	Eggs	Coast - 200 miles offshore	Bottom Habitats Cobble / gravel substrate	20 - 80 m isobath Temperatures < 15 C, Salinity 32 - 33 ppt
	Larvae	Coast - 200 miles offshore	Pelagic waters	50 - 90 m isobath Temperatures < 16 C, Salinity 32 ppt
	Juveniles	Coast - 200 miles offshore	Pelagic waters Bottom Habitats	15 - 135 m isobath Temperatures < 10 C, Salinity 26 - 32 ppt
	Adults	Coast - 200 miles offshore	Pelagic waters Bottom Habitats	20 - 130 m isobath Temperatures < 10 C, Salinity > 28 ppt
	Spawning Adults	Coast - 200 miles offshore	Bottom Habitats Cobble / gravel substrate	20 - 80 m isobath Temperatures < 15 C, Salinity 32 - 33 ppt
Haddock	Eggs	Coast - 200 miles offshore	Surface Waters	50 - 90 m isobath Temperatures < 10 C, Salinity 34 - 36 ppt
	Larvae	Estuaries	Surface Waters	30 - 90 m isobath Temperatures < 14 C, Salinity 34 - 36 ppt
	Juveniles	Coast - 200 miles offshore	Bottom Habitats Pebble / gravel substrate	35 - 100 m isobath Temperatures < 11 C, Salinity 31.5 - 34 ppt
	Adults	Coast - 200 miles offshore	Bottom Habitats Pebble / gravel substrate	40 - 150 m isobath Temperatures < 7 C, Salinity 31.5 - 35 ppt
	Spawning Adults	Coast - 200 miles offshore	Bottom Habitats Pebble / gravel substrate	40 - 150 m isobath Temperatures < 6 C, Salinity 31.5 - 34 ppt
Little Skate	Juvenile	Coast - 200 miles offshore	Sandy / Gravelly / Muddy Substrates	0 - 137 m isobath Temperatures < 21 C, Salinity 32 ppt
	Adults	Coast - 200 miles offshore	Sandy / Gravelly / Muddy Substrates	0 - 137 m isobath Temperatures < 21 C, Salinity 32 ppt
Monkfish	Eggs	Coast - 200 miles offshore	Surface waters Eggs in floating mucus veil	15 - 1000 m isobath Temperatures < 18 C
	Larvae	Coast - 200 miles offshore	Pelagic waters	25 - 1000 m isobath Temperatures 15 C
	Juveniles	Coast - 200 miles offshore	Bottom Habitats w/ sand shell, algae, gravel, & mud	25 - 200 m isobath Temperatures < 13 C, Salinity 29.9 - 36.7 ppt
	Adults	Coast - 200 miles offshore	Bottom Habitats w/ sand shell, algae, gravel, & mud	25 - 200 m isobath Temperatures < 15 C, Salinity 29.9 - 36.7 ppt
	Spawning Adults	Coast - 200 miles offshore	Bottom Habitats w/ sand shell, algae, gravel, & mud	25 - 200 m isobath Temperatures < 13 C, Salinity 29.9 - 36.7 ppt
Ocean Pout	Eggs	Coast - 200 miles offshore	Bottom Habitats Hard substrates / crevices	< 50 m isobath Temperatures < 10 C, Salinity 32 - 34 ppt
	Larvae	Coast - 200 miles offshore	Bottom Habitats Hard substrates / crevices	< 50 m isobath Temperatures < 10 C, Salinity > 25 ppt
	Juveniles	Coast - 200 miles offshore	Bottom Habitats Smooth bottom / algae	< 80 m isobath Temperatures < 14 C, Salinity > 25 ppt
	Adults	Coast - 200 miles offshore	Bottom Habitats Sediment depressions	< 110 m isobath Temperatures < 15 C, Salinity 32 - 34 ppt
	Spawning Adults	Coast - 200 miles offshore	Bottom Habitats Hard substrates / crevices	< 50 m isobath Temperatures < 10 C, Salinity 32 - 34 ppt
Pollock	Eggs	Coast - 200 miles offshore	Pelagic Waters	30 - 270 m isobath Temperatures < 17 C, Salinity 32 - 32.8 ppt
	Larvae	Coast - 200 miles offshore	Pelagic Waters	10 - 250 m isobath Temperatures < 17 C
	Juveniles	Coast - 200 miles offshore	Bottom Habitats w/ sand, vegetation, mud, & rocks	0 - 250 m isobath Temperatures < 18 C, Salinity 29 - 32 ppt
	Adults	Coast - 200 miles offshore	Bottom Habitats Artificial reefs	15 - 365 m isobath Temperatures < 14 C, Salinity 31 - 34 ppt
	Spawning Adults	Coast - 200 miles offshore	Bottom Habitats Artificial reefs	15 - 365 m isobath Temperatures < 8 C, Salinity 32 - 32.8 ppt

* Continued on next page

Table 4 Continued
Essential Fish Habitat Information for Species Managed by the New England Fishery Management Council

Species	Life Stage	EFH Geographic Extent	Habitat	Notes
Finfish				
Red Hake	Eggs	Coast - 200 miles offshore	Surface waters Inner Continental Shelf	Surface waters Temperatures < 10 C, Salinity < 25 ppt
	Larvae	Coast - 200 miles offshore	Surface waters	< 200 m isobath Temperatures < 19 C, Salinity > 0.5 ppt
	Juveniles	Coast - 200 miles offshore	Bottom Habitats Shell fragments	< 100 m isobath Temperatures < 16 C, Salinity 31 - 33 ppt
	Adults	Coast - 200 miles offshore	Bottom Habitats Sediment depressions	10 - 130 m isobath Temperatures < 12 C, Salinity 33 - 34 ppt
	Spawning Adults	Coast - 200 miles offshore	Bottom Habitats Sediment depressions	< 100 m isobath Temperatures < 10 C, Salinity > 25 ppt
Whiting	Eggs	Coast - 200 miles offshore	Surface waters	50 - 150 m isobath Temperatures < 20 C
	Larvae	Coast - 200 miles offshore	Surface waters	50 - 130 m isobath Temperatures < 20 C
	Juveniles	Coast - 200 miles offshore	Bottom habitats All substrate types	20 - 270 m isobath Temperatures < 21 C, Salinity > 20 ppt
	Adults	Coast - 200 miles offshore	Bottom habitats All substrate types	30 - 325 m isobath Temperatures < 22 C
	Spawning Adults	Coast - 200 miles offshore	Bottom habitats All substrate types	30 - 325 m isobath Temperatures < 13 C
Windowpane Flounder	Eggs	Coast - 200 miles offshore	Surface waters	< 70 m isobath Temperatures < 20 C
	Larvae	Coast - 200 miles offshore	Pelagic waters	< 70 m isobath Temperatures < 20 C
	Juveniles	Coast - 200 miles offshore	Bottom Habitats Fine grained substrate	1 - 100 m isobath Temperatures < 25 C, Salinity 5.5 - 36 ppt
	Adults	Coast - 200 miles offshore	Bottom Habitats Fine grained substrate	1 - 75 m isobath Temperatures < 26.8 C, Salinity 5.5 - 36 ppt
	Spawning Adults	Coast - 200 miles offshore	Bottom Habitats Fine grained substrate	1 - 75 m isobath Temperatures < 21 C, Salinity 5.5 - 36 ppt
Winter Flounder	Eggs	Coast - 200 miles offshore	Bottom habitats Sand / gravel substrate	< 5 m isobath Temperatures < 10 C, Salinity 10 - 30 ppt
	Larvae	Coast - 200 miles offshore	Pelagic waters Bottom waters	< 6 m isobath Temperatures < 15 C, Salinity 4 - 30 ppt
	Juveniles	Coast - 200 miles offshore	Bottom habitats Fine grained substrate	1 - 50 m isobath Temperatures < 25 C, Salinity 10 - 30 ppt
	Adults	Coast - 200 miles offshore	Bottom habitats Mud / sand / gravel	1 - 100 m isobath Temperatures < 25 C, Salinity 15 - 33 ppt
	Spawning Adults	Coast - 200 miles offshore	Bottom habitats Mud / sand / gravel	< 6 m isobath Temperatures < 15 C, Salinity 5.5 - 36 ppt
Winter Skate	Juveniles	Coast - 200 miles offshore	Sandy / Gravelly / Muddy Substrates	0 - 371 m isobath Temperatures < 19 C, Salinity 30 - 36 ppt
	Adults	Coast - 200 miles offshore	Sandy / Gravelly / Muddy Substrates	0 - 371 m isobath Temperatures < 19 C, Salinity 30 - 36 ppt
Witch Flounder	Eggs	Coast - 200 miles offshore	Surface waters	Deep Temperatures < 13 C, Salinity Hight
	Larvae	Coast - 200 miles offshore	Surface waters to 250 m	Deep Temperatures < 13 C, Salinity Hight
	Juveniles	Coast - 200 miles offshore	Bottom habitats Fine grained substrate	50 - 1500 m isobath Temperatures < 13 C, Salinity 34 - 36 ppt
	Adults	Coast - 200 miles offshore	Bottom habitats Fine grained substrate	20 - 300 m isobath Temperatures < 13 C, Salinity 32 - 36 ppt
	Spawning Adults	Coast - 200 miles offshore	Bottom habitats Fine grained substrate	25 - 360 m isobath Temperatures < 15 C, Salinity 32 - 36 ppt
Yellowtail Flounder	Eggs	Coast - 200 miles offshore	Surface waters	30 - 90 m isobath Temperatures < 15 C, Salinity 32.4 - 33.5 ppt
	Larvae	Coast - 200 miles offshore	Surface waters	10 - 90 m isobath Temperatures < 17 C, Salinity 32.4 - 33.5 ppt
	Juveniles	Coast - 200 miles offshore	Bottom habitats Sand / mud substrate	20 - 50 m isobath Temperatures < 15 C, Salinity 32.4 - 33.5 ppt
	Adults	Coast - 200 miles offshore	Bottom habitats Sand / mud substrate	20 - 50 m isobath Temperatures < 15 C, Salinity 32.4 - 33.5 ppt
	Spawning Adults	Coast - 200 miles offshore	Bottom habitats Sand / mud substrate	10 - 125 m isobath Temperatures < 17 C, Salinity 32.4 - 33.5 ppt

Source: NMFS. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species.

Table 5
Essential Fish Habitat Information for Species Managed by the South Atlantic Fishery Management Council

Species	Life Stage	EFH Geographic Extent	Habitat	Notes
Cobia	All	Coast - 200 miles offshore	Sandy shoals Rock bottoms Seagrass	EFH decignated for all coastal inlets
King Mackerel	All	Coast - 200 miles offshore	Sandy shoals Rock bottoms	EFH decignated for all coastal inlets
Spanish Mackerel	All	Coast - 200 miles offshore	Sandy shoals Rock bottoms	EFH decignated for all coastal inlets

Source: NMFS. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species.

Table 6
Essential Fish Habitat Information for Highly Migratory Species

Species	Life Stage	EFH Geographic Extent	Habitat	Notes
Atlantic Bluefin Tuna	Spawning Eggs / Larvae	Coast - 200 miles offshore	Pelagic waters Near coastal surface waters	0 - 200 m isobath North Carolina to Florida
	Juveniles / Subadults	Coast - 200 miles offshore	Pelagic waters	20 - 200 m isobath Temperature > 12 C
	Adults	Coast - 200 miles offshore	Pelagic waters	50 - 200 m isobath
Atlantic Skipjack Tuna	Spawning Eggs / Larvae	Coast - 200 miles offshore	Offshore waters	200 m isobath to EEZ Florida and Gulf waters
	Juveniles / Subadults	Coast - 200 miles offshore	Pelagic surface waters	25 - 200 m isobath - Florida Temperature 20 - 31 C
	Adults	Coast - 200 miles offshore	Pelagic surface waters	25 - 200 m isobath - Mid Atl. Bight Temperature 20 - 31 C
Basking Shark	Neonate / Early Juveniles	Insufficient information available	Insufficient information available	Insufficient information available
	Late Juvenile / Subadults	Coast - 200 miles offshore	Offshore waters	50 - 200 m isobath Western edge Gulf Stream
	Adults	Coast - 200 miles offshore	Offshore waters	50 - 200 m isobath Western edge Gulf Stream
Blue Shark	Neonate / Early Juveniles	Coast - 200 miles offshore	Offshore waters	Offshore waters
	Late Juvenile / Subadults	Coast - 200 miles offshore	Offshore waters Epipelagic	Offshore waters
	Adults	Coast - 200 miles offshore	Offshore waters Epipelagic	Offshore waters
Dusky Shark	Neonate / Early Juveniles	Coast - 200 miles offshore	Shallow coastal waters Inlets / estuaries	1 - 25 m isobath New York to North Carolina
	Late Juvenile / Subadults	Coast - 200 miles offshore	Coastal and pelagic waters	25 - 200 m isobath New England to Florida
	Adults	Coast - 200 miles offshore	Pelagic waters	25 - 200 m isobath North Carolina to Florida
Sand Tiger Shark	Neonate / Early Juveniles	Coast - 200 miles offshore	Shallow coastal waters	1 - 25 m isobath Barnegat Inlet, NJ to Florida
	Late Juvenile / Subadults	Coast - 200 miles offshore	Insufficient Information for EFH	Insufficient Information for EFH
	Adults	Coast - 200 miles offshore	Shallow coastal waters	1 - 25 m isobath Barnegat Inlet, NJ to Florida
Sandbar Shark	Neonate / Early Juveniles	Coast - 200 miles offshore	Shallow coastal waters	1 - 25 m isobath Great and Delaware Bays - pupping
	Late Juvenile / Subadults	Coast - 200 miles offshore	Coastal and pelagic waters	1 - 25 m isobath Winter - benthic, 100 - 200 m iso.
	Adults	Coast - 200 miles offshore	Coastal and pelagic waters	1 - 50 m isobath
Shortfin Mako Shark	Neonate / Early Juveniles	Coast - 200 miles offshore	Pelagic waters	25 - 2000 m isobaths
	Late Juvenile / Subadults	Coast - 200 miles offshore	Pelagic waters	25 - 2000 m isobaths
	Adults	Coast - 200 miles offshore	Pelagic waters	25 - 2000 m isobaths
Thresher Shark	Neonate / Early Juveniles	Coast - 200 miles offshore	Pelagic waters	> 50 m isobath
	Late Juvenile / Subadults	Coast - 200 miles offshore	Pelagic waters	> 50 m isobath
	Adults	Coast - 200 miles offshore	Pelagic waters	> 50 m isobath
Tiger Shark	Neonate / Early Juveniles	Coast - 200 miles offshore	Shallow coastal - deep waters	1 - 200 m isobath
	Late Juvenile / Subadults	Coast - 200 miles offshore	Shallow coastal waters	1 - 100 m isobath
	Adults	Coast - 200 miles offshore	Offshore	25 - 200 m isobaths Maryland to Florida
White Shark	Neonate / Early Juveniles	Coast - 200 miles offshore	Insufficient Information for EFH	Insufficient Information for EFH
	Late Juvenile / Subadults	Coast - 200 miles offshore	Pelagic waters	25 - 100 m isobath New York Bight
	Adults	Coast - 200 miles offshore	Insufficient Information for EFH	Insufficient Information for EFH

Source: NMFS. Guide to Essential Fish Habitat Descriptions. Highly Migratory Species.

Table 7
Endangered, Threatened, Candidate, and Fish Species of Concern in the New York Bight

Species	State Status	Federal Status	Range in North Atlantic	Habitat	Notes
Shortnose Sturgeon	Endangered	Endangered	St. John River (Canada) to St. Johns River (Florida)	Nearshore estuaries of rivers	Significant population in tidal portion of Hudson River
Atlantic Sturgeon	Threatened	Candidate Species	Labrador (Canada) to St. Johns River (Florida)	Rivers to open ocean	Population declining
Atlantic Salmon	Not Listed	Endangered	Greenland to New York Bight	Rivers to open ocean	Last wild population from Gulf of Maine
Dusky Shark	Not Listed	Species of Concern	Southern New England to Southern Brazil	Coastal surf zone to offshore	Major nursery grounds New Jersey to South Carolina nearshore waters
Night Shark	Not Listed	Species of Concern	Delaware to Brazil	Deep water (150 - 350 m)	Tropical shark rarely found in cooler waters
Sand Tiger Shark	Not Listed	Species of Concern	Gulf of Maine to Florida	Coasts to continental shelf	Juveniles dependant on Delaware Estuary
Rainbow Smelt	Not Listed	Species of Concern	Labrador to New Jersey	Rivers to open ocean	Spawn in rivers Overwinter coastally
Alewife	Not Listed	Species of Concern	Newfoundland to North Carolina	Rivers to open ocean	Spawn in rivers Overwinter coastally
Blueback Herring	Not Listed	Species of Concern	Nova Scotia to St. John's River - FL	Rivers to open ocean	Spawn in rivers Overwinter coastally
Thorny Skate	Not Listed	Species of Concern	Labrador to South Carolina	Deep demersal species 20 - 3900 feet deep	Area of Concern - West Greenland to New York
Porbeagle Shark	Not Listed	Species of Concern	Circumglobal - North Atlantic, S. Pacific, & Indian Oceans	Offshore pelagic Surface to 1000 feet deep	Pelagic - cold-temperate coastal and oceanic
Cusk	Not Listed	Candidate Species	NW Atlantic - NJ to Strait of Belle Isle & Grand Banks	Deep water, rocky bottoms Depth of 330 feet	Candidate species - throughout range Area of Concern - Gulf of ME
Atlantic Halibut	Not Listed	Species of Concern	Labrador to Southern New England	Boreal - Coastal to Upper slope	One of the largest fish in area
Warsaw Grouper	Not Listed	Species of Concern	Massachusetts to Gulf of Mexico	Deep water reefs 180 - 1700 feet deep	Population declining
American Shad	Threatened in NJ	Not Listed	Newfoundland to Florida	Rivers to open ocean	Spawning in Hudson River
Atlantic Tomcod	Threatened in NJ	Not Listed	Labrador to Virginia	Brackish water / estuaries	Only known NJ population in Sandy Hook Bay

Sources: National Marine Fisheries Service. 2010. Andromonous and Marine Fishes. NOAA - Office of Protected Resources. http://www.nmfs.noaa.gov/prot_res?PR3/Fish/fishes.html Accessed 03/10/10.
South Jersey Resource Conservation and Development Council. 2010. Endangered Fish of New Jersey. http://www.sjrcd.org/wildlife/fish.htm Accessed 03/01/10.

Table 8
Major Commercial Finfish and Shellfish Annual Landings
2006 – 2008
New York

Species Finfish	2006 Pounds	2006 Dollars	2007 Pounds	2007 Dollars	2008 Pounds	2008 Dollars	Total Pounds	Total Dollars
Silver Hake	2,557,315	1,855,744	3,562,794	2,259,911	4,089,379	2,551,908	**10,209,488**	**6,667,563**
Goosefish	1,169,776	1,446,046	1,844,215	2,030,786	1,922,594	1,963,796	**4,936,585**	**5,440,628**
Bluefish	1,180,388	584,170	1,468,337	595,664	1,261,345	663,361	**3,910,070**	**1,843,195**
Golden Tilefish	1,295,710	3,320,083	1,392,951	3,843,056	1,198,876	3,343,220	**3,887,537**	**10,506,359**
Scup	0	0	2,324,675	2,348,525	1,214,116	1,710,401	**3,538,791**	**4,058,926**
Summer Flounder	1,219,842	3,418,061	941,878	3,132,859	857,036	2,933,398	**3,018,756**	**9,484,318**
Scup / Porgy	2,423,179	2,457,390	333	333	0	0	**2,423,512**	**2,457,723**
Skates	505,430	126,220	710,497	186,136	902,357	192,977	**2,118,284**	**505,333**
Striped Bass	688,165	2,039,820	731,371	1,528,558	653,108	1,691,141	**2,072,644**	**5,259,519**
Butterfish	470,534	364,829	361,861	350,941	415,176	345,602	**1,247,571**	**1,061,372**
Winter Flounder	366,194	721,558	400,345	805,673	180,482	412,874	**947,021**	**1,940,105**
Black Sea Bass	315,700	1,049,133	270,427	989,511	201,943	701,874	**788,070**	**2,740,518**
Menhaden	334,046	35,222	137,399	22,306	114,772	29,108	**586,217**	**86,636**
Finfishes - General (Uncoded)	20,237	12,765	160	143	432,883	614,365	**453,280**	**627,273**
Red Hake	51,740	27,258	168,775	77,988	199,078	80,267	**419,593**	**185,513**
Atlantic Mackerel	132,561	66,129	137,633	66,204	127,483	69,656	**397,677**	**201,989**
Smooth Dogfish Shark	114,165	49,382	103,598	43,316	151,269	77,098	**369,032**	**169,796**
Weakfish	152,209	218,861	86,707	144,469	44,275	83,999	**283,191**	**447,329**
Atlantic Herring	8,935	3,677	131,397	28,085	126,114	39,737	**266,446**	**71,499**
Windowpane Flounder	56,835	32,619	101,162	57,700	78,281	50,741	**236,278**	**141,060**
Tautog	68,312	183,249	73,811	214,671	88,581	254,232	**230,704**	**652,152**
TOTAL	**13,131,273**	**18,012,216**	**14,950,326**	**18,726,835**	**14,259,148**	**17,809,755**	**42,340,747**	**54,548,806**

Species Shellfish	2006 Pounds	2006 Dollars	2007 Pounds	2007 Dollars	2008 Pounds	2008 Dollars	Total Pounds	Total Dollars
Atlantic Surf Clam	6,912,659	4,472,941	9,161,113	5,932,387	8,752,926	5,669,578	**24,826,698**	**16,074,906**
Longfin Squid	6,461,684	5,846,228	5,439,120	5,159,482	5,467,495	5,288,297	**17,368,299**	**16,294,007**
Quahog	1,649,772	12,237,334	1,591,970	14,224,265	1,475,630	13,184,754	**4,717,372**	**39,646,353**
American Lobster	1,242,601	6,288,543	716,300	3,638,804	1,159,602	5,285,805	**3,118,503**	**15,213,152**
Blue Crab	870,261	1,108,677	714,628	800,384	535,998	707,515	**2,120,887**	**2,616,576**
Sea Scallop	577,097	3,517,662	619,416	3,871,582	782,106	5,050,147	**1,978,619**	**12,439,391**
Horseshoe Crab	172,745	87,749	796,253	498,031	397,901	142,667	**1,366,899**	**728,447**
Jonah Crab	24,467	12,144	202,898	89,475	561,387	243,185	**788,752**	**344,804**
Softshell Clam	393,168	2,054,963	197,686	1,627,615	130,601	1,075,536	**721,455**	**4,758,114**
Eastern Oyster	269,305	2,389,799	123,885	2,627,163	135,338	2,870,069	**528,528**	**7,887,031**
Conchs / Snails	110,121	245,356	64,720	62,983	139,733	117,344	**314,574**	**425,683**
Green Crab	0	0	169,603	218,788	134,946	87,718	**304,549**	**306,506**
TOTAL	**18,683,880**	**38,261,396**	**19,797,592**	**38,750,959**	**19,673,663**	**39,722,615**	**58,155,135**	**116,734,970**

Source: National Marine Fisheries Service. Annual Commercial Landings Statistics. Landings by Species for New York. http://www.st.nmfs.noaa.gov/pls/webpls/mf_lndngs_grp.data_in Accessed 02/17/10.

Table 9
Major Commercial Finfish and Shellfish Annual Landings
2006 – 2008
New Jersey

Species	**2006**		**2007**		**2008**		**Total**	
Finfish	**Pounds**	**Dollars**	**Pounds**	**Dollars**	**Pounds**	**Dollars**	**Pounds**	**Dollars**
Menhaden	24,085,182	1,541,354	37,634,929	3,193,724	0	0	**61,720,111**	**4,735,078**
Finfish - General (Uncoded)	4,136	4,509	239,456	187,084	45,470,602	5,681,522	**45,714,194**	**5,873,115**
Atlantic Mackerel	24,976,551	3,709,384	5,384,026	668,364	0	0	**30,360,577**	**4,377,748**
Goosefish	3,840,988	4,415,297	4,229,134	4,484,247	3,692,664	4,004,920	**11,762,786**	**12,904,464**
Finfish - Bait / Animal Food (Uncoded)	110	16	0	0	6,540,035	548,083	**6,540,145**	**548,099**
Atlantic Herring	0	0	6,039,473	563,083	0	0	**6,039,473**	**563,083**
Summer Flounder	2,379,801	4,926,355	1,697,504	3,988,869	1,540,813	3,460,641	**5,618,118**	**12,375,865**
Skates	995,632	160,038	1,085,384	216,476	1,633,496	239,496	**3,714,512**	**616,010**
Bluefish	1,048,008	443,405	1,403,717	500,053	1,022,646	466,652	**3,474,371**	**1,410,110**
Atlantic Croaker	1,617,144	800,826	1,357,999	586,684	0	0	**2,975,143**	**1,387,510**
Sea Herring	2,451,489	389,274	0	0	0	0	**2,451,489**	**389,274**
Scup	0	0	1,575,159	1,544,596	773,876	633,573	**2,349,035**	**2,178,169**
Black Sea Bass	494,352	1,346,236	480,238	1,479,709	424,722	1,094,214	**1,399,312**	**3,920,159**
Scup / Porgy	1,392,868	1,054,922	0	0	0	0	**1,392,868**	**1,054,922**
Silver Hake	185,923	118,510	997,211	494,766	0	0	**1,183,134**	**613,276**
Golden Tilefish	539,891	1,173,211	234,397	641,847	342,632	788,039	**1,116,920**	**2,603,097**
Yellowfin Tuna	370,743	694,972	378,338	855,479	285,869	778,549	**1,034,950**	**2,329,000**
TOTAL	**64,382,818**	**20,778,309**	**62,736,965**	**19,404,981**	**61,727,355**	**17,695,689**	**188,847,138**	**57,878,979**

Species	**2006**		**2007**		**2008**		**Total**	
Shellfish	**Pounds**	**Dollars**	**Pounds**	**Dollars**	**Pounds**	**Dollars**	**Pounds**	**Dollars**
Atlantic Surf Clam	43,643,726	25,107,029	44,791,212	26,546,602	51,596,665	30,838,137	**140,031,603**	**82,491,768**
Clams / Bivalves	0	0	0	0	51,596,665	30,838,137	**51,596,665**	**30,838,137**
Sea Scallop	8,439,261	57,465,057	11,807,581	77,359,023	13,278,708	91,319,873	**33,525,550**	**226,143,953**
Squids	0	0	0	0	25,790,848	6,572,618	**25,790,848**	**6,572,618**
Ocean Quahog	11,642,560	5,930,919	10,954,880	5,815,130	0	0	**22,597,440**	**11,746,049**
Shellfish	10,672,426	1,843,916	11,713,906	1,882,483	101	125	**22,386,433**	**3,726,524**
Blue Crab	5,769,634	5,973,934	4,636,368	5,471,118	5,522,229	6,523,880	**15,928,231**	**17,968,932**
Longfin Squid	3,201,305	1,822,594	3,115,969	2,258,146	0	0	**6,317,274**	**4,080,740**
Quahog	1,843,991	7,614,520	239,733	968,308	1,529,231	6,306,220	**3,612,955**	**14,889,048**
American Lobster	470,877	2,532,956	680,623	4,055,895	632,547	3,213,673	**1,784,047**	**9,802,524**
TOTAL	**85,683,780**	**108,290,925**	**87,940,272**	**124,356,705**	**149,946,994**	**175,612,663**	**323,571,046**	**408,260,293**

Source: National Marine Fisheries Service. Annual Commercial Landings Statistics. Annual Landings by Species for New Jersey. http://www.st.nmfs.noaa.gov/pls/webpls/mf_lndngs_grp.data_in Accessed 02/17/10.

Table 10
Major Commercial Finfish and Shellfish Landings by Distance from Shore
New York
2008

Species	Distance from Shore						Total	
	0 - 3 Miles		3 - 200 Miles		High Seas			
Finfish	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Silver Hake	—	—	4,150,000	2,576,000	—	—	4,150,000	2,576,000
Goosefish	307,000	314,000	1,612,000	1,648,000	—	—	1,920,000	1,962,000
Bluefish	1,059,000	557,000	202,000	106,000	—	—	1,261,000	663,000
Scup / Porgy	547,000	770,000	668,000	941,000	—	—	1,215,000	1,711,000
Tilefish	—	—	1,199,000	3,344,000	—	—	1,199,000	3,344,000
Skates	479,000	103,000	423,000	90,000	—	—	902,000	193,000
Summer Flounder	351,000	1,203,0.00	506,000	1,731,000	—	—	857,000	2,934,000
Striped Bass	651,000	1,719,000	—	—	—	—	651,000	1,719,000
Butterfish	195,000	163,000	220,000	183,000	—	—	416,000	346,000
Red Hake	—	—	203,000	82,000	—	—	203,000	82,000
Black Sea Bass	83,000	288,000	119,000	414,000	—	—	202,000	702,000
Dogfish	51,000	24,000	138,000	60,000	—	—	189,000	84,000
Winter Flounder	58,000	132,000	123,000	281,000	—	—	180,000	413,000
Atlantic Sea Herring	38,000	26,000	102,000	38,000	—	—	139,000	63,000
Atlantic Mackerel	—	—	128,000	70,000	—	—	128,000	70,000
Menhaden	84,000	20,000	31,000	8,000	—	—	115,000	28,000
Gulf Flounder	41,000	26,000	62,000	41,000	—	—	103,000	67,000
Yellowtail Flounder	5,000	9,000	41,000	81,000	—	—	45,000	90,000
Gray Sea Trout	29,000	55,000	15,000	29,000	—	—	44,000	84,000
Yellowfin Tuna	—	—	44,000	118,000	—	—	44,000	118,000
Yellow Perch	44,000	63,000	—	—	—	—	44,000	63,000
Albacore Tuna	—	—	42,000	29,000	—	—	42,000	29,000
Bigeye Tuna	—	—	36,000	189,000	—	—	36,000	189,000
American Shad	16,000	14,000	4,000	4,000	—	—	20,000	18,000
Sharks - Uncoded	—	—	19,000	22,000	—	—	19,000	22,000
Bluefin Tuna	—	—	13,000	81,000	—	—	13,000	81,000
Alewife	8,000	2,000	—	—	—	—	8,000	2,000
Bonito	< 1,000	< 1,000	8,000	16,000	—	—	8,000	16,000
Little Tunny	4,000	2,000	2,000	1,000	—	—	6,000	3,000
Dolphinfish	—	—	4,000	11,000	—	—	4,000	11,000
Spanish Mackerel	—	—	3,000	7,000	—	—	3,000	7,000
Eels - Common	2,000	2,000	—	—	—	—	2,000	2,000
Catfish / Bullheads	1,000	1,000	—	—	—	—	1,000	1,000
Tuna - Unclassified	—	—	1,000	3,000	—	—	1,000	3,000
Wolffish	—	—	< 1,000	< 1,000	—	—	< 1,000	< 1,000
Total	**4,053,000**	**4,290,000**	**10,118,000**	**12,204,000**	—	—	**14,170,000**	**17,696,000**

Species	Distance from Shore						Total	
	0 - 3 Miles		3 - 200 Miles		High Seas			
Shellfish	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Surf Clam	5,952,000	3,855,000	2,801,000	1,814,000	—	—	8,753,000	5,670,000
Long Finned Squid	1,651,000	1,603,000	3,853,000	3,740,000	—	—	5,504,000	5,343,000
Hard Clam	1,461,000	13,053,000	—	—	—	—	1,461,000	13,053,000
American Lobster	684,000	3,426,000	130,000	653,000	—	—	814,000	4,079,000
Sea Scallop	—	—	783,000	5,054,000	—	—	783,000	5,054,000
Blue Crab	489,000	660,000	—	—	—	—	489,000	660,000
Horseshoe Crab	387,000	220,000	—	—	—	—	387,000	220,000
Jonah Crab	114,000	87,000	243,000	184,000	—	—	358,000	271,000
Crab - Other	189,000	71,000	3,000	1,000	—	—	192,000	71,000
Conch	135,000	2,868,000	—	—	—	—	135,000	2,868,000
Oyster	135,000	2,868,000	—	—	—	—	135,000	2,868,000
Soft Shelled Clam	125,000	1,030,000	—	—	—	—	125,000	1,030,000
Clam - Unclassified	18,000	51,000	—	—	—	—	18,000	51,000
Sea Mussel	15,000	10,000	—	—	—	—	15,000	10,000
Bay Scallop	1,000	154,000	—	—	—	—	1,000	154,000
Shrimp	< 1,000	< 1,000	—	—	—	—	< 1,000	< 1,000
Short Finned Squid	—	—	< 1,000	< 1,000	—	—	< 1,000	< 1,000
Total	**11,356,000**	**29,956,000**	**7,813,000**	**11,446,000**	—	—	**19,170,000**	**41,402,000**

Source: National Marine Fisheries Service. 2010. Landings by Distance from US Shores, 2008, State of New York. http://www.st.nmfs.noaa.gov/pls/webpls/mf_8850_landings.results Accessed 02/17/10.

Table 11
Major Commercial Finfish and Shellfish Landings by Distance from Shore
New Jersey
2008

Species	Distance from Shore						Total	
	0 - 3 Miles		3 - 200 Miles		High Seas			
Finfish	**Pounds**	**Dollars**	**Pounds**	**Dollars**	**Pounds**	**Dollars**	**Pounds**	**Dollars**
Fish - Bait	1,000	< 1,000	6,539,000	559,000			6,540,000	559,000
Goosefish	—	—	3,693,000	4,005,000	—	—	3,693,000	4,005,000
Skates	—	—	1,633,000	239,000	—	—	1,633,000	239,000
Summer Flounder	1,000	3,000	1,542,000	3,463,000	—	—	1,544,000	3,466,000
Bluefish	307,000	140,000	716,000	327,000	—	—	1,023,000	467,000
Scup / Porgy	—	—	774,000	634,000	—	—	774,000	634,000
Black Sea Bass	—	—	425,000	1,095,000	—	—	425,000	1,095,000
Tilefish	—	—	343,000	788,000	—	—	343,000	788,000
Yellowfin Tuna	—	—	287,000	780,000	—	—	287,000	780,000
Dogfish	—	—	237,000	136,000	—	—	237,000	136,000
Winter Flounder	< 1,000	1,000	208,000	457,000	—	—	208,000	458,000
Bigeye Tuna	—	—	141,000	690,000	—	—	141,000	690,000
Eels - Common	134,000	254,000	—	—	—	—	134,000	254,000
Unclassified Tuna	—	—	97,000	188,000	—	—	97,000	188,000
Uncoded Sharks	—	—	74,000	71,000	—	—	74,000	71,000
Gray Sea Trout	1,000	2,000	56,000	84,000	—	—	57,000	86,000
Butterfish	—	—	45,000	34,000	—	—	45,000	34,000
Gulf Flounder	—	—	45,000	46,000	—	—	45,000	46,000
American Shad	7,000	7,000	—	—	—	—	7,000	7,000
Alewife	1,000	< 1,000	—	—	—	—	1000	< 1,000
Total	**452,000**	**407,000**	**16,855,000**	**13,596,000**	—	—	**17,308,000**	**14,003,000**

Species	Distance from Shore						Total	
	0 - 3 Miles		3 - 200 Miles		High Seas			
Shellfish	**Pounds**	**Dollars**	**Pounds**	**Dollars**	**Pounds**	**Dollars**	**Pounds**	**Dollars**
Atlantic Surf Clam	635,000	393,000	50,962,000	30,445,000	—	—	51,597,000	30,838,000
Squid	—	—	25,798,000	6,579,000	—	—	25,798,000	6,579,000
Sea Scallop	—	—	13,297,000	91,454,000	—	—	13,297,000	91,454,000
Blue Crab	5,522,000	6,524,000	—	—	—	—	5,522,000	6,524,000
Hard Clam	1,529,000	6,306,000	—	—	—	—	1,529,000	6,306,000
American Lobster	9,000	45,000	624,000	3,169,000	—	—	633,000	3,214,000
Oyster	550,000	2,547,000	—	—	—	—	550,000	5,547,000
Blue Crab - Soft Shell	294,000	760,000	—	—	—	—	294,000	760,000
Conch	168,000	376,000	—	—	—	—	168,000	376,000
Jonah Crab	94,000	89,000	22,000	21,000	—	—	116,000	111,000
Crab - Other	—	—	5,000	5,000	—	—	5,000	5,000
Total	8,801,000	17,040,000	90,708,000	131,673,000	—	—	99,509,000	151,714,000

Source: National Marine Fisheries Service. 2010. Landings by Distance from US Shores, 2008, State of New Jersey. http://www.st.nmfs.noaa.gov/pls/webpls/mf_8850_landings.results Accessed 02/17/10.

Table 12
Life History Characteristics of Finfish Found in the Central Part of the Mid-Atlantic Bight

Scientific Name	Common Name	Spawning Time	Spawning Location	Egg Type	Habitat Summer	Habitat Winter
Mustelus canis	Smooth Dogfish	March - May	Estuary / Mid-Atlantic Bight	Live	Estuary	Ocean
Anguilla rostrata	American Eel	March - May	Sargasso Sea	?	Estuary	Estuary
Conger oceanicus	Conger Eel	June - February	Sargasso Sea	?	Estuary	?
Alosa aestivalis	Blueback Herring	March - May	Fresh Water	Pelagic	Estuary	Ocean
Alosa mediocris	Hickory Shad	March - May	Fresh Water	Demersal / Pelagic	?	?
Alosa pseudoharengus	Alewife	March - May	Fresh Water	Pelagic	Estuary	Ocean
Alosa sapidissima	American Shad	March - May	Fresh Water	Demersal / Pelagic	Fresh Water / Estaury	Ocean
Brevoortia tyrannus	Atlantic Menhaden	Sept.-Nov. & Mar.-May	Mid and South Atlantic Bight	Pelagic	Estuary	Ocean
Clupea harengus	Atlantic Herring	March - May	Mid-Atlantic Bight	Demersal	?	?
Anchoa hepsetus	Striped Anchovy	June - August	Mid-Atlantic Bight	Pelagic	Estuary / Ocean	Estuary / Ocean
Anchoa mitchilli	Bay Anchovy	June - August	Estuary / Mid-Atlantic Bight	Pelagic	Estuary	Ocean
Osmerus mordax	Rainbow Smelt	March - May	Fresh Water	Demersal	Brackish	Estuary
Synodus foetens	Inshore Lizardfish	?	South Atlantic Bight	?	?	Ocean
Microgadus tomcod	Atlantic Tomcod	December - February	Fresh Water	Demersal	Estuary / Fresh Water	Fresh Water
Pollachius virens	Pollock	September - February	Mid-Atlantic Bight	Pelagic	Estaury	Ocean
Urophycis chuss	Red Hake	June - August	Mid-Atlantic Bight	Pelagic	Ocean	Ocean
Urophycis regia	Spotted Hake	June-Nov. & Mar.-May	Mid-Atlantic Bight	Pelagic	Ocean	Ocean
Urophycis tenuis	White Hake	March - May	Mid-Atlantic Bight	Pelagic	Ocean	Ocean
Ophidion marginatum	Striped Cusk-Eel	June - November	Mid-Atlantic Bight	Pelagic	Estuary / Ocean	Ocean
Opsanus tau	Oyster Toadfish	March - August	Estuary	Demersal	Estuary	Estuary
Strongylura marina	Atlantic Needlefish	March - May	Estuary	Demersal	Estuary	?
Cyprinodon variegatus	Sheepshaed minnow	March - August	Estuary	Demersal	Marsh	Estuary
Fundulus heteroclitus	Mummichog	March - August	Estuary	Demersal	Marsh	Estuary
Fundulus luciae	Spotfin Killifish	March - August	Estuary	Demersal	Marsh	Estuary
Fundulus majalis	Striped Killifish	March - August	Estuary	Demersal	Creeks / Shores	Estuary
Lucania parva	Rainwater Killifish	March - August	Estuary	Demersal	Marsh	Estuary
Gambusia holbrooki	Eastern Mosquitofish	June - August	Fresh Water	Live	Fresh Water / Estaury	Fresh Water / Estuary
Menidia beryllina	Inland Silverside	March - August	Estuary	Demersal	Marsh	Estuary
Menidia menidia	Atlantic Silverside	March - August	Estuary	Demersal	Estuary	Ocean
Apeltes quadracus	Fourspine Stickleback	March - May	Estuary	Demersal	Eelgrass	Estuary
Gasterosteus aculeatus	Threespine Stickleback	March - May	Estuary	Demersal	Marsh	Ocean
Hippocampus erectus	Lined Seahorse	March - August	Estuary / Mid-Atlantic Bight	Live	Estuary	Ocean
Syngnathus fuscus	Northern Pipefish	June - August	Estuary	Live	Estuary	Ocean
Prionotus carolinus	Northern Searobin	June - November	Mid-Atlantic Bight (Estuary?)	Pelagic	Estuary / Ocean	Ocean
Prionotus evolans	Striped Searobin	June - November	Mid-Atlantic Bight (Estuary?)	Pelagic	Estuary / Ocean	Ocean
Myoxocephalus aenaeus	Grubby	December - February	Estuary / Mid-Atlantic Bight	Demersal	Estuary / Ocean?	Estuary / Ocean?

* Continued on next page

Table 12 Continued
Life History Characteristics of Finfish Found in the Central Part of the Mid-Atlantic Bight

Scientific Name	Common Name	Spawning Time	Spawning Location	Egg Type	Habitat Summer	Habitat Winter
Morone americana	White Perch	March - May	Fresh Water	Demersal / Pelagic	Estuary / Fresh Water	Estuary
Morone saxatilus	Striped Bass	March - May	Fresh Water	Pelagic	Estuary / Fresh Water	Estuary
Centropristis striata	Black Sea Bass	March - November	Mid-Atlantic Bight	Pelagic	Estuary / Ocean	Ocean
Pomatomus saltatrix	Bluefish	March - August	Mid and South Atlantic Bight	Pelagic	Estuary	Ocean
Caranx hippos	Crevalle Jack	?	South Atlantic Bight	Pelagic	Estuary	?
Lutjanus griseus	Gray Snapper	June - August	South Atlantic Bight	Pelagic	?	?
Stenotomus chrysops	Scup	March - August	Estuaries, Bays, Cont Shelf	Pelagic	Estuary	Ocean
Bairdiella chrysoura	Silver Perch	June - August	?	Pelagic	Estuary	?
Cynoscion regalis	Weakfish	March - August	Estuary / Mid-Atlantic Bight	Pelagic	Estuary	Ocean
Leiostomus xanthurus	Spot	December - February	Southern Mid-Atlantic Bight	Pelagic	Estuary	Ocean
Menticirrhus saxatilis	Northern Kingfish	June - August	Mid-Atlantic Bight	Pelagic	Ocean / Estuary	Ocean
Micropogonias undulatus	Atlantic Croaker	June - November	Southern Mid-Atlantic Bight	Pelagic	Estuary	Estuary
Pogonias cromis	Black Drum	June - August	Mid-Atlantic Night	Pelagic	Estuary	Ocean
Chaetodon ocellatus	Spotfin Butterflyfish	?	South Atlantic Bight	Pelagic	Estuary	?
Mugil cephalus	Striped Mullet	December - February	South Atlantic Bight	Pelagic	Estuary / Fresh Water	Ocean
Mugil curema	White Mullet	March - May	South Atlantic Bight	Pelagic	Estuary	Ocean
Sphyraena borealis	Northern Sennet	March - May	South Atlantic Bight	Pelagic	Estuary	?
Tautoga onitis	Tautog	March - November	Estuary / Mid-Atlantic Bight	Pelagic	Estaury	Estuary
Tautogolabrus adspersus	Cunner	March - November	Mid-Atlantic Bight	Pelagic	Estuary	Estuary / Ocean
Pholis gunnellus	Rock Gunnel	December - February	Estuary / Mid-Atlantic Bight	Demersal	Estuary	Ocean
Astroscopus guttatus	Northern Stargazer	June - August	Estuary / Mid-Atlantic Bight	?	Estuary / Ocean	?
Hypsoblennius hentz	Feather Blenny	June - August	Estuary	Demersal	Estuary	Estuary
Ammodytes americanus	American Sand Lance	December - February	?	Demersal	Estuary	Estuary
Gobionellus boleosoma	Darter Goby	June - August	Estuary	Demersal	Estuary	Estuary
Gobiosoma bosc	Naked Goby	March - August	Estuary	Demersal	Estuary	Estuary
Gobiosoma ginsburgi	Seaboard Goby	June - August	Estuary	Demersal	Estuary / Ocean	?
Peprilus triacanthus	Butterfish	June - August	Estuary / Mid-Atlantic Bight	Pelagic	Estuary / Ocean	Ocean
Scophthalmus aquosus	Windowpane	Mar.-May & Sept.-Nov.	Estuary / Mid-Atlantic Bight	Pelagic	Estuary / Ocean	Ocean
Eutropus microstomus	Smallmouth Flounder	March - November	Mid-Atlantic Bight	Pelagic	Estuary / Ocean	Ocean
Paralichthys dentatus	Summer Flounder	September - February	Mid-Atlantic Bight	Pelagic	Estuary	Estuary
Pseudopleuronectes americanus	Winter Flounder	December - February	Estuary / Mid-Atlantic Bight	Demersal	Estuary	Estuary / Ocean?
Trinectes maculatus	Hogchoker	March - November	Estaury	Pelagic	Estaury	Estuary
Sphoeroides maculatus	Northern Puffer	March - August	Estuary	Demersal	Estuary	Ocean

Source : Able, K.W. & Fahay, M.P. 1998 The First Year in the Life of Estuarine Fishes in the Middle Atlantic Bight. Rutgers University Press. New Brunswick, NJ.

Table 13
Endangered, Threatened, & Special Concern Birds in the New York Bight

Species	State Status	Federal Status	Habitat & Nest Areas	Breeding Status	Notes
Least Tern	Threatened NY Endangered NJ	Endangered	Beaches	Breeding / Migrant	Ground nester Forrage in bays, estuaries, & rivers
Roseate Tern	Endangered NY Endangered NJ	Endangered	Beaches / Marshes	Breeding / Migrant	Ground nester (among common terns) Forrage along coasts, inlets, & offshore
Bald Eagle	Threatened NY Endangered NJ	Threatened	Forests Near Water	Breeding / Migrant / Winters	Dividing Creek has only active nest site in NJ
Piping Plover	Endangered NY Endangered NJ	Threatened	Beaches	Breeding / Migrant	Ground nester Forrage on intertidal beaches
American Bittern	Special Concern NY Endangered NJ	Special Concern	Wetlands / Marshes	Breeding / Migrant	
Northern Harrier	Threatened NY Endangered NJ	Special Concern	Marshes / Grasslands	Breeding / Migrant / Winters	Observed inland - Kittatinny Ridge Hunts over coastal marshes
Sedge Wren	Threatened NY Endangered NJ	Special Concern	Meadows / High Marshes	Breeding / Migrant	Delaware Bay Estuary
Short-Eared Owl	Endangered NY Endangered NJ	Special Concern	Marshes / Grasslands	Breeding / Migrant / Winters	Only breeding population endangered Ground nester
Black Skimmer	Special Concern NY Endangered NJ	Not Listed	Beaches / Coastal Bays	Breeding / Migrant	Ground nester Forrage in tidal creeks & inlets
Golden Eagle	Endangered NY Not Listed NJ	Not Listed	Tundra / Grasslands / Deserts	Not Locally Breeding	Winters coastally with Bald Eagles
Henslow's Sparrow	Not Listed NY Endangered NJ	Not Listed	Grassy Fields / Marsh Edges	Breeding / Migrant	All inland and coastal nesting areas appear unoccupied
Peregrine Falcon	Endangered NY Endangered NJ	Not Listed	Bulidings / Bridges / Marsh Platforms	Breeding / Migrant / Winters	Hunt over marshes, beaches, and open water
Pied-Billed Grebe	Threatened NY Endangered NJ	Not Listed	Ponds / Creeks / Marshes	Breeding / Migrant / Winters	One nesting population - Kearny Marsh Breeding status Endangered
Yellow-Crowned Night-Heron	Not Listed NY Endangered NJ	Not Listed	Barrier Islands / Shrub Thickets	Breeding / Migrant	Forrage in tidal creeks and marshes
Black Rail	Endangered NY Threatened NJ	Special Concern	Marshes	Breeding / Migrant	
Black-Crowned Night-Heron	Not Listed NY Threatened NJ	Not Listed	Forests / Marshes	Breeding / Migrant	Forrage in marshes and ponds
Bobolink	Not Listed NY Threatened NJ	Not Listed	Meadows / Hayfields / Marshes	Breeding / Migrant	Breeds in northwest part of NJ Found in marshes during migration
Ipswich Sparrow	Not Listed NY Threatened NJ	Not Listed	Grassy Beach Dunes	Migrant / Winters	Only breeds on Cape Sable Island - Nova Scotia
Long-Eared Owl	Not Listed NY Threatened NJ	Not Listed	Forests / Marshes	Breeding / Migrant / Winters	
Osprey	Special Concern NY Threatened NJ	Not Listed	Marshes / Bays / Rivers / Lakes	Breeding / Migrant	Nests on transmission towers, light poles, channel markers, & platforms
Red Knot	Not Listed NY Threatened NJ	Not Listed	Beaches / Inlet Spits / Marshes	Migrant	Delaware Bay - migration stopover Feeds on horseshoe crab eggs
Savannah Sparrow	Not Listed NY Threatened NJ	Not Listed	Grassy Fields / Salt Marshes / Dunes	Breeding / Migrant / Winters	Coastline and farm fields

* Continued on next page

Table 13 Continued
Endangered, Threatened, & Special Concern Birds in the New York Bight

Species	State Status	Federal Status	Habitat & Nest Areas	Breeding Status	Notes
American Oystercatcher	Not Listed NY Special Concern NJ	Not Listed	Ocean Shores / Salt Marshes	Breeding / Migrant	Nests on the Ground
Caspian Tern	Not Listed NY Special Concern NJ	Not Listed	Beaches	Migrant	Breeding status of Special Concern
Cattle Egret	Not Listed NY Special Concern NJ	Not Listed	Marshes	Breeding / Migrant	Nests in Trees Breeds in Colonies w/ other Herons
Common Loon	Special Concern NY Not Listed NJ	Not Listed	Lakes of Adirondack Mountains / Rivers	Not Locally Breeding	Winter Along the Coast of Long Island
Common Nighthawk	Special Concern NY Special Concern NJ	Not Listed	Sand / Dirt / Gravel / Bare Rock	Breeding / Migrant	Breeds on Coastal Dunes
Common Tern	Threatened NY Special Concern NJ	Not Listed	Beaches	Breeding / Migrant	Breeding status of Special Concern Ground nester
Glossy Ibis	Not Listed NY Special Concern NJ	Not Listed	Marshes	Breeding / Migrant	Nests on the Ground
Great Blue Heron	Not Listed NY Special Concern NJ	Not Listed	Marshes / Swamps / Lakes	Breeding / Migrant / Winters	Breeding status of Special Concern 3 breeding colonies in NJ inland swamps
Gull-Billed Tern	Not Listed NY Special Concern NJ	Not Listed	Shoreline / Beaches / Salt Marshes	Breeding / Migrant	Breeds on Gravelly Beaches Winters in marshes
Horned Lark	Special Concern NY Special Concern NJ	Not Listed	Fields / Beaches	Breeding / Migrant / Winters	Breeding status of Special Concern
King Rail	Threatened NY Special Concern NJ	Not Listed	Marshes / Swamps	Breeding / Migrant	
Least Bittern	Threatened NY Special Concern NJ	Not Listed	Marshes	Breeding / Migrant	Breeding status of Special Concern
Little Blue Heron	Not Listed NY Special Concern NJ	Not Listed	Marshes	Breeding / Migrant	
Saltmarsh Sharp-Tailed Sparrow	Not Listed NY Special Concern NJ	Not Listed	Marshes	Breeding / Migrant	
Sanderling	Not Listed NY Special Concern NJ	Not Listed	Beaches / Tidal Flats	Migrant / Winters	
Seaside Sparrow	Special Concern NY Not Listed NJ	Not Listed	Maritime Areas / Elevated Vegetation	Breeding / Migrant	Barrier Islands South Shore of Long Island
Semipalmated Sandpiper	Not Listed NY Special Concern NJ	Not Listed	Mudflats / Sandy Beaches	Migrant	Breeds in Open Tundra
Short-Billed Marsh Wren	Not Listed NY Special Concern NJ	Not Listed	Brackish Marshes / Inland Meadows	Breeding / Migrant / Winters	Coastline and Meadows
Snowy Egret	Not Listed NY Special Concern NJ	Not Listed	Marshes	Breeding / Migrant	Nests in Trees
Spotted Sandpiper	Not Listed NY Special Concern NJ	Not Listed	Marshes / Wetlands / Uplands	Breeding / Migrant	Breeding status of Special Concern
Tricolor Heron	Not Listed NY Special Concern NJ	Not Listed	Marshes	Breeding / Migrant	Breeding status of Special Concern
Virginia Rail	Not Listed NY Special Concern NJ	Not Listed	Marshes	Breeding / Migrant	Nests on the Ground

Sources: New Jersey Division of Fish and Wildlife. Endangered and Threatened Wildlife of New Jersey. http://www.nj/gov/dep/fgw/tandespp.htm
South Jersey Resource Conservation and Development Council. Endangered Birds of New Jersey and More Endangered Birds of New Jersey. http://www.sjrcd.org/wildlife/bird1.htm & http://www.sjrcd.org/wildlife/bird2.htm
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Table 14
Endangered, Threatened, and Special Concern Sea Turtles and Terrapins in the New York Bight

Species	State Status	Federal Status	Range in North Atlantic	Habitat	Notes
Atlantic Loggerhead Turtle	Endangered in NJ Threatened in NY	Threatened	Newfoundland to Argentina	Continental shelves, bays, estuaries, lagoons	Nests Florida to Carolinas Nests reported in New Jersey
Atlantic Leatherback Turtle	Endangered	Endangered	Nova Scotia to Puerto Rico	Open seas	Nests Georgia to US Virgin Islands Critical Habitat - waters surrounding St Croix, US Virgin Islands
Kemp's Ridley Turtle	Endangered	Endangered	Nova Scotia to Gulf of Mexico	Coastline, estuaries, bays, lagoons	Most endangered sea turtle
Atlantic Hawksbill Turtle	Endangered	Endangered	Massachusetts to Puerto Rico	Warm coastal vegetated water depths less than 50 feet	Critical Habitat - waters surrounding Puerto Rico
Atlantic Green Turtle	Threatened	Threatened	Massachusetts to Puerto Rico	Shallow vegetated waters, inlets, bays, estuaries	Florida and Mexico breeding populations endangered Critical Habitat - waters surrounding Puerto Rico
Northern Diamondback Terrapin	Special Concern in NJ Not Listed in NY	Not Listed	Cape Cod to Cape Hattaras	Marshes, estuaries, beaches	

Sources: National Marine Fisheries. Sea Turtle Protection and Conservation. http://www.nmfs.noaa.gov/prot_res/PR3/Turtles/turtles.html
Plotkin, P.T. (Editor). 1995. National Marine Fisheries Service and US Fish and Wildlife Service Status Reviews for Sea Turtles Listed Under the Endangered Species Act of 1973. National Marine Fisheries Service, Silver Spring, Maryland.
Conant, R. & Collins, J.T. 1998. Peterson Field Guides. Reptiles and Amphibians Eastern / Central North America. Houghton Mifflin Company. Boston.

Table 15
Marine Mammals in the New York Bight

Species	Range In North Atlantic	Distance from Shore	Notes
Cetaceans			
Atlantic Spotted Dolphin	New England to Venezuela	Continental Shelf to Slope Shallow, Inshore Water South of the Chesapeake Bay	Near 200m Isobath Within 350km of Coast
Atlantic White-Sided Dolphin	West Greenland to North Carolina	Continental Shelf to 100m Contour	January - May Few Individuals Present Temperate and Sub-Polar Waters
Blainsville's Beaked Whale	Nova Scotia to Florida	Continental Shelf Edge to Slope	Sighted in Gulf Stream Features Few Observed in Tropical Waters
Blue Whale	Arctic to Mid-Lattitude Waters	Open Ocean	Possible Occurrence to Florida
Bottlenose Dolphin	New Jersey to Florida	Shoreline to 25m Isobath Continental Shelf Break to Slope	Coastal Stock Offshore Stock
Common Dolphin	Georges Bank to Cape Hatteras	Continental Shelf to Slope	Near 200 - 300m Isobaths
Cuvier's Beaked Whale	Nova Scotia to the Caribbean	Continental Shelf Edge	
Dwarf Sperm Whale	Georges Bank to Florida Keys	Continental Shelf	
Fin Whale	Nova Scotia to Cape Hatteras	Continental Shelf to Deep Ocean	Dominant Large Cetacean in Area
Gervias' Beaked Whale	Georges Bank to Caribbean	Open Ocean	Observed in Gulf Stream Features
Harbor Porpoise	Arctic to North Carolina	Coastline to > 200m Isobath	Large Populations off NJ in Fall & Winter
Humpback Whale	Newfoundland to Chesapeake Bay	Continental Shelf	Water off the Mid-Atlantic & Southern States Provide Important Habitat for Juveniles
Killer Whale	Arctic to Massachusetts Bay	Offshore	Rare in US Atlantic EEZ
Long-Finned Pilot Whale	Iceland to Cape Hatteras	Continental Shelf Edge	Associated w/ Gulf Stream & Thermal Fronts on Shelf
Minke Whale	Davis Strait to Gulf of Mexico	US EEZ Continental Shelf	Most Abundant Spring and Summer Polar, Temperate, & Tropical Waters
North Atlantic Right Whale	Bay of Fundy to Florida	Coastal Waters to Continental Shelf	World's Most Endangered Large Whale
Pantropical Spotted Dolphin	Georges Bank to Florida	Continental Shelf Edge to Slope	Prefer Deeper Water
Pygmy Sperm Whale	Georges Bank to Florida Keys	Deep Continental Shelf to Shelf Edge	
Risso's Dolphin	Newfoundland to Florida	Continental Shelf Edge to Open Ocean	Associated w/ Bathymetric Features & Gulf Stream Warm-Core Rings & Gulf Stream North Wall
Rough-Toothed Dolphin	All Oceans	Shelf and Oceanic Waters	Travel in Groups of 10 - 20 individuals
Sei Whale	Nova Scotia to Cape Hatteras	Offshore	Will Move Inshore w/ Food Source
Short-Finned Pilot Whale	Georges Bank to Florida	Continental Shelf and Slope	Observed in the Gulf Stream
Sperm Whale	Georges Bank to Cape Hatteras	Continental Shelf Edge to Mid-Ocean	Associated with Gulf Stream Edge
Striped Dolphin	Nova Scotia to Jamaica	Continental Slope to Gulf Stream	Associated w/ Gulf Stream North Wall, Warm-Core Rings, & New England Sea Mounts Associated w/ 1000m Isobath
True's Beaked Whale	Nova Scotia to Bahamas	Offshore	Associated w/ Gulf Stream Features
White-Beaked Dolphin	Nova Scotia to Cape Hatteras	Continental Slope	
White-Sided Dolphin	Bay of Fundy to North Carolina	Continental Shelf	Associated with 100m Isobath
Pinnipeds			
Gray Seal	New England to Labrador	Nearshore Waters	Numbers Increasing in Region
Harbor Seal	Arctic to South Carolina	Nearshore Waters	Seasonal Interval in Southern New England to New Jersey Increasing
Harp Seal	Arctic to New Jersey	Nearshore Waters	Sightning Increasing from Maine to NJ
Hooded Seal	Arctic to Puerto Rico	Offshore	Increased Occurrences from ME to FL

Source: National Marine Fisheries Service. September 2002. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment - 2008. NOAA Technical Memorandum NMFS-NE-210.

Table 16
Major Fishing Ports in New York

Port	Fleet	Target Species	Notes	Fishing Cooperatives / Commercial Village Dock
New York City	Recreational	Recreational species	Primarily Recreational Fishing	Fulton Fish Market
	Head Boats	Recreational species		
	Pleasure Boats	Recreational species		
Freeport / Point Lookout	Otter Trawlers	Demersal Species	Atlantic Ocean Waters Only	Jones Inlet Packing Doxsee Offshore Seafood Bracco's Fiore Fish market St. Peter's Dock Cossing Fish Market
	Clam Dredges	Surf Clams Ocean Quahogs		
	Head Boats	Recreational species		
	Pleasure Boats	Recreational species		
Islip	Recreational	Recreational species	Primarily Recreational Fishing	
	Head Boats	Recreational species		
	Pleasure Boats	Recreational species		
Hampton Bays / Shinnecock	Trawlers	Squid Whiting Scup Fluke Butterfish Bluefish Weakfish	Trawlers Most Common	Shinnecock Fishing Cooperative
	Clam Dredges	Surf Clams Ocean Quahogs		
	Lobster Boats	Lobster		
	Longliners	Tuna Swordfish		
	Gillnetters	Monkfish Bluefish Weakfish		
	Baymen	Fish Shellfish		
Montauk	Otter Trawlers	Squid Whiting Fluke Glounder Scup Butterfish	Trawlers Most Common	Montauk Fish Dock Gosman's Dock Onlet Seafood
	Longliners	Tilefish Tuna Swordfish	Largest NY Fishing Port	
	Lobster Boats	Lobster		
	Fish Potters			
	Pound Netters			
	Gillnetters			
	Baymen	Shellfish	Large Sportfishing Fleet	
	Hook & Line	Sport Fish		

Sources: New York State Department of State. 2001. Long Island South Shore Estuary Reserve. Comprehensive Management Plan. Gall, K. 2005. New York's Seafood Industry. New York Sea Grant, Stony Brook, NY. Updated June 2005. Originally Published in New York Seafood Council's Newsletter in 1995.

Table 17
Major Fishing Ports in New Jersey

Port	Fleet	Target Species	Notes	Fishing Cooperatives / Commercial Village Dock
Belford	Gill Netters		Mixed Trawl Fisherey*	Belford Fisherman's Cooperative
	Lobster Boats	Lobster		
	Purse Seiners	Atlantic Menhaden		
	Otter Trawlers	Silver Hake Red Hake Summer Flounder Winter Flounder Blasck Sea Bass Scup		
Point Pleasant	Gill Netters		Mixed Trawl Fisherey* Primarily Fish Local Waters	Fisherman's Dock Cooperative
	Otter Trawlers	Summer Flounder Squid Silver Hake Red Hake Winter Fklounder Bluefish Monkfish Scallops		
	Clam Dredges	Surf Clams Ocean Quahogs		
Barnegat Light	Longliners	Tuna Swordfish Tilefish	Large Offshore Vessels	Viking Village Commercial Fishing Dock
	Scallopers	Scallops		
	Gill Netters	Weakfish Monkfish Bluefish Shad Dogfish	Small Inshore Vessels	
Atlantic City	Clam Dredges	Surf Clams Ocean Quahogs		
Cape May / Wildwood	Otter Trawlers	Squid Mackerel Summer Flounder Black Sea Bass Scup Lobster Atlantic Mehnaden	Largest NJ Port One of Largest Ports on Coast NJ Center of Fish Processing and Freezing	
	Clam Dredges	Surf Clam Ocean Quahog		

* Mixed Trawl Fishery - the adjustment of fishing and marketing of fish to annual migrations of several finfish species.

Source: New Jersey Fishing Web Page. http://www.fishingnj.org/sitemap.htm Accessed 02/17/10.

Table 18
Major Commercial Finfish and Shellfish Landings by Gear Type
2006 – 2008
New York

Gear Type	Target Species	2006		2007		2008		Total	
		Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Other	Other	5,540,579	11,364,300	20,926,827	40,176,762	19,181,853	34,367,726	**45,649,259**	**85,908,788**
Otter Trawl - Bottom	Fish	10,728,069	12,041,020	5,191,458	5,649,794	4,883,342	8,106,228	**20,802,869**	**25,797,042**
Gill Nets - Sink / Anchor	Fish	1,854,511	1,907,982	2,379,903	2,599,437	2,455,019	2,373,583	**6,689,433**	**6,881,002**
Hydraulic Dredge	Clam	0	0	2,748,288	1,782,912	2,786,572	1,808,996	**5,534,860**	**3,591,908**
Dredge	Other	3,737,338	2,872,950	827,436	2,301,789	510,820	1,261,467	**5,075,594**	**6,436,206**
Lines - Long	Reef Fish	1,712,446	3,559,066	1,258,692	3,356,471	883,136	2,369,495	**3,854,274**	**9,285,032**
Dredge	Clam	3,541,219	2,474,597	0	0	0	0	**3,541,219**	**2,474,597**
Pots / Traps	Other	237,628	934,605	894,373	966,058	2,398,239	6,160,717	**3,530,240**	**8,061,380**
Lines - Hand	Fish	610,848	1,562,465	569,956	1,247,217	629,859	1,423,933	**1,810,663**	**4,233,615**
Rakes	Other	1,261,286	8,299,203	0	0	10,672	9,831	**1,271,958**	**8,309,034**
Otter Trawl - Midwater	Fish	689,546	616,427	416,061	358,484	40	200	**1,105,647**	**975,111**
Tongs / Grabs	Other	1,099,011	8,513,286	0	0	0	0	**1,099,011**	**8,513,286**
Pots / Traps	Blue Crab	869,382	1,107,494	61	122	0	0	**869,443**	**1,107,616**
By Hand	Other	19,705	44,883	10,023	16,648	291,131	109,352	**320,859**	**170,883**
Dredge	Sea Scallop	239,603	1,013,153	5,946	38,655	0	0	**245,549**	**1,051,808**
Pound Nets	Other	40,711	143,628	105,359	99,333	89,122	166,557	**235,192**	**409,518**
Cast Nets	Fish	0	0	104,967	116,096	71,067	25,682	**176,034**	**141,778**
Lines - Troll	Fish	164,363	234,434	0	0	0	0	**164,363**	**234,434**
Troll & Hand Lines Combined	Fish	0	0	69,091	136,450	52,848	111,274	**121,939**	**247,724**
Pots / Traps	Lobster - Inshore	95,438	472,275	0	0	157	131	**95,595**	**472,406**
Otter Trawl - Bottom	Crab	0	0	0	0	75,304	60,772	**75,304**	**60,772**
Unspecified Gear	Not Specified	15,230	21,776	14,197	19,057	44,434	64,356	**73,861**	**105,189**
Gill Nets - Drift	Fish	0	0	39,919	36,532	21,546	16,655	**61,465**	**53,187**
Pots / Traps	Fish	20,976	46,858	0	0	34,771	12,999	**55,747**	**59,857**
Pots / Traps	Conch	54,450	69,657	0	0	0	0	**54,450**	**69,657**
Pots / Traps	Lobster - Offshore	44,402	58,843	0	0	0	0	**44,402**	**58,843**
Gill Nets	Fish	0	0	18,599	11,874	15,961	5,527	**34,560**	**17,401**
Pound Nets	Fish	34,456	25,455	0	0	0	0	**34,456**	**25,455**
Haul Seines - Long	Fish	1,100	660	2,048	2,336	17,679	18,288	**20,827**	**21,284**
Lines - Long (Set w/ Hooks)	Fish	3,187	25,866	4,688	26,374	11,790	68,568	**19,665**	**120,808**
Fyke Net	Fish	3,579	6,419	9,959	10,810	4,421	9,781	**17,959**	**27,010**
Lines - Machine Jigging	Fish	16,821	28,001	0	0	0	0	**16,821**	**28,001**
Dredge	Bay Scallop	15,747	238,081	0	0	366	965	**16,113**	**239,046**
Dip Nets - Common	Not Specified	2,190	1,553	6,838	4,899	5,919	149	**14,947**	**6,601**
Spears	Fish	2,060	4,880	3,437	6,863	2,926	3,864	**8,423**	**15,607**
Otter Trawl - Bottom	Scallop	7,028	44,215	0	0	0	0	**7,028**	**44,215**
Haul Seines - Beach	Fish	5,300	4,300	1,140	1,290	0	0	**6,440**	**5,590**
Gill Nets - Drift (Runaround)	Fish	151	145	202	423	3,793	9,261	**4,146**	**9,829**
Weirs	Fish	2,394	3,579	958	1,967	711	1,316	**4,063**	**6,862**
Purse Seines	Fish	0	0	76	111	3,541	2,610	**3,617**	**2,721**
Beam Trawls	Fish	0	0	40	33	2,228	6,006	**2,268**	**6,039**
Floating Traps - Shallow	Not Specified	0	0	2,199	3,552	0	0	**2,199**	**3,552**
Scottish Seine	Fish	2,149	2,204	0	0	0	0	**2,149**	**2,204**
Midwater Trawl - Paired	Fish	390	673	0	0	1,245	359	**1,635**	**1,032**
Diving Gear	Other	22	44	705	2,123	316	1,359	**1,043**	**3,526**
Pots / Traps	Eel	314	930	215	344	296	478	**825**	**1,752**
Bag Nets	Fish	0	0	0	0	187	821	**187**	**821**
Otter Trawl - Bottom	Lobster	0	0	0	0	22	139	**22**	**139**
	TOTAL	**32,673,629**	**57,745,907**	**35,613,661**	**58,974,816**	**34,491,333**	**58,579,445**	**102,778,623**	**175,300,168**

Source: National Marine Fisheries Service. Annual Commercial Landings by Gear Type. New York. http://www.st.nmfs.gov/pls/webpls/MF_GEAR_LANDINGS.RESULTS. Accessed 02/17/10.

Table 19
Major Commercial Finfish and Shellfish Landings by Gear Type
2006 – 2008
New Jersey

Gear Type	Target Species	2006		2007		2008		Total	
		Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Hydraulic Dredge	Clam	0	0	55,745,747	32,361,042	51,599,993	30,839,239	**107,345,740**	**63,200,281**
Otter Trawl - Bottom	Fish	29,448,223	13,572,421	20,611,281	14,953,450	25,172,187	16,460,823	**75,231,691**	**44,986,694**
Purse Seines	Other Fish	9,605,228	565,974	29,171,788	2,496,351	29,255,298	1,856,291	**68,032,314**	**4,918,616**
Dredge	Clam	55,431,870	31,870,970	768	4,828	0	0	**55,432,638**	**31,875,798**
Dredge	Other	12,363,403	43,423,168	14,488,936	67,049,865	12,267,711	69,315,056	**39,120,050**	**179,788,089**
Otter Trawl - Midwater	Fish	12,927,148	2,215,904	6,890,251	960,683	4,438,895	916,373	**24,256,294**	**4,092,960**
Midwater Trawl - Paired	Fish	691,940	96,791	2,993,390	385,840	13,219,406	1,615,861	**16,904,736**	**2,098,492**
Gill Nets - Sink / Anchor	Fish	5,333,878	6,738,379	5,437,136	6,011,019	4,989,272	5,218,708	**15,760,286**	**17,968,106**
Other	Other	6,982,635	10,954,348	3,704,796	5,855,853	4,923,859	23,494,383	**15,611,290**	**40,304,584**
Pots / Traps	Blue Crab	4,845,710	5,935,145	4,193,421	5,579,547	5,396,071	7,027,088	**14,435,202**	**18,541,780**
Dip Nets - Common	Not Specified	2,441,000	195,280	3,120,000	249,600	2,485,000	198,800	**8,046,000**	**643,680**
Lines - Hand	Fish	443,804	758,894	1,889,951	1,159,888	4,816,056	1,445,416	**7,149,811**	**3,364,198**
Purse Seines	Menhaden	4,888,605	254,117	0	0	0	0	**4,888,605**	**254,117**
Pound Nets	Fish	1,497,192	492,154	1,860,041	513,338	1,026,864	347,518	**4,384,097**	**1,353,010**
Lines - Long	Reef Fish	1,289,318	3,153,770	1,402,266	3,754,314	1,135,287	2,929,340	**3,826,871**	**9,837,424**
Dredge	Sea Scallop	1,780,062	8,934,738	686,039	3,778,647	261,808	1,714,012	**2,727,909**	**14,427,397**
Pots / Traps	Other	451,564	1,247,910	819,196	2,374,807	486,293	1,957,187	**1,757,053**	**5,579,904**
Dredge	Crab	1,307,354	904,855	0	0	0	0	**1,307,354**	**904,855**
Pots / Traps	Lobster - Offshore	162,161	800,492	391,464	2,004,434	361,160	1,527,321	**914,785**	**4,332,247**
By Hand	Other	198,476	757,138	208,460	1,019,603	235,927	951,668	**642,863**	**2,728,409**
Dredge	Oyster	322,386	1,969,723	0	0	0	0	**322,386**	**1,969,723**
Pots / Traps	Eel	130,945	277,709	88,757	181,620	94,964	178,521	**314,666**	**637,850**
Pots / Traps	Fish	13,622	28,278	95,098	186,655	57,496	114,253	**166,216**	**329,186**
Pots / Traps	Conch	19,947	81,905	26,552	132,598	97,792	96,206	**144,291**	**310,709**
Rakes	Other	73,667	299,577	39,447	163,707	22,128	91,826	**135,242**	**555,110**
Gill Nets - Drift	Fish	14,247	2,491	67,322	66,673	2,008	2,841	**83,577**	**72,005**
Lines - Long (Set w/ Hooks)	Fish	19,369	133,226	15,605	91,273	21,794	123,635	**56,768**	**348,134**
Gill Nets - Drift	Shad	52,524	24,090	0	0	0	0	**52,524**	**24,090**
Tongs / Grabs	Other	4,380	13,979	19,653	94,005	2,459	10,565	**26,492**	**118,549**
Tongs / Grabs	Oyster	18,708	99,395	0	0	0	0	**18,708**	**99,395**
Otter Trawl - Bottom	Scallop	531	2,608	0	0	15,444	50,000	**15,975**	**52,608**
Fyke Nets	Fish	3,249	5,657	712	1,490	10,837	11,748	**14,798**	**18,895**
Pots / Traps	Lobster - Inshore	129	198	9,119	12,276	3,180	2,206	**12,428**	**14,680**
By Hand	Oyster	9,297	218,480	0	0	0	0	**9,297**	**218,480**
Pots / Traps	Other Crab	0	0	300	585	5,603	12,481	**5,903**	**13,066**
Cast Nets	Fish	4,946	2,868	125	644	408	2,726	**5,479**	**6,238**
Lines - Trot (w/ Baits)	Fish	960	720	280	286	400	446	**1,640**	**1,452**
Haul Seines - Long	Fish	1,360	1,433	24	287	0	0	**1,384**	**1,720**
Otter Trawl - Bottom	Lobster	0	0	0	0	946	1,095	**946**	**1,095**
Haul Seines - Beach	Fish	188	342	233	341	273	394	**694**	**1,077**
Lines - Troll	Fish	553	1,327	0	0	0	0	**553**	**1,327**
Otter Trawl - Bottom	Crab	0	0	140	63	360	297	**500**	**360**
Dredge	Bay Scallop	423	2,553	0	0	0	0	**423**	**2,553**
Gill Nets	Sea Bass	0	0	0	0	224	75	**224**	**75**
Gill Nets	Fish	161	40	0	0	0	0	**161**	**40**
	TOTAL	**152,781,163**	**136,039,047**	**153,978,298**	**151,445,612**	**162,407,403**	**168,514,399**	**469,166,864**	**455,999,058**

Source: National Marine Fisheries Service. Annual Commercial Landings by Gear Type. New Jersey. http://www.st.nmfs.gov/pls/webpls/MF_GEAR_LANDINGS.RESULTS. Accessed 02/17/10.

Table 20
Area Code Totals by State
New York and New Jersey
2004 - 2009

Gear	158 NY Total	158 NJ Total	158 Grand Total	158 % of Total	162 NY Total	162 NJ Total	162 Grand Total	162 % of Total	164 NY Total	164 NJ Total	164 Grand Total	164 % of Total	165 NY Total	165 NJ Total	165 Grand Total	165 % of Total	166 NY Total	166 NJ Total	166 Grand Total	166 % of Total	167 NY Total	167 NJ Total	167 Grand Total	167 % of Total
Otter Trawl - Bottom (Fish)	159	0	159	6	216	0	216	9	304	0	304	13	129	0	129	6	1737	1	1738	33	2062	6	2068	29
Dredge - Sea Scallop	0	0	0	0	0	12	12	1	1	0	1	0	0	1	1	0	1	0	1	0	1	0	1	0
Gill Net - Sink	0	0	0	0	1137	0	1137	50	1182	0	1182	50	490	0	490	23	2793	0	2793	53	1485	0	1485	21
Hand Line / Rod & Reel	1730	2	1732	62	775	3	778	34	527	0	527	22	184	0	184	9	460	0	460	9	3236	0	3236	45
Pot - Lobster	73	0	73	3	74	0	74	3	2	0	2	0	0	0	0	0	9	0	9	0	77	0	77	1
Dredge - Ocean Quahog / Surf Clam	0	0	0	0	0	0	0	0	302	0	302	13	1	0	1	0	0	0	0	0	0	0	0	0
Pot - Fish	386	0	386	14	5	0	5	0	35	0	35	1	23	0	23	1	10	0	10	0	225	0	225	3
Otter Trawl - Bottom (Scallop)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dredge - Other	0	8	8	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0
Gill Net - Runaround	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	12	0	22	0	22	0
Gill Net - Drift (Large Mesh)	0	0	0	0	6	0	6	0	0	0	0	0	291	0	291	14	31	0	31	1	16	0	16	0
Pot - Conch / Whelk	1	0	1	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	13	0
Otter Trawl - Beam	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	182	0	182	3	31	0	31	0
Trap	0	0	0	0	1	0	1	0	0	0	0	0	639	0	639	31	26	0	26	0	2	0	2	0
Pot - Crab	138	0	138	5	5	0	5	0	0	0	0	0	309	0	309	15	0	0	0	0	0	0	0	0
Hand Rake	1	0	1	0	0	0	0	0	3	0	3	0	2	0	2	0	0	0	0	0	0	0	0	0
Gill Net - Drift (Small Mesh)	0	0	0	0	14	0	14	1	3	0	3	0	0	0	0	0	20	0	20	0	24	0	24	0
Long Line - Bottom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Purse	0	0	0	0	0	0	0	0	2	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0
Cast Net	297	0	297	11	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Danish	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Pair Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dredge - Scallop (Chainmat)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otter Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Gear	4	0	4	0	37	0	37	2	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Diving Gear	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Seine - Haul	0	0	0	0	0	0	0	0	2	0	2	0	15	0	15	1	0	0	0	0	0	0	0	0
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6	0	3	0	3	0
Seine - Scottish	0	0	0	0	0	0	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Stop	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2798	10	2808		2276	15	2291		2380	0	2380		2087	1	2088		5287	1	5288		7200	6	7206	

Gear	168 NY Total	168 NJ Total	168 Grand Total	168 % of Total	612 NY Total	612 NJ Total	612 Grand Total	612 % of Total	613 NY Total	613 NJ Total	613 Grand Total	613 % of Total	614 NY Total	614 NJ Total	614 Grand Total	614 % of Total	615 NY Total	615 NJ Total	615 Grand Total	615 % of Total	616 NY Total	616 NJ Total	616 Grand Total	616 % of Total	Sum of Grand Totals
Otter Trawl - Bottom (Fish)	61	0	61	10	3041	10878	13919	33	12833	507	13340	56	6	490	496	4	52	1548	1600	6	1966	1892	3858	70	37888
Dredge - Sea Scallop	2	0	2	0	265	7518	7783	19	2009	943	2952	12	3	2567	2570	23	48	18782	18830	65	4	702	706	13	32859
Gill Net - Sink	8	0	8	1	816	2372	3188	8	2664	303	2967	12	3	3970	3973	35	180	4021	4201	15	8	199	207	4	21631
Hand Line / Rod & Reel	511	0	511	86	1822	629	2451	6	2063	3	2066	9	1	121	122	1	4	178	182	1	80	19	99	2	12348
Pot - Lobster	6	0	6	1	1469	4626	6095	15	860	62	922	4	2	463	465	4	52	834	886	3	198	41	239	4	8848
Dredge - Ocean Quahog / Surf Clam	1	0	1	0	211	1087	1298	3	2	584	586	2	0	181	181	2	2	1259	1261	4	0	33	33	1	3663
Pot - Fish	3	0	3	1	854	203	1057	3	314	0	314	1	0	929	929	8	0	436	436	2	0	0	0	0	3423
Otter Trawl - Bottom (Scallop)	0	0	0	0	1038	898	1936	5	138	67	205	1	4	16	20	0	21	233	254	1	10	48	58	1	2473
Dredge - Other	0	0	0	0	48	1753	1801	4	0	167	167	1	0	29	29	0	0	1	1	0	0	1	1	0	2010
Gill Net - Runaround	0	0	0	0	0	126	126	0	12	3	15	0	0	714	714	6	0	415	415	1	0	1	1	0	1305
Gill Net - Drift (Large Mesh)	0	0	0	0	6	113	119	0	27	2	29	0	0	315	315	3	0	305	305	1	0	0	0	0	1112
Pot - Conch / Whelk	0	0	0	0	0	143	143	0	48	12	60	0	0	619	619	6	0	0	0	0	0	1	1	0	842
Otter Trawl - Beam	0	0	0	0	268	156	424	1	145	1	146	1	0	8	8	0	0	35	35	0	0	6	6	0	833
Trap	0	0	0	0	8	39	47	0	4	0	4	0	0	3	3	0	0	0	0	0	0	0	0	0	722
Pot - Crab	0	0	0	0	5	1	6	0	8	0	8	0	0	212	212	2	0	0	0	0	0	0	0	0	678
Hand Rake	0	0	0	0	4	634	638	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	645
Gill Net - Drift (Small Mesh)	0	0	0	0	15	20	35	0	17	2	19	0	0	246	246	2	0	252	252	1	0	8	8	0	621
Long Line - Bottom	0	0	0	0	0	16	16	0	25	0	25	0	0	36	36	0	0	35	35	0	155	82	237	4	349
Seine - Purse	0	0	0	0	0	70	70	0	0	0	0	0	0	264	264	2	0	2	2	0	0	1	1	0	341
Cast Net	1	0	1	0	15	0	15	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	315
Otter Trawl - Bottom (Shrimp)	0	0	0	0	251	13	264	1	0	0	0	0	0	0	0	0	17	12	29	0	1	1	2	0	295
Seine - Danish	0	0	0	0	0	214	214	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	220
Pair Trawl - Midwater	0	0	0	0	0	47	47	0	0	28	28	0	0	2	2	0	0	53	53	0	0	28	28	1	158
Dredge - Scallop (Chainmat)	0	0	0	0	0	29	29	0	3	11	14	0	2	1	3	0	0	68	68	0	0	3	3	0	117
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	53	0	0	8	8	0	61
Otter Trawl - Midwater	0	0	0	0	0	14	14	0	1	9	10	0	0	2	2	0	0	15	15	0	1	5	6	0	47
Other Gear	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43
Diving Gear	0	0	0	0	29	1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40
Seine - Haul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17
Dredge - Urchin	0	0	0	0	0	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Seine - Stop	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
Pot - Hagfish	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
TOTAL	594	0	594		10167	31609	41776		21173	2705	23878		21	11190	11211		376	28537	28913		2423	3082	5505		133938

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 - 2009.

Table 21
Major Transportation Corridors on the Rockaway Peninsula

Roadways	Bridges	Public Transportation
Rockaway Freeway	Atlantic Beach Bridge (Far Rockaway)	MTA Subway System
Beach Channel Drive	Cross Bay Bridge (Seaside)	
Rockaway Beach Blvd	Marine Parkway (Roxbury)	
Beach 3rd St – Beach 227th St (north – south side roads)		

Source: NYC Oasis. Community Maps for NYC. http://www.oasisnyc.net/ Accessed 03/24/10.

APPENDIX C

AGENCY RESPONSE LETTERS

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

FEB 17 2010

Michelle K. Nannen
EEA Inc.
1239 Route 25A, Suite 1
Stony Brook, New York 11790

Re: Long Island – New York City Offshore Wind Collaborative Project

Dear Ms. Nannen,

This is in response to your letter dated February 9, 2010 regarding the Long Island – New York City Offshore Wind Collaborative Project. The project would consist of a 350-700 megawatt project at a site located approximately 11-17 nautical miles south of Long Beach and Jones Islands, between the Ambrose to Nantucket and Hudson Canyon to Ambrose traffic lanes. Your letter requested information on threatened and endangered species listed under the jurisdiction of NOAA's National Marine Fisheries Service (NMFS) that may occur in the project area.

NMFS Listed Species
Federally endangered Northern right whales (*Eubalaena glacialis*) and humpback whales (*Megaptera novaeangliae*) are found seasonally in the waters off of New York. Northern right whales are likely to occur near the project site between November 1 and April 30. Humpback whales feed during the spring, summer, and fall over a range that encompasses the eastern coast of the United States and individuals may be found at the project site year round. Fin whales (*Balaenoptera physalus*) may also be present near the project site. Sei (*Balaenoptera borealis*) and Sperm (*Physter macrocephalus*) whales are also seasonally present off the coast of New York but are typically found in deeper offshore waters.

Listed sea turtles are also found seasonally in the waters off of New York with the most abundant being the federally threatened loggerhead (*Caretta caretta*) followed by the federally endangered Kemp's ridley (*Lepidochelys kempi*). Federally endangered leatherback (*Dermochelys coriacea*) and green *(Chelonia mydas)* sea turtles may also occur seasonally at the project site. These species would typically be present at the project site between June and November.

Technical Assistance for Candidate Species
Candidate species are those petitioned species that are actively being considered for listing as endangered or threatened under the ESA, as well as those species for which NMFS has initiated an ESA status review that it has announced in the *Federal Register*.

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) occur in the coastal waters of New York and are likely to occur at the project site. In 2006, NMFS initiated a status review for Atlantic sturgeon to determine if listing as threatened or endangered under the ESA is warranted. The Status Review Report was published on February 23, 2007. NMFS is currently considering the information presented in the Status Review Report to determine if any listing action pursuant to the ESA is warranted at this time. If it is determined that listing is warranted, a final rule listing the species could be published within a year from the date of publication of the proposed rule. Currently, NMFS expects to publish a finding as to whether any listing action is appropriate by the Fall of 2010. As a candidate species, Atlantic sturgeon receive no substantive or procedural protection under the ESA; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on Atlantic sturgeon from any proposed project. Please note that once a species is proposed for listing the conference provisions of the ESA apply (see 50 CFR 402.10). As the listing status for this species may change, NMFS recommends that the project proponent obtain updated status information from NMFS prior to the submittal of any applications.

Marine Mammals
Several species of marine mammals are common residents or occasional visitors to the waters off of New York including gray seals, harbor seals, and harbor porpoise. All marine mammals receive protection under the Marine Mammal Protection Act (MMPA) of 1972, as amended. The MMPA prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. NMFS may issue permits under MMPA Section 104 (16 U.S.C. 1374) to persons that authorize the taking or importing of specific species of marine mammals. As previously indicated, several marine mammals are likely to occur in the project area and thus could be affected by the proposed offshore wind project. It is recommended that the project proponent discuss permitting needs with NMFS' Office of Protected Resources Permits, Conservation, & Education Division (Jaclyn Daly (301-713-2289 x 151 or Jaclyn.Daly@noaa.gov). Information on the MMPA permitting process can also be found online at: https://apps.nmfs.noaa.gov/questionnaire/questionnaire.cfm.

Section 7 Consultation
The construction and operation of the planned wind farm off the coast of New York could adversely affect fish populations, marine mammals and sea turtles. Under Section 7(a)(2) of the ESA, each Federal agency is required to insure that any action they authorize, fund or carry out is not likely to jeopardize the continued existence of any endangered or threatened species. Consultation would be necessary for any permits, authorizations, leases, easements or right of ways issued by the US Army Corps of Engineers or the Minerals Management Service.

We encourage the applicant to work with NMFS as project plans become more developed to identify and evaluate the potential for impacts to the species under NMFS' jurisdiction. Informal discussions can greatly facilitate consultation. If the applicant intends to conduct biological surveys at the project site, we encourage coordination with NMFS Northeast Fisheries Science Center (NEFSC). Please contact Dr. Richard Merrick at NMFS NEFSC (508-495-2291) to discuss any planned biological surveys. Thank you for the opportunity to provide information for the development of the natural resources assessment. Should you have any questions regarding these comments, please contact Julie Crocker of my staff at (978)282-8480 or Julie.Crocker@Noaa.gov.

Sincerely,

Mary Colligan

Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

CC: Rusanowsky, F/NER4
Daly, F/PR1

EC: Crocker, F/NER3

File Code: Sec 7 MMS Long Island-New York City Offshore Wind Collaborative
PCTS: T/NER/2010/ 00431

New York State Department of Environmental Conservation
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, Albany, New York 12233-4757
Phone: (518) 402-8935 • **FAX:** (518) 402-8925
Website: www.dec.state.ny.us

Alexander B. Grannis
Commissioner

February 18, 2010

Michelle K. Nannen
EEA, Inc.
1239 Route 25A, Suite 1
Stony Brook, NY 11790

Dear Ms. Nannen:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to an Environmental Assessment for the proposed Long Island - New York City Offshore Wind Collaborative Project, approximately 11 - 17 nautical miles south of Long Beach and Jones Island, area as indicated on the map you provided.

Our database does not include offshore areas in the Atlantic Ocean. Information on the marine resources in your project area, including fish and wildlife, may be available from NYS DEC's Marine Resources Bureau (Karen Chytalo, knchytal@gw.dec.state.ny.us - 631-444-0430.

PLEASE NOTE: We refer you to hhtp://www.dec.ny.gov/energy 40966.html on the NYS DEC Website for guidelines on the environmental review of wind power projects.

The absence of data does not necessarily mean that rare or state-listed species, natural communities or other significant habitats do not exist on or adjacent to the proposed site. Rather, our files currencly do not contain any information which indicates their presence. For most sites, comprehensive field surveys have not been conducted. We cannot provide a definitive statement on the presence or absence of all rare or state-listed species, or of significant natural communities. This information should not be substituted for on-site surveys that may be required for environmental assessment.

Sincerely,

Nicholas Conrad

Nicholas B. Conrad, Information Services
NY Natural Heritage Program

jvs

cc: Brianna Gary, Bureau of Habitat, Albany
Rudyard Edick, Environmental Permits, Albany
Karen Chytalo, Bureau of Marine Resources, Region 1, Stony Brook

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New York Field Office
3817 Luker Road, Cortland, NY 13045
Phone: (607) 753-9334
Fax: (607) 753-9699

Long Island Field Office
3 Old Barto Rd., Brookhaven, NY 11719
Phone: (631) 776-1401
Fax: (631) 776-1405

Endangered Species Act List Request Response Cover Sheet

This cover sheet is provided in response to a search of our website* for information regarding the potential presence of species under jurisdiction of the U.S. Fish and Wildlife Service (Service) within a proposed project area.

Attached is a copy of the New York State County List of Threatened, Endangered, and Candidate Species for the appropriate county(ies). The database that we use to respond to list requests was developed primarily to assist Federal agencies that are consulting with us under Section 7(a)(2) of the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.). Our lists include all Federally-listed, proposed, and candidate species known to occur, as well as those likely to occur, in specific counties.

The attached information is designed to assist project sponsors or applicants through the process of determining whether a Federally-listed, proposed, or candidate species and/or "critical habitat" may occur within their proposed project area and when it is appropriate to contact our offices for additional coordination or consultation. You may be aware that our offices have provided much of this information in the past in project-specific letters. However, due to increasing project review workloads and decreasing staff, we are now providing as much information as possible through our website. We encourage anyone requesting species list information to print out all materials used in any analyses of effects on listed, proposed, or candidate species.

The Service routinely updates this database as species are proposed, listed, and delisted, or as we obtain new biological information or specific presence/absence information for listed species. If project proponents coordinate with the Service to address proposed and candidate species in early stages of planning, this should not be a problem if these species are eventually listed. However, we recommend that both project proponents and reviewing agencies retrieve from our online database an *updated* list every 90 days to append to this document to ensure that listed species presence/absence information for the proposed project is *current.*

Reminder: Section 9 of the ESA prohibits unauthorized taking** of listed species and applies to Federal and non-Federal activities. For projects not authorized, funded, or carried out by a Federal agency, consultation with the Service pursuant to Section 7(a)(2) of the ESA is not required. However, no person is authorized to "take**" any listed species without appropriate authorizations from the Service. Therefore, we provide technical assistance to individuals and agencies to assist with project planning to avoid the potential for "take**," or when appropriate, to provide assistance with their application for an incidental take permit pursuant to Section 10(a)(1)(B) of the ESA.

Additionally, endangered species and their habitats are protected by Section 7(a)(2) of the ESA, which requires Federal agencies, in consultation with the Service, to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. An assessment of the potential direct, indirect, and cumulative impacts is required for all Federal actions that may affect listed species.

For instance, work in certain waters of the United States, including wetlands and streams, may require a permit from the U.S. Army Corps of Engineers (Corps). If a permit is required, in reviewing the application pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401, as amended;16 U.S.C. 661 *et seq.*), the Service may concur, with or without recommending additional permit conditions, or recommend denial of the permit depending upon potential adverse impacts on fish and wildlife resources associated with project construction or implementation. The need for a Corps permit may be determined by contacting the appropriate Corps office(s).*

For additional information on fish and wildlife resources or State-listed species, we suggest contacting the appropriate New York State Department of Environmental Conservation regional office(s) and the New York Natural Heritage Program Information Services.*

Since wetlands, ponds, streams, or open or sheltered coastal waters may be present in the project area, it may be helpful to utilize the National Wetlands Inventory (NWI) maps as an initial screening tool. However, they may or may not be available for the project area. Please note that while the NWI maps are reasonably accurate, they should not be used in lieu of field surveys for determining the presence of wetlands or delineating wetland boundaries for Federal regulatory purposes. Online information on the NWI program and digital data can be downloaded from Wetlands Mapper, http://wetlands.fws.gov/mapper_tool.htm.

Project construction or implementation should not commence until all requirements of the ESA have been fulfilled. After reviewing our website and following the steps outlined, we encourage both project proponents and reviewing agencies to contact our office to determine whether an accurate determination of species impacts has been made. If there are any questions about our county lists or agency or project proponent responsibilities under the ESA, please contact the New York or Long Island Field Office Endangered Species Program at the numbers listed above.

Attachment (county list of species)

*Additional information referred to above may be found on our website at: http://www.fws.gov/northeast/nyfo/es/section7.htm

** Under the Act and regulations, it is illegal for any person subject to the jurisdiction of the United States to ***take*** (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these), import or export, ship in interstate or foreign commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any endangered fish or wildlife species and most threatened fish and wildlife species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. "Harm" includes any act which actually kills or injures fish or wildlife, and case law has clarified that such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife.

Queens County

Federally Listed Endangered and Threatened Species and Candidate Species

This list represents the best available information regarding known or likely County occurrences of Federally-listed and candidate species and is subject to change as new information becomes available.

Common Name	Scientific Name	Status
Piping plover	*Charadrius melodus*	T
Roseate tern	*Sterna dougallii dougallii*	E
Seabeach amaranth	*Amaranthus pumilus*	T
Shortnose sturgeon[1]	*Acipenser brevirostrum*	E

Status Codes: E=Endangered, T=Threatened, P=Proposed, C=Candidate, D=Delisted.

[1] Primarily occurs in Hudson River. Principal responsibility for this species is vested with the National Oceanic and Atmospheric Administration/Fisheries.

Please visit the following website for more information http://www.nmfs.noaa.gov/pr/species/esa.htm.

Information current as of: 4/1/2010

Print Species List

APPENDIX D

VESSEL TRIP REPORTS BY AREA CODE

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 158

	2004		2005		2006		2007		2008		2009					
	158		158		158		158		158		158		NY	NJ	Grand	% of
Gear	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	Total	Total	Total	Total
Hand Line / Rod & Reel	376	0	315	0	379	0	354	0	140	0	166	2	1,730	2	1,732	62
Pot - Fish	121	0	50	0	35	0	163	0	12	0	5	0	386	0	386	14
Cast Net	14	0	81	0	122	0	79	0	0	0	1	0	297	0	297	11
Otter Trawl - Bottom (Fish)	51	0	25	0	47	0	36	0	0	0	0	0	159	0	159	6
Pot - Crab	2	0	16	0	52	0	67	0	0	0	1	0	138	0	138	5
Pot - Lobster	11	0	11	0	19	0	16	0	8	0	8	0	73	0	73	3
Diving Gear	9	0	0	0	0	0	0	0	0	0	0	0	9	0	9	0
Dredge - Other	0	8	0	0	0	0	0	0	0	0	0	0	0	8	8	0
Other Gear	0	0	0	0	4	0	0	0	0	0	0	0	4	0	4	0
Pot - Conch / Whelk	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0
Hand Rake	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0
Dredge - Sea Scallop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gill Net - Sink	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dredge - Ocean Quahog / Surf Clam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otter Trawl - Bottom (Scallop)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gill Net - Runaround	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gill Net - Drift (Large Mesh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otter Trawl - Beam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gill Net - Drift (Small Mesh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long Line - Bottom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Purse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Danish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pair Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dredge - Scallop (Chainmat)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otter Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Haul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Stop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	584	8	498	0	658	0	717	0	160	0	181	2	2,798	10	2,808	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 162

	2004		2005		2006		2007		2008		2009					
	162		162		162		162		162		162		NY	NJ	*Grand*	*% of*
Gear	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**Total**	**Total**	***Total***	***Total***
Gill Net - Sink	236	0	206	0	225	0	184	0	142	0	144	0	**1,137**	**0**	***1,137***	***50***
Hand Line / Rod & Reel	139	0	158	3	172	0	192	0	54	0	60	0	**775**	**3**	***778***	***34***
Otter Trawl - Bottom (Fish)	103	0	28	0	28	0	37	0	16	0	4	0	**216**	**0**	***216***	***9***
Pot - Lobster	6	0	19	0	16	0	12	0	14	0	7	0	**74**	**0**	***74***	***3***
Other Gear	10	0	6	0	12	0	9	0	0	0	0	0	**37**	**0**	***37***	***2***
Gill Net - Drift (Small Mesh)	14	0	0	0	0	0	0	0	0	0	0	0	**14**	**0**	***14***	***1***
Dredge - Sea Scallop	0	0	0	0	0	1	0	9	0	2	0	0	**0**	**12**	***12***	***1***
Gill Net - Drift (Large Mesh)	0	0	0	0	2	0	0	0	0	0	4	0	**6**	**0**	***6***	***0***
Pot - Fish	0	0	0	0	0	0	0	0	3	0	2	0	**5**	**0**	***5***	***0***
Pot - Conch / Whelk	0	0	0	0	0	0	0	0	0	0	5	0	**5**	**0**	***5***	***0***
Pot - Crab	0	0	5	0	0	0	0	0	0	0	0	0	**5**	**0**	***5***	***0***
Dredge - Other	0	0	0	0	0	0	1	0	0	0	0	0	**1**	**0**	***1***	***0***
Trap	0	0	0	0	1	0	0	0	0	0	0	0	**1**	**0**	***1***	***0***
Dredge - Ocean Quahog / Surf Clam	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Bottom (Scallop)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Gill Net - Runaround	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Beam	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Hand Rake	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Bottom	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Purse	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Cast Net	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Danish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pair Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Scallop (Chainmat)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Diving Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Haul	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Stop	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
TOTAL	**508**	**0**	**422**	**3**	**456**	**1**	**435**	**9**	**229**	**2**	**226**	**0**	**2,276**	**15**	***2,291***	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 164

Gear	2004		2005		2006		2007		2008		2009					
	164		164		164		164		164		164		NY	NJ	Grand	% of
	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	Total	Total	Total	Total
Gill Net - Sink	362	0	173	0	149	0	285	0	107	0	106	0	**1,182**	**0**	***1,182***	***50***
Hand Line / Rod & Reel	142	0	112	0	103	0	100	0	33	0	37	0	**527**	**0**	***527***	***22***
Otter Trawl - Bottom (Fish)	101	0	70	0	40	0	37	0	21	0	35	0	**304**	**0**	***304***	***13***
Dredge - Ocean Quahog / Surf Clam	89	0	50	0	34	0	46	0	54	0	29	0	**302**	**0**	***302***	***13***
Pot - Fish	0	0	0	0	26	0	9	0	0	0	0	0	**35**	**0**	***35***	***1***
Seine - Scottish	2	0	5	0	1	0	0	0	0	0	0	0	**8**	**0**	***8***	***0***
Seine - Stop	4	0	0	0	0	0	0	0	0	0	0	0	**4**	**0**	***4***	***0***
Hand Rake	3	0	0	0	0	0	0	0	0	0	0	0	**3**	**0**	***3***	***0***
Gill Net - Drift (Small Mesh)	0	0	0	0	3	0	0	0	0	0	0	0	**3**	**0**	***3***	***0***
Seine - Danish	0	0	0	0	0	0	3	0	0	0	0	0	**3**	**0**	***3***	***0***
Pot - Lobster	2	0	0	0	0	0	0	0	0	0	0	0	**2**	**0**	***2***	***0***
Seine - Purse	0	0	0	0	0	0	2	0	0	0	0	0	**2**	**0**	***2***	***0***
Seine - Haul	0	0	0	0	2	0	0	0	0	0	0	0	**2**	**0**	***2***	***0***
Dredge - Sea Scallop	0	0	1	0	0	0	0	0	0	0	0	0	**1**	**0**	***1***	***0***
Otter Trawl - Beam	0	0	1	0	0	0	0	0	0	0	0	0	**1**	**0**	***1***	***0***
Cast Net	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**0**	***1***	***0***
Otter Trawl - Bottom (Scallop)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Gill Net - Runaround	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Gill Net - Drift (Large Mesh)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Conch / Whelk	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Trap	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Crab	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Bottom	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pair Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Scallop (Chainmat)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Other Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Diving Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
TOTAL	**705**	**0**	**412**	**0**	**358**	**0**	**482**	**0**	**215**	**0**	**208**	**0**	**2,380**	**0**	***2,380***	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 165

	2004		2005		2006		2007		2008		2009					
	165		165		165		165		165		165		NY	NJ	Grand	% of
Gear	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**Total**	**Total**	**Total**	**Total**
Trap	133	0	134	0	178	0	194	0	0	0	0	0	**639**	**0**	***639***	***31***
Gill Net - Sink	126	0	141	0	98	0	119	0	0	0	6	0	**490**	**0**	***490***	***23***
Pot - Crab	85	0	71	0	88	0	65	0	0	0	0	0	**309**	**0**	***309***	***15***
Gill Net - Drift (Large Mesh)	100	0	65	0	64	0	62	0	0	0	0	0	**291**	**0**	***291***	***14***
Hand Line / Rod & Reel	71	0	28	0	21	0	29	0	32	0	3	0	**184**	**0**	***184***	***9***
Otter Trawl - Bottom (Fish)	0	0	59	0	2	0	45	0	17	0	6	0	**129**	**0**	***129***	***6***
Pot - Fish	5	0	1	0	6	0	11	0	0	0	0	0	**23**	**0**	***23***	***1***
Seine - Haul	14	0	0	0	0	0	1	0	0	0	0	0	**15**	**0**	***15***	***1***
Hand Rake	2	0	0	0	0	0	0	0	0	0	0	0	**2**	**0**	***2***	***0***
Seine - Purse	0	0	0	0	2	0	0	0	0	0	0	0	**2**	**0**	***2***	***0***
Dredge - Sea Scallop	0	0	0	0	0	0	0	1	0	0	0	0	**0**	**1**	***1***	***0***
Dredge - Ocean Quahog / Surf Clam	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**0**	***1***	***0***
Other Gear	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**0**	***1***	***0***
Pot - Other	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**0**	***1***	***0***
Pot - Lobster	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Bottom (Scallop)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Gill Net - Runaround	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Conch / Whelk	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Beam	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Gill Net - Drift (Small Mesh)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Bottom	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Cast Net	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Danish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pair Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Scallop (Chainmat)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Diving Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Stop	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
TOTAL	**539**	**0**	**499**	**0**	**459**	**0**	**526**	**1**	**49**	**0**	**15**	**0**	**2,087**	**1**	***2,088***	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 166

	2004		2005		2006		2007		2008		2009					
	166		166		166		166		166		166		NY	NJ	Grand	% of
Gear	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**Total**	**Total**	**Total**	**Total**
Gill Net - Sink	442	0	545	0	494	0	727	0	257	0	328	0	**2,793**	**0**	***2,793***	***53***
Otter Trawl - Bottom (Fish)	414	1	248	0	172	0	265	0	336	0	302	0	**1,737**	**1**	***1,738***	***33***
Hand Line / Rod & Reel	72	0	110	0	126	0	131	0	16	0	5	0	**460**	**0**	***460***	***9***
Otter Trawl - Beam	61	0	16	0	53	0	24	0	15	0	13	0	**182**	**0**	***182***	***3***
Gill Net - Drift (Large Mesh)	5	0	0	0	16	0	10	0	0	0	0	0	**31**	**0**	***31***	***1***
Trap	24	0	1	0	0	0	1	0	0	0	0	0	**26**	**0**	***26***	***0***
Gill Net - Drift (Small Mesh)	20	0	0	0	0	0	0	0	0	0	0	0	**20**	**0**	***20***	***0***
Gill Net - Runaround	12	0	0	0	0	0	0	0	0	0	0	0	**12**	**0**	***12***	***0***
Pot - Fish	1	0	0	0	0	0	4	0	1	0	4	0	**10**	**0**	***10***	***0***
Pot - Lobster	2	0	2	0	0	0	5	0	0	0	0	0	**9**	**0**	***9***	***0***
Pot - Shrimp	6	0	0	0	0	0	0	0	0	0	0	0	**6**	**0**	***6***	***0***
Dredge - Sea Scallop	0	0	0	0	1	0	0	0	0	0	0	0	**1**	**0**	***1***	***0***
Dredge - Ocean Quahog / Surf Clam	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Bottom (Scallop)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Conch / Whelk	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Crab	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Hand Rake	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Bottom	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Purse	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Cast Net	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Danish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pair Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Scallop (Chainmat)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Other Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Diving Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Haul	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Stop	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
TOTAL	**1,059**	**1**	**922**	**0**	**862**	**0**	**1,167**	**0**	**625**	**0**	**652**	**0**	**5,287**	**1**	***5,288***	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 167

	2004		2005		2006		2007		2008		2009					
	167		167		167		167		167		167		NY	NJ	Grand	% of
Gear	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	Total	Total	Total	Total
Hand Line / Rod & Reel	726	0	627	0	578	0	452	0	398	0	455	0	**3,236**	**0**	***3,236***	***45***
Otter Trawl - Bottom (Fish)	825	0	254	3	200	2	280	0	283	0	220	1	**2,062**	**6**	***2,068***	***29***
Gill Net - Sink	160	0	307	0	275	0	286	0	195	0	262	0	**1,485**	**0**	***1,485***	***21***
Pot - Fish	30	0	13	0	14	0	31	0	35	0	102	0	**225**	**0**	***225***	***3***
Pot - Lobster	12	0	6	0	0	0	8	0	21	0	30	0	**77**	**0**	***77***	***1***
Otter Trawl - Beam	0	0	0	0	2	0	5	0	21	0	3	0	**31**	**0**	***31***	***0***
Gill Net - Drift (Small Mesh)	0	0	6	0	3	0	7	0	0	0	8	0	**24**	**0**	***24***	***0***
Gill Net - Runaround	11	0	6	0	0	0	0	0	5	0	0	0	**22**	**0**	***22***	***0***
Gill Net - Drift (Large Mesh)	4	0	12	0	0	0	0	0	0	0	0	0	**16**	**0**	***16***	***0***
Pot - Conch / Whelk	0	0	2	0	0	0	11	0	0	0	0	0	**13**	**0**	***13***	***0***
Pot - Shrimp	3	0	0	0	0	0	0	0	0	0	0	0	**3**	**0**	***3***	***0***
Dredge - Other	2	0	0	0	0	0	0	0	0	0	0	0	**2**	**0**	***2***	***0***
Trap	0	0	1	0	1	0	0	0	0	0	0	0	**2**	**0**	***2***	***0***
Dredge - Sea Scallop	0	0	1	0	0	0	0	0	0	0	0	0	**1**	**0**	***1***	***0***
Diving Gear	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**0**	***1***	***0***
Dredge - Ocean Quahog / Surf Clam	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Bottom (Scallop)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Crab	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Hand Rake	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Bottom	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Purse	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Cast Net	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Danish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pair Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Scallop (Chainmat)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Other Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Haul	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Stop	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
TOTAL	**1,773**	**0**	**1,235**	**3**	**1,073**	**2**	**1,080**	**0**	**958**	**0**	**1,081**	**1**	**7,200**	**6**	***7,206***	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 168

	2004		2005		2006		2007		2008		2009					
	168		168		168		168		168		168		NY	NJ	Grand	% of
Gear	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	Total	Total	Total	Total
Hand Line / Rod & Reel	138	0	116	0	76	0	79	0	40	0	62	0	**511**	**0**	***511***	***86***
Otter Trawl - Bottom (Fish)	11	0	9	0	14	0	4	0	13	0	10	0	**61**	**0**	***61***	***10***
Gill Net - Sink	0	0	2	0	1	0	1	0	0	0	4	0	**8**	**0**	***8***	***1***
Pot - Lobster	6	0	0	0	0	0	0	0	0	0	0	0	**6**	**0**	***6***	***1***
Pot - Fish	2	0	0	0	0	0	1	0	0	0	0	0	**3**	**0**	***3***	***1***
Dredge - Sea Scallop	1	0	1	0	0	0	0	0	0	0	0	0	**2**	**0**	***2***	***0***
Dredge - Ocean Quahog / Surf Clam	0	0	1	0	0	0	0	0	0	0	0	0	**1**	**0**	***1***	***0***
Cast Net	0	0	0	0	0	0	1	0	0	0	0	0	**1**	**0**	***1***	***0***
Seine - Stop	0	0	0	0	1	0	0	0	0	0	0	0	**1**	**0**	***1***	***0***
Otter Trawl - Bottom (Scallop)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Gill Net - Runaround	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Gill Net - Drift (Large Mesh)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Conch / Whelk	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Beam	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Trap	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Crab	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Hand Rake	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Gill Net - Drift (Small Mesh)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Bottom	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Purse	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Danish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pair Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Scallop (Chainmat)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Midwater	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Other Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Diving Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Haul	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
TOTAL	**158**	**0**	**129**	**0**	**92**	**0**	**86**	**0**	**53**	**0**	**76**	**0**	**594**	**0**	***594***	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 612

Gear	2004		2005		2006		2007		2008		2009					
	612		612		612		612		612		612		NY	NJ	Grand	% of
	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	Total	Total	Total	Total
Otter Trawl - Bottom (Fish)	339	1,827	368	2,066	367	1,874	470	1,701	761	1,827	736	1,583	3,041	10,878	13,919	33
Dredge - Sea Scallop	19	444	85	897	93	1,595	52	1,486	15	1,495	1	1,601	265	7,518	7,783	19
Pot - Lobster	362	721	253	731	231	771	221	946	193	792	209	665	1,469	4,626	6,095	15
Gill Net - Sink	153	554	175	349	121	398	146	453	124	400	97	218	816	2,372	3,188	8
Hand Line / Rod & Reel	305	106	298	143	333	94	384	108	271	82	231	96	1,822	629	2,451	6
Otter Trawl - Bottom (Scallop)	1	31	0	11	0	107	197	487	508	162	332	100	1,038	898	1,936	5
Dredge - Other	0	377	6	415	19	384	23	230	0	187	0	160	48	1,753	1,801	4
Dredge - Ocean Quahog / Surf Clam	5	86	0	61	82	318	77	224	36	223	11	175	211	1,087	1,298	3
Pot - Fish	36	47	146	41	213	68	179	27	131	13	149	7	854	203	1,057	3
Hand Rake	4	76	0	108	0	158	0	157	0	69	0	66	4	634	638	2
Otter Trawl - Beam	1	85	36	0	58	0	24	4	68	17	81	50	268	156	424	1
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	0	0	68	9	183	4	251	13	264	1
Seine - Danish	0	90	0	1	0	36	0	29	0	9	0	49	0	214	214	1
Pot - Conch / Whelk	0	0	0	0	0	0	0	18	0	87	0	38	0	143	143	0
Gill Net - Runaround	0	54	0	15	0	34	0	0	0	6	0	17	0	126	126	0
Gill Net - Drift (Large Mesh)	0	24	0	21	0	26	6	12	0	27	0	3	6	113	119	0
Seine - Purse	0	43	0	0	0	1	0	3	0	0	0	23	0	70	70	0
Trap	0	1	0	28	0	10	0	0	8	0	0	0	8	39	47	0
Pair Trawl - Midwater	0	13	0	2	0	0	0	2	0	7	0	23	0	47	47	0
Gill Net - Drift (Small Mesh)	0	20	0	0	1	0	13	0	1	0	0	0	15	20	35	0
Diving Gear	29	1	0	0	0	0	0	0	0	0	0	0	29	1	30	0
Dredge - Scallop (Chainmat)	0	0	0	0	0	0	0	14	0	11	0	4	0	29	29	0
Long Line - Bottom	0	10	0	2	0	0	0	0	0	2	0	2	0	16	16	0
Cast Net	9	0	0	0	3	0	3	0	0	0	0	0	15	0	15	0
Otter Trawl - Midwater	0	2	0	1	0	6	0	4	0	1	0	0	0	14	14	0
Dredge - Urchin	0	6	0	1	0	2	0	0	0	0	0	0	0	9	9	0
Pot - Crab	1	0	3	0	1	1	0	0	0	0	0	0	5	1	6	0
Other Gear	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0
Pot - Hagfish	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Haul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Stop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1,264	4,618	1,370	4,893	1,522	5,883	1,795	5,905	2,185	5,426	2,031	4,884	10,167	31,609	41,776	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 613

	2004		2005		2006		2007		2008		2009					
	613		613		613		613		613		613		NY	NJ	Grand	% of
Gear	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**NY**	**NJ**	**Total**	**Total**	**Total**	**Total**
Otter Trawl - Bottom (Fish)	2,042	87	2,392	93	2,373	96	2,218	78	2,038	71	1,770	82	**12,833**	**507**	***13,340***	***56***
Gill Net - Sink	427	33	380	20	394	65	521	74	539	46	403	65	**2,664**	**303**	***2,967***	***12***
Dredge - Sea Scallop	136	25	440	302	592	200	605	280	150	118	86	18	**2,009**	**943**	***2,952***	***12***
Hand Line / Rod & Reel	399	0	404	0	442	0	365	2	246	0	207	1	**2,063**	**3**	***2,066***	***9***
Pot - Lobster	160	33	136	23	147	1	87	0	152	3	178	2	**860**	**62**	***922***	***4***
Dredge - Ocean Quahog / Surf Clam	0	20	0	199	1	161	0	99	0	95	1	10	**2**	**584**	***586***	***2***
Pot - Fish	13	0	59	0	64	0	74	0	63	0	41	0	**314**	**0**	***314***	***1***
Otter Trawl - Bottom (Scallop)	9	0	51	0	73	1	3	39	0	7	2	20	**138**	**67**	***205***	***1***
Dredge - Other	0	5	0	10	0	48	0	44	0	40	0	20	**0**	**167**	***167***	***1***
Otter Trawl - Beam	12	0	111	0	2	1	2	0	0	0	18	0	**145**	**1**	***146***	***1***
Pot - Conch / Whelk	5	0	0	0	0	9	1	3	42	0	0	0	**48**	**12**	***60***	***0***
Gill Net - Drift (Large Mesh)	4	0	19	0	0	0	0	0	4	1	0	1	**27**	**2**	***29***	***0***
Pair Trawl - Midwater	0	9	0	8	0	0	0	5	0	2	0	4	**0**	**28**	***28***	***0***
Long Line - Bottom	6	0	0	0	1	0	5	0	8	0	5	0	**25**	**0**	***25***	***0***
Gill Net - Drift (Small Mesh)	1	2	0	0	0	0	9	0	7	0	0	0	**17**	**2**	***19***	***0***
Gill Net - Runaround	0	0	0	0	2	2	9	0	0	1	1	0	**12**	**3**	***15***	***0***
Dredge - Scallop (Chainmat)	0	0	0	0	3	0	0	7	0	3	0	1	**3**	**11**	***14***	***0***
Otter Trawl - Midwater	1	1	0	5	0	1	0	2	0	0	0	0	**1**	**9**	***10***	***0***
Pot - Crab	0	0	1	0	1	0	0	0	0	0	6	0	**8**	**0**	***8***	***0***
Trap	3	0	1	0	0	0	0	0	0	0	0	0	**4**	**0**	***4***	***0***
Hand Rake	0	0	0	0	0	0	0	0	0	0	0	1	**0**	**1**	***1***	***0***
Seine - Purse	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Cast Net	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Danish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Other Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Diving Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Haul	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Stop	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
TOTAL	**3,218**	**215**	**3,994**	**660**	**4,095**	**585**	**3,899**	**633**	**3,249**	**387**	**2,718**	**225**	**21,173**	**2,705**	***23,878***	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 614

	2004		2005		2006		2007		2008		2009					
	614		614		614		614		614		614		NY	NJ	Grand	% of
Gear	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	Total	Total	Total	Total
Gill Net - Sink	0	762	2	680	0	632	1	748	0	495	0	653	3	3,970	3,973	35
Dredge - Sea Scallop	0	394	0	688	1	587	0	554	2	241	0	103	3	2,567	2,570	23
Pot - Fish	0	206	0	124	0	117	0	182	0	149	0	151	0	929	929	8
Gill Net - Runaround	0	184	0	170	0	120	0	110	0	51	0	79	0	714	714	6
Pot - Conch / Whelk	0	37	0	117	0	124	0	136	0	125	0	80	0	619	619	6
Otter Trawl - Bottom (Fish)	1	81	2	150	0	55	1	26	0	53	2	125	6	490	496	4
Pot - Lobster	0	31	1	62	1	98	0	97	0	102	0	73	2	463	465	4
Gill Net - Drift (Large Mesh)	0	7	0	18	0	45	0	95	0	75	0	75	0	315	315	3
Seine - Purse	0	22	0	74	0	39	0	47	0	59	0	23	0	264	264	2
Gill Net - Drift (Small Mesh)	0	99	0	65	0	9	0	10	0	31	0	32	0	246	246	2
Pot - Crab	0	50	0	54	0	32	0	75	0	0	0	1	0	212	212	2
Dredge - Ocean Quahog / Surf Clam	0	1	0	65	0	65	0	20	0	18	0	12	0	181	181	2
Hand Line / Rod & Reel	0	21	1	23	0	29	0	21	0	7	0	20	1	121	122	1
Long Line - Bottom	0	0	0	0	0	0	0	8	0	9	0	19	0	36	36	0
Dredge - Other	0	18	0	6	0	5	0	0	0	0	0	0	0	29	29	0
Otter Trawl - Bottom (Scallop)	0	0	0	0	0	0	4	0	0	12	0	4	4	16	20	0
Otter Trawl - Beam	0	0	0	0	0	1	0	2	0	0	0	5	0	8	8	0
Trap	0	2	0	1	0	0	0	0	0	0	0	0	0	3	3	0
Dredge - Scallop (Chainmat)	0	0	0	0	2	0	0	0	0	0	0	1	2	1	3	0
Pair Trawl - Midwater	0	0	0	2	0	0	0	0	0	0	0	0	0	2	2	0
Otter Trawl - Midwater	0	0	0	1	0	0	0	1	0	0	0	0	0	2	2	0
Cast Net	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0
Pot - Other	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Hand Rake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Danish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long Line - Pelagic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Gear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diving Gear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Haul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Stop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	1,916	6	2,300	4	1,958	6	2,132	2	1,427	2	1,457	21	11,190	11,211	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 615

	2004		2005		2006		2007		2008		2009					
	615		615		615		615		615		615		NY	NJ	Grand	% of
Gear	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	Total	Total	Total	Total
Dredge - Sea Scallop	1	2,271	0	4,180	1	3,793	38	3,486	3	2,863	5	2,189	48	18,782	18,830	65
Gill Net - Sink	12	646	51	761	86	576	23	612	4	747	4	679	180	4,021	4,201	15
Otter Trawl - Bottom (Fish)	11	204	5	255	11	132	11	364	11	308	3	285	52	1,548	1,600	6
Dredge - Ocean Quahog / Surf Clam	0	6	0	380	0	266	0	285	2	230	0	92	2	1,259	1,261	4
Pot - Lobster	31	118	19	136	1	144	0	146	1	138	0	152	52	834	886	3
Pot - Fish	0	74	0	86	0	96	0	77	0	75	0	28	0	436	436	2
Gill Net - Runaround	0	22	0	0	0	124	0	63	0	82	0	124	0	415	415	1
Gill Net - Drift (Large Mesh)	0	5	0	65	0	22	0	49	0	82	0	82	0	305	305	1
Otter Trawl - Bottom (Scallop)	0	12	0	12	0	74	21	99	0	5	0	31	21	233	254	1
Gill Net - Drift (Small Mesh)	0	157	0	12	0	0	0	83	0	0	0	0	0	252	252	1
Hand Line / Rod & Reel	1	59	0	55	1	15	1	26	0	13	1	10	4	178	182	1
Dredge - Scallop (Chainmat)	0	0	0	1	0	10	0	25	0	17	0	15	0	68	68	0
Pair Trawl - Midwater	0	22	0	4	0	6	0	2	0	17	0	2	0	53	53	0
Long Line - Pelagic	0	12	0	9	0	7	0	5	0	10	0	10	0	53	53	0
Otter Trawl - Beam	0	0	0	2	0	19	0	9	0	4	0	1	0	35	35	0
Long Line - Bottom	0	1	0	4	0	3	0	5	0	5	0	17	0	35	35	0
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	17	0	0	9	0	3	17	12	29	0
Otter Trawl - Midwater	0	3	0	3	0	5	0	4	0	0	0	0	0	15	15	0
Seine - Purse	0	0	0	1	0	0	0	0	0	1	0	0	0	2	2	0
Dredge - Other	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0
Pot - Conch / Whelk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Crab	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hand Rake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cast Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Danish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Gear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diving Gear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Haul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seine - Stop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	56	3,612	75	5,966	100	5,292	111	5,341	21	4,606	13	3,720	376	28,537	28,913	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

Appendix D
Fishing Vessel Trips to Area Codes
New York and New Jersey
2004 – 2009

AREA CODE 616

	2004		2005		2006		2007		2008		2009					
	616		616		616		616		616		616		NY	NJ	Grand	% of
Gear	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	NY	NJ	Total	Total	Total	Total
Otter Trawl - Bottom (Fish)	340	445	415	428	363	267	335	279	252	261	261	212	**1,966**	**1,892**	***3,858***	***70***
Dredge - Sea Scallop	0	56	1	132	0	146	2	206	1	48	0	114	**4**	**702**	***706***	***13***
Pot - Lobster	55	6	29	0	45	0	21	7	25	12	23	16	**198**	**41**	***239***	***4***
Long Line - Bottom	27	14	20	6	11	23	31	11	41	11	25	17	**155**	**82**	***237***	***4***
Gill Net - Sink	3	65	1	50	0	11	0	32	4	29	0	12	**8**	**199**	***207***	***4***
Hand Line / Rod & Reel	13	2	18	0	16	2	24	11	6	3	3	1	**80**	**19**	***99***	***2***
Otter Trawl - Bottom (Scallop)	0	2	0	19	3	18	5	9	1	0	1	0	**10**	**48**	***58***	***1***
Dredge - Ocean Quahog / Surf Clam	0	0	0	3	0	0	0	5	0	3	0	22	**0**	**33**	***33***	***1***
Pair Trawl - Midwater	0	6	0	4	0	2	0	1	0	14	0	1	**0**	**28**	***28***	***1***
Gill Net - Drift (Small Mesh)	0	8	0	0	0	0	0	0	0	0	0	0	**0**	**8**	***8***	***0***
Long Line - Pelagic	0	3	0	0	0	0	0	0	0	4	0	1	**0**	**8**	***8***	***0***
Otter Trawl - Beam	0	0	0	1	0	2	0	1	0	0	0	2	**0**	**6**	***6***	***0***
Otter Trawl - Midwater	0	1	0	2	0	2	0	0	0	0	1	0	**1**	**5**	***6***	***0***
Seine - Danish	0	1	0	0	0	1	0	0	0	1	0	0	**0**	**3**	***3***	***0***
Dredge - Scallop (Chainmat)	0	0	0	0	0	3	0	0	0	0	0	0	**0**	**3**	***3***	***0***
Otter Trawl - Bottom (Shrimp)	0	0	0	0	0	0	1	0	0	1	0	0	**1**	**1**	***2***	***0***
Dredge - Other	0	0	0	1	0	0	0	0	0	0	0	0	**0**	**1**	***1***	***0***
Gill Net - Runaround	0	0	0	0	0	0	0	1	0	0	0	0	**0**	**1**	***1***	***0***
Pot - Conch / Whelk	0	0	0	0	0	0	0	0	0	1	0	0	**0**	**1**	***1***	***0***
Seine - Purse	0	0	0	1	0	0	0	0	0	0	0	0	**0**	**1**	***1***	***0***
Pot - Fish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Gill Net - Drift (Large Mesh)	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Trap	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Crab	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Hand Rake	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Cast Net	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Other Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Diving Gear	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Haul	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Dredge - Urchin	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Scottish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Seine - Stop	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
Pot - Hagfish	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	***0***	***0***
TOTAL	**438**	**609**	**484**	**647**	**438**	**477**	**419**	**563**	**330**	**388**	**314**	**398**	**2,423**	**3,082**	***5,505***	

Source: National Marine Fisheries Service. 2010. Fishing Vessel Trip Reports. Preliminary Data 2004 – 2009.

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Pre-Development Assessment of Natural Resources for the Proposed Long Island – New York City Offshore Wind Project Area

Final Report 10-22 Task 3a