February 20, 2012

Michelle Magliocca
Office of Protected Resources (F/PR)
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, Maryland 20910

**Re: REVISED REQUEST FOR INCIDENTAL HARASSMENT AUTHORIZATION
20MW OFFSHORE WIND ENERGY PROJECT
OFFSHORE OF ATLANTIC CITY, NEW JERSEY**

Dear Michelle:

AMEC Environment & Infrastructure, Inc. (AMEC), on behalf of Fishermen's Atlantic City Windfarm, LLC (FISHERMEN'S) is pleased to provide you with this Revised Request for an Incidental Harassment Authorization (IHA) for FISHERMEN'S proposed 20MW Offshore Wind Energy Project.

After reviewing and responding to your January 26th and February 15th comments on FISHERMEN'S August 26th draft IHA, all of the agreed-upon text changes have been made to the enclosed Revised IHA. If you have any questions or require additional information, please do not hesitate to contact me at (732) 302-9500 x 127 or at charles.harman@amec.com. Thank you.

Sincerely,

AMEC
Environment & Infrastructure, Inc.

Charles R. Harman, P.W.S.
Principal Ecologist

Cc: L. Slavitter (USACOE)
J. Stewart (NJDEP)
D. Cohen (FISHERMEN'S)
S. O'Malley (FISHERMEN'S)
M. Madia (FISHERMEN'S)
R. Jackson (FISHERMEN'S)
A. Goldsmith (FISHERMEN'S)
P. Perhamus (AMEC)

Revised Request for an Incidental Harassment Authorization

20 MW Offshore Wind Energy Project
Offshore of Atlantic City, New Jersey

Submitted to
Office of Protected Resources (F/PR)
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, Maryland 20910

Prepared for
Fishermen's Atlantic City Windfarm, LLC
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February 20, 2012

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ACE	Atlantic City Electric
AMEC	AMEC Environment & Infrastructure, Inc
BA	Biological Assessment
BOEM	Bureau of Ocean Energy Management
BPU	Board of Public Utilities
CAFRA	Coastal Area Facility Review Act
dB	decibel(s)
dBL	linear decibel(s)
DLUR	Division of Land Use Regulation
EBS	Ecological Baseline Study
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FISHERMEN'S	Fishermen's Atlantic City Windfarm, LLC
HDD	Horizontal Directional-Drilling
Hz	hertz
IHA	Incidental Harassment Authorization
IWC	International Whaling Commission
kHz	kilohertz
kV	kilovolt
LOC	Letter of Concurrence
MLLW	Mean Lower Low Water
mm^2	millimeters squared
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
m/s	meters per second
MW	megawatt(s)
MWh	megawatt-hours
NEXRAD	Next Generation Radar
NJDEP	New Jersey Department of Environmental Protection
NM	nautical mile(s)
NMFS	National Marine Fisheries Service

NOAA	National Oceanic and Atmospheric Administration
NWP	Nationwide Permit
µPa	microPascal
PATON	Private Aid to Navigation
PTS	Permanent Threshold Shift
re	Referenced To
RMS	Root Mean Square
SAR	Stock Assessment Report
SPL	Sound Pressure Level
TI-VPR	Thermal Imaging-Vertically Pointing Radar
TTS	Temporary Threshold Shift
USACOE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USCG	United States Coast Guard
UTM	Universal Transverse Mercator

1.0 INTRODUCTION

AMEC Environment & Infrastructure (AMEC), on behalf of Fishermen's Atlantic City Windfarm, LLC (FISHERMEN'S), is submitting this Request for an Incidental Harassment Authorization in support of FISHERMEN'S 20 MW Offshore Wind Farm project (the "Project"), proposed to be located in State waters off the coast of New Jersey. The Project comprises six electric generating windmills located approximately 2.8 miles off the New Jersey coast from Atlantic City (**Figure 1-1**). The proposed windmills will be of the size and scale of the GE4MW or the 3.6 MW Siemens turbines oriented in one row, approximately 1,080 meters (3,542 feet) apart, generating a total of less than 25MW consistent with rules recently adopted by the NJDEP for a demonstration windfarm in New Jersey territorial waters. Each turbine will be supported by a jacketed foundation consisting of three relatively small-diameter piles driven into the sea floor. Power output from the turbines will be transmitted via a 34.5 kilovolt (kV) submarine electric cable to access the shore via a single submarine electric transmission cable. The cable will make landfall at a point in Atlantic City and continue underground to the existing Huron Substation located along Absecon Avenue. The path of this underground cable is roughly coincident with the line created by Tennessee Avenue.

A Letter of Concurrence (LOC) had been issued by the NMFS on April 21, 2010 for pre-construction geotechnical and geophysical surveys of the project area, and for the deployment of a buoy outfitted with meteorological survey equipment. However, for the actual construction of this project, pile-driving will be required for the six turbine foundations. This proposed pile-driving will produce underwater noise that has the potential to result in adverse impacts to marine mammals and sea turtles, thus requiring an IHA.

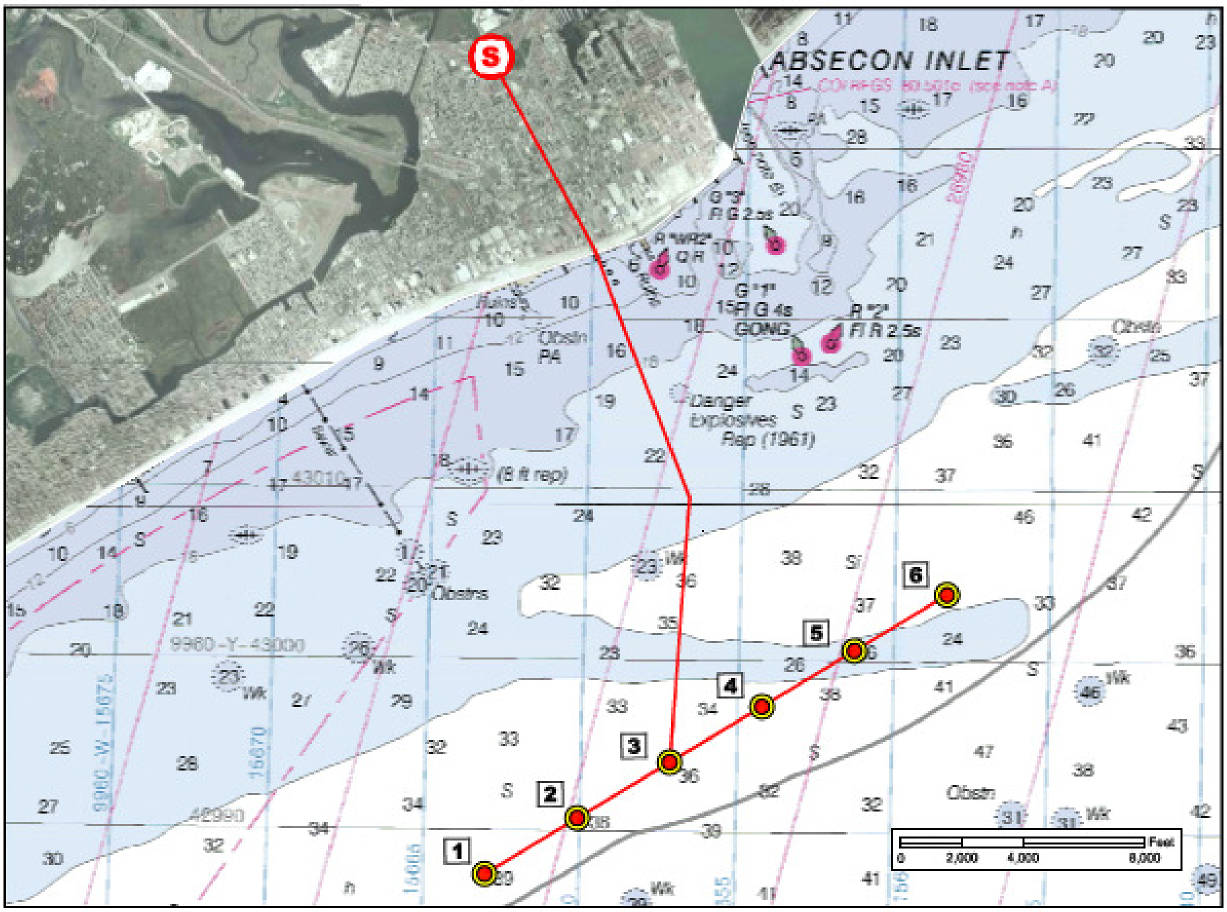
1.1 PROJECT OVERVIEW

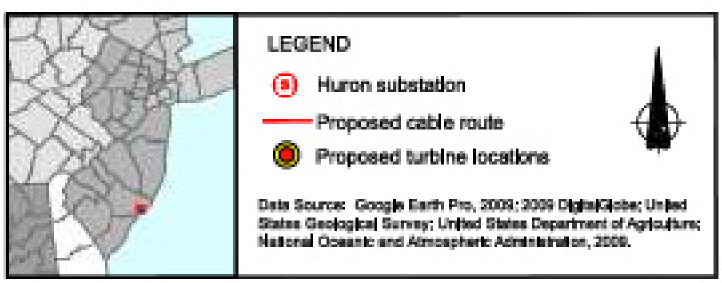
The reference design for this Project is the construction and operation of six marine turbines oriented in one row generating less than 25MW consistent with NJDEP rules for a demonstration windfarm in territorial waters of NJ. The Board of Public Utilities (BPU) Feasibility Study (with NJDEP comments) conducted in 2004 and the NJ Blue Ribbon Panel Final Report of 2006 underlined the fact that New Jersey does not have access to good winds onshore. Both reports found that if New Jersey wishes to develop renewable wind energy, its only credible option is to build offshore. The proposed turbine locations were selected to maximize that wind energy potential while minimizing visual impacts by orienting the turbines parallel to the shore to create a uniform appearance, and by locating them as far offshore as possible, while still remaining within State waters. The site off of Atlantic City was chosen from all alternatives off of New Jersey in territorial waters, where the local community would benefit from the project and where support for the visual association with the business and populace of the community could be counted on by FISHERMEN'S. Other alternative locations, such as Stone Harbor or Long Beach Island, would likely have resulted in opposition rather than the public and tourist support associated with the casino environment. The purpose of this Project, possibly the first of its kind off the Eastern seaboard, is to create a renewable source of clean energy for the State of New Jersey of a scale and cost, which has been identified by the NJ Energy Master Plan, that can only come from offshore wind.

Annual net electricity production for this Project is anticipated to be approximately 75,000 MW-hours (MWh). The total Project area is conservatively estimated to be approximately 170 acres, calculated as the perimeter around the group of six turbines with a 200 foot "buffer" around each turbine foundation plus a five foot width along the length of the cable route from the turbines to the shore; however, the actual portion of the area that will be physically disturbed by the placement of the turbines and cables is significantly less than 170 acres. A review of the National Oceanic and Atmospheric Administration (NOAA) nautical charts indicates that the proposed cable and turbines for the in-water portion of the Project would be located in water depths of 26 to 40 feet below mean lower low water (MLLW).

The Project will not require an offshore substation, but will rather utilize a 34.5 kV subsea cable to access the shore from the turbine array. At shore the power will be transmitted via a horizontal directionally-drilled (HDD) underground cable largely within an Atlantic City right of way to the 69 kV Huron Substation which is part of the PJM electric system. No aircraft will be used during the development of this project.

In accordance with its proposals to state and federal permitting agencies, FISHERMEN'S proposed to conduct pre-construction monitoring of the project area in order to obtain baseline data for the biological resources that could potentially be impacted by the Project. FISHERMEN'S has concluded these monitoring studies which supplement an existing, large-scale, multi-year monitoring study of the regional marine resources, commissioned by the NJDEP BPU (NJDEP, 2010), often referred to as the Ecological Baseline Study (EBS) or the "GeoMarine Study". This biological monitoring information, combined with meteorological, geotechnical, and geophysical information collected to date provides FISHERMEN'S and the affected state and federal regulatory agencies with a comprehensive baseline data set to be used in their decision-making processes in issuing to FISHERMEN'S permits and in evaluating construction and post construction studies.





on Map

1.1.1 Windmill Specifications

Turbines such as GE4MW and 3.6MW Siemens turbines are each composed of three primary elements, a foundation, transition piece, and turbine assembly (**Figure 1-2**). Each of these elements is described below.

The jacketed turbine foundation will be a three-legged structure, with each leg being a hollow steel pipe with an approximate outer diameter of 52 inches. Each leg will be driven into the bottom to the required depth which is approximately 150 feet below the seabed. Cross braces measuring approximately 49 feet in length and 18 inches in diameter will provide additional support. At the mudline, each side of the foundation will measure approximately 53 feet from the center point of each leg. The foundation will have a slight taper to it and will extend through the water column to approximately 46 feet above mean higher high water, depending on the tide levels. The base of each foundation will be surrounded by a scour protection mat that will be installed to prevent ocean currents from eroding the seabed around the foundation base. The major components of the jacket foundation will be manufactured and pre-assembled in a Gulf of Mexico fabrication yard. Once completed, the jacket foundations will be loaded on to ABS class ocean deck barges that would carry three foundation jackets per barge. It is anticipated that the two barges will be transported by two tugs directly to the worksite (AMEC, 2011).

The transition section extends from the top of foundation (ending approximately 46 feet above sea level) to the turbine at approximately 306 feet above mean higher high water. The transition pile tapers at the base from approximately 10 to 15 feet in diameter before extending up to full height. A boat landing for service access is located just above water level, as well as an access door to the structure interior spaces and ladder. The transition pile interior is also used as the conduit for the electrical cable as it runs from the turbine motor to the seabed where it emerges from a "J-tube" to its connection with the cabling network.

The primary wind turbine components are the nacelle, which houses the gearbox and generator, and the rotor works which include the hub and three turbine blades. Each turbine will have a rotor diameter of approximately 377 feet and a center hub height of approximately 306 feet above mean higher high water. The turbines are installed on the transition pile top and will automatically rotate to orient the blades into the wind to most effectively capture energy.

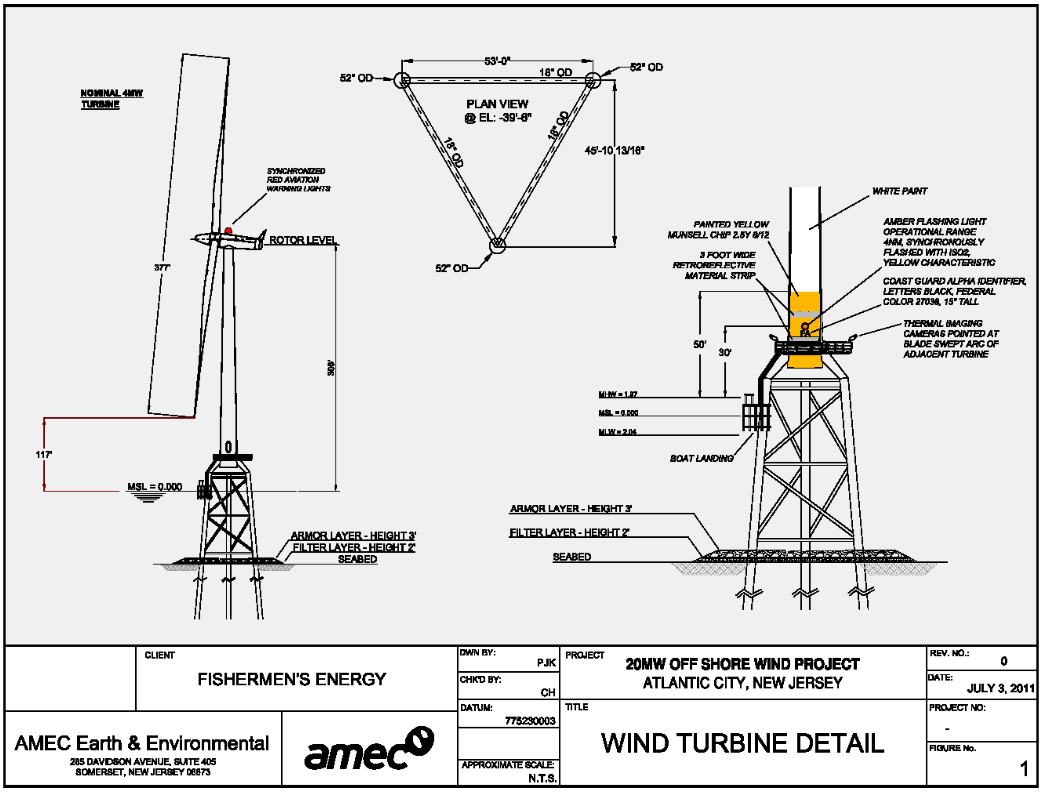


Figure 1-2

Foundation Detail

1.1.2 Windmill Assembly

The jacket foundations will be manufactured and assembled in a Gulf of Mexico fabrication yard. Once completed, the jacket foundations will be loaded on to ABS class ocean deck barges that would carry three jackets per barge. Since the jacket foundations will be manufactured in the US there will be no requirement for importation or customs clearances of the units into the Camden/Philadelphia region. Therefore it is anticipated that the two jacket foundation barges will be transported by two tugs directly to the worksite located approximately 2.8 miles offshore Atlantic City, New Jersey. At the turbine location, the first barge would be positioned alongside a heavy lift crane barge using a 4 point mooring system or spud poles. The heavy lift crane barge would contain the lift crane and a pile driving hammer. The second barge will be safely moored in the vicinity of the worksite with the transport tug standing by. The crane on the heavy lift barge would be used to lift the foundation off the transfer barge and place it on the floor of the ocean, positioned using GPS. The hammer on the heavy lift barge would then be used to drive pilings inside, down and through the length of each of the three 52" outer diameter legs of the foundation. The anchoring piles would be driven to a depth of approximately 150 feet below the mudline.

After the foundation is set, the transition piece would be lifted off of the delivery barge and welded into place on top of the foundation. Subsequently, the tower sections, nacelles, hubs and blades would be loaded onto barges at the Beckett Street Terminal in Camden NJ and towed around Cape May Point and up to the installation location. The turbine materials barge would be anchored alongside one foundation at a time close to a jack up installation crane vessel. The jack-up crane vessel will be a different vessel then the foundation heavy lift barge. The jack-up crane vessel would lift first the tower sections, install them on the transition piece, then lift and install the nacelle, which would be bolted to the top tower section, and then each individual blade would be lifted and fitted to the hub in the nacelle. One turbine would be constructed at a time. It is anticipated that there will be no significant difference in the time to install the 6 off-shore wind turbines using the jacketed foundation as compared to using a monopole foundation.

1.1.3 Submarine Electric Cable Specifications

The subsea cable will likely be arranged in a "single string" array and will be composed of three copper conductors, each 185 millimeters squared (mm^2) in size, arranged within an insulated, single wire armored submarine electric composite cable. An additional interstitial fiber-optic cable bundle, composed of 12 single mode fibers, will also be included within the composite cable for telecommunication purposes. The overall diameter of the composite cable would be approximately 128 millimeters (5.04 inches) in diameter. As an alternative, a "double string" cable routing could be employed that would utilize a smaller 95 mm^2 conductor cable for intra-array connections and a 185 mm^2 cable for connections to shore.

1.1.4 Submarine Electric Cable Installation

Jet plowing will take place in the areas between the turbines and from the turbine array towards the shore landing at Atlantic City; however, horizontal directional-drilling (HDD) will be employed from a distance of approximately 1,800 feet from the shore to the first vault.

The use of jetting technology for the installation of the submarine electric cables is a common method as it has the ability to achieve the desired burial depth with minimal environmental impacts to water quality or sensitive aquatic natural resources. In addition, it avoids the need to remove and handle sediments along the cable route which is a drawback to traditional mechanical dredging. The jet plow device is hydraulically powered and requires a specially designed cable laying vessel to tow it along the sea bottom. As it is pulled forward, it fluidizes the sediment in such a way that the cable settles into the trench under its own weight to the planned depth of burial. It achieves this through the use of pressurized seawater and hydraulic pressure nozzles on the jet plow device. These jet nozzles create a direct downward and backward "swept flow" force inside the trench which limits the upward movement of sediments into the water column and maximizes the gravitational replacement of sediments onto the cable. Depending on the composition of the sediments, the jet plow is capable of fluidizing a single trench of approximately 24 inches wide to a depth of up to 16.5 feet below the sea floor. It is also equipped with horizontal and vertical positioning equipment that records the laying and burial conditions, position, and burial depth.

The burial depth of the subsea cable from the turbine field to a point approximately 1,800 feet from the shoreline is 9 feet. Because the final burial depth is relatively deep, jetting of the splice may displace up to 100 cubic yards of bottom material. The surface area to be disturbed will be approximately 15x15 feet squared. After the transition joint has been buried to depth, the hole will be backfilled to the extent possible using previously removed material. Any remaining depression will be filled by natural sediment accretion. From this near-shore location, a conduit path will be installed via HDD to pass 30 feet below the beach, and then rise to a 10-foot depth below the ground surface for the terrestrial run of the upland cable. The terrestrial HDD will be routed to a depth sufficient to clear all underground utilities and other interferences.

The Huron Substation is located on Absecon Boulevard, generally due north where the cable makes landfall. Several 69 kV points of interconnect were reviewed in the vicinity of Atlantic City and the Huron substation was selected based on (a) available capacity for interconnection, as confirmed by PJM, (b) proximity to the shore (and therefore less land-based impacts especially considering the use of HDD), and (c) substation capacity and stability.

1.1.5 Decommissioning

The project is presently planned for a 25-ear operational period. The potential for equipment upgrades and continued operation will be evaluated throughout the project life. When it is determined that the project has completed its useful life and cannot be further upgraded, it will be decommissioned and all physical elements of the project will be removed and the site will be restored to its original condition.

1.1.6 Decommissioning Plan

A more comprehensive Decommissioning Plan will be developed in parallel with the requirements being developed by the USCG and the Bureau of Ocean Energy Management (BOEM). No offshore wind farms have been decommissioned to date in Europe. This current decommissioning plan is based upon experience in the oil and gas industry and is consistent with current USCG and BOEM guidelines. The Decommissioning Plan may be modified by FISHERMEN'S in the future based upon the experience of offshore windfarm development in Europe and the generation of additional regulations, if any in the US. As submitted, the decommission plan currently meets the requirements of the federal and state agencies. The plan will address State requirements presently in place, but it is the intent of FISHERMEN'S that the final decommissioning plan will be consistent with the current Minerals Management Service (MMS) guidelines for the removal of offshore structures which are described in 30 CFR 250.1700 – 1754 and any additional MMS guidance developed in the future for offshore wind farms. An overview of the decommissioning plan is provided below.

1.1.7 Decommissioning Process

Decommissioning of the project involves the removal of equipment both offshore and onshore and will be performed utilizing similar equipment to that used during the construction process. This equipment will include barges, lift boats, tugs and crew vessels. Deep draft vessels will port at the Beckett Street Terminal in Camden, NJ, while smaller crew vessels will operate from Atlantic City. Onshore, trucks, trailers and cable handing equipment will be used to recover the cable and substation equipment. Removed materials will be refurbished, recycled or disposed of as appropriate. It is anticipated that much of the material being metals will be recycled.

1.1.7.1 Offshore Equipment Removal

Removal of the offshore equipment will consist of the following tasks:

- Removal of scour protection
- Removal of the wind turbines
- Removal of towers and foundations to 15 feet below the surface
- Removal of inter-array and export cables
- Site clearance post clean up survey

The removal processes will be performed with full consideration of environmental and safety compliance. Federal and State permits will be in place as required prior to initiating decommissioning. During decommissioning, safety exclusion zones will be established and marked with buoys and navigational aids to protect the workforce and vessel traffic. FISHERMEN'S shall ensure that any subsea obstacles will be adequately marked until they are made safe or removed. Each of the above steps is described below.

Scour Protection

Prior to any disassembly, power transmission cables will be disconnected from the substation and each turbine. All lubricating fluids and hazardous liquids will be removed from the turbines and transported to port for proper disposal. The scour protection mats will be crane lifted from the seabed onto barges for transport to shore and disposal.

Turbine Equipment

Removal of the turbine equipment will essentially be the reverse of the installation. Using a barge supported heavy lift crane, each rotor and nacelle will be lowered to a transport barge and secured for transit to port. Power cables will be removed from the tower and cut above the scour protection at the sea bed. The steel turbine transition piece will be removed as one unit above the transition joint at the top of the jacket.

Foundations

Each tower is composed of a jacket foundation extending from the transition joint (above the sea surface) to approximately 150 feet below the sea bed. After removal of the scour protection, each leg of the jacketed foundation will be removed to approximately 15 feet below grade. The upper section will be lifted using a crane from a heavy lift jack-up barge and then towed away for recycling, while the remaining foundation (i.e. below -15 ft) is left in place. Sediment removed from the columns will be replaced, and any remaining depression will be quickly filled by natural accretion processes.

Cabling

Because full removal off all buried cable will cause increased disturbance to the sea bed, power cables at each turbine location will be excavated to the 3 meter burial depth, cut and removed. All cabling at or below the 3-meter depth will be left in place, undisturbed. The transition bell at the nearshore burial-to HDD transition will be removed and backfilled. The shore end of the transmission cable from the turbines will be cut three (3) meters below grade and abandoned.

Site Clearance

Upon completion of structural decommissioning, a site clearance survey will be performed to ensure that no debris remains within the project area, and to document the physical condition of the seabed. Similar to the geophysical survey performed during pre-construction, the clearance survey will employ a side-scan sonar for imaging the seabed, a magnetometer to detect ferrous materials, and depth mapping systems. Any objects detected will be investigated and removed as appropriate. Demonstration of clearance will be provided to the appropriate agencies.

In addition to debris surveys, a post-decommissioning seabed sampling survey will be undertaken to document the presence and densities of the benthic biology. The scope of this survey will be defined within the biological monitoring program so that a comprehensive assessment of the project impacts (pre-construction, during use and post-decommissioning) may be developed.

1.2 NOISE

Noise can be characterized by the following four factors: frequency, intensity, duration, and distance. Each of these factors is described below.

Frequency – Sound travels in waves, and the frequency of a sound is the number of wave cycles per second, measured in hertz (Hz). High frequency sounds have many cycles per second; low frequency sounds have fewer. The wavelength (the distance sound travels in one cycle), can be calculated by dividing the speed of sound underwater by the frequency of the sound. For example, the speed of sound in seawater is approximately 1,500 meters per second (m/s); therefore, a sound wave with a frequency of 100 Hz will have a wavelength of 1,500/100 = 15 meters.

A sound wave is a pressure disturbance, traveling molecule to molecule through the water. As one molecule is vibrated, it vibrates adjacent molecules and the sound energy is transported through the water in this manner. The speed of sound is how fast the disturbance is passed through unit time (e.g., m/s), and frequency refers to the number of vibrations an individual molecule creates per second.

Marine mammals and sea turtles are sensitive to a wide range of frequencies, with different species exhibiting varying sensitivities to differing frequencies. Pile-driving creates a loud broad-band sound that spans across many frequencies; however, the sound perceived by a marine mammal or sea turtle will be limited to those that the species has the ability to hear.

Intensity – Noise intensity is the power (average energy per unit time) transmitted through a unit area in a specific direction. Sound intensity (i.e. loudness) is measured in decibels (dB). The dB is a relative unit of measure describing the logarithm of the ratio of a sound's intensity to a reference intensity. Because of the logarithmic scale, decibels are not directly additive – two 70 dB sounds results in 73 dB, but a doubling of the sound energy. For broadband sounds, a 3 dB change is the minimum change perceptible to the human ear.

Measurements of dB in water are not directly comparable to dB in air because different reference intensities are used for the different media. A sound wave pressure of 1.0 microPascal (µPa) is normally used as the underwater reference intensity. When reporting sound intensity in water, it is noted as decibels relative to 1 µPa or "dB re 1 µPa".

Duration – The duration of a sound affects its potential impact. Generally, long-term sounds are considered more harmful than short bursts of sound. "Masking" occurs when the pressure of a sound masks a sound of interest, by being equal or greater in sound. For marine mammals and sea turtles, a low-level sound of long duration could mask sounds of interest such as prey and inter- and intra-species communication.

Distance – In the ocean, sound radiates in all directions from the source, in a spherical pattern. As the sound radiates, the pressure wave increases in size and the power of the wave dissipates. When the spherical sound pattern reaches the water surface or the sea floor, the sound continues to travel but in a cylindrical pattern. The intensity of the sound is also reduced by absorption of the water molecules, reflection off of underwater features, refraction if traveling through varying water temperatures or densities, and scattering off of particles in the water column.

1.2.1 Effects of Noise

When anthropogenic disturbances elicit responses from marine mammals and sea turtles, it is not always clear whether they are responding to visual stimuli, the physical presence of humans or manmade structures, or acoustic stimuli. However, because sound travels well underwater, it is reasonable to assume that, in many conditions, marine mammals and sea turtles would be able to detect sounds from anthropogenic activities before receiving visual stimuli. As such, exploring the acoustic effects of the proposed project provides a reasonable and conservative estimate of the magnitude of disturbance caused by the general presence of a manmade, industrial structure in the marine environment, as well as the specific effects of sound on marine mammal and sea turtle behavior (NMFS, 2010).

Marine mammals rely on sound to communicate with conspecifics and derive information about their environment. Marine mammals rely on hearing in order to find prey, avoid predators, communicate, and navigate. They may be impacted when noise is present at levels that adversely interfere with these actions. There is growing concern about the effect of increasing ocean noise levels due to anthropogenic sources on marine organisms, particularly marine mammals. Effects of exposure on marine organisms can be characterized by the following range of physical and behavioral responses (Richardson et al., 1995):

1. Behavioral reactions – Range from brief startle responses, to changes or interruptions in feeding, diving, or respiratory patterns, to cessation of vocalizations, to temporary or permanent displacement from habitat.
2. Masking – Reduction in ability to detect communication or other relevant sound signals due to elevated levels of background noise.
3. Temporary threshold shift (TTS) – Temporary, fully recoverable reduction in hearing sensitivity caused by exposure to sound.

4. Permanent threshold shift (PTS) – Permanent, irreversible reduction in hearing sensitivity due to damage or injury to ear structures caused by prolonged exposure to sound or temporary exposure to very intense sound.
5. Non-auditory physiological effects – Effects of sound exposure on tissues in non-auditory systems either through direct exposure or as a consequence of changes in behavior, e.g., resonance of respiratory cavities or growth of gas bubbles in body fluids.

Richardson et al. (1995) also defines four zones of noise influence for marine species depending on the distance between a strong noise source and the animal. These zones, starting from the closest to the source, are as follows:

1. Zone of Hearing Loss - The area closest to the noise source is the zone of hearing loss, where the sound pressure is high enough to cause tissue damage either temporarily or permanently. Even more severe physical damage is possible depending on the strength of the sound source.
2. Zone of Responsiveness - The zone of responsiveness is the area in which the noise is strong enough to elicit behavioral and/or physiological responses from the animal. Such responses include alarm movements or area avoidance.
3. Zone of Masking - The zone of masking is the area in which noise is strong enough to interfere with the detection of other sounds. Examples of these other sounds include communication signals and echo-location clicks.
4. Zone of Audibility - The zone of audibility is farthest from the source, and extends to the limits of hearing, until the sound is lost to ambient background noise.

1.2.2 Regulatory Criteria for Sound

Under the Marine Mammal Protection Act (MMPA), a Level A harassment is defined as "*…any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild*". NMFS is currently in the process of developing sound pressure level (SPL) guidelines for determining acoustic harassment thresholds for marine mammals. In the interim, the zone of injury is generally considered to be 180 linear decibels (dBL) referenced to 1 microPascal (µPa) root mean square (RMS) (180 dBL re 1 µPa) for cetaceans, and 190 dBL re 1 µPa for pinnipeds. The NMFS guideline of 180 dBL re 1 µPa considers instantaneous sound pressure levels at a given receiver location and is designed to protect all marine species from high sound pressure levels at any discrete frequency across the entire frequency spectrum. It does not take into account species-specific hearing capabilities; therefore, it is very conservative in nature.

The MMPA defines Level B harassment as "…*any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild*". The interim threshold levels for Level B harassment are considered to be 160 dBL re 1 µPa for exposure to pulsed sounds and 120 dBL re 1 µPa for exposure to continuous sounds, averaged over the duration of the signal.

These thresholds are based on a limited number of experimental studies on captive odontocetes (i.e. toothed whales), a limited number of controlled field studies on wild marine mammals, observations of marine mammal behavior in the wild, and inferences from studies of hearing in terrestrial mammals (NMFS, 2010). In addition, marine mammal responses to sound can highly variable, depending on the individual hearing sensitivity of the animal, the behavioral or motivational state at the time of exposure, past exposure to the noise which may have caused habituation or sensitization, demographic factors, habitat characteristics, environmental factors that affect sound transmission, and non-acoustic characteristics of the sound source, such as whether it is stationary or moving (NRC, 2003).

1.2.3 Project-Specific Noise

Pile-driving with an impact hammer produces impulsive sounds. All other noise sources associated with construction will be non-impulse sounds continuous for the duration of the activity. Sources of noise associated with the proposed project include the following:

- Geophysical and geotechnical surveys
- Cable laying and associated activities
- Pile driving of foundations
- Construction and maintenance vessel transits
- Operation of the wind turbines

1.2.3.1 Noise Associated with Geotechnical and Geophysical Surveys

A Letter of Concurrence (LOC) was issued by the NMFS to FISHERMEN'S on April 21, 2010 for the geophysical and geotechnical surveys of the project area. **Appendix A** presents a copy of this letter. The Geotechnical studies were completed during October 2010. Geophysical surveys were completed during January and February 2011. NMFS NOAA approved Marine Mammal Observers were on board the geophysical survey vessels and continuously monitored a 750-meter exclusionary area for the presence of marine mammals. No whales, turtles, dolphins or other marine mammals were observed during the survey period. Attached as **Appendix B** are the Marine Mammal logs from the Geophysical investigations. (Editorial Note: No marine mammal observations were required or performed during the geotechnical (drilling) investigations).

1.2.3.2 Noise Associated with Cable Laying

Jet-plowing and HDD will be used for the installation of the submarine electric cable. Jet-plowing and HDD is considered by the BOEM to be relatively quiet to underwater receptors, although highly-localized vibrations typically result in animal movement out of the area (MMS, 2009a). The MMS (2009a) reports that the only audible underwater sound from jet-plowing is the sound of water rushing through the plow nozzle, and that this is only audible from a close distance from the nozzle. The MMS (2009a) also reports that the types of vessels typically used for offshore windfarm construction (barges and tugs) produce sound at levels that would not physically harm or produce behavioral effects in marine life.

1.2.3.3 Noise Associated with Pile Driving

The MMS, now BOEM, in their Environmental Assessment (EA) for the *Issuance of Leases for Wind Resource Data Collection on the Outer Continental Shelf Offshore Delaware and New Jersey* (MMS, 2009b) and associated Biological Assessment (BA) (MMS, 2008) concluded that noise generated from pile-driving activities would result in minimal to negligible behavioral harassment and would not result in injury, death, or population level effects to marine mammals and sea turtles. This conclusion was based on their evaluation for the installation of seven (7) meteorological towers with associated oceanographic data collection devices across seven (7) separate lease blocks, one of which includes the FISHERMEN'S meteorological tower on Lease Block 6931. The MMS specifically concluded that because of the limited location and duration of pile-driving activities, it is expected that few individuals would be present within the project area and that marine mammals and sea turtles would likely leave the immediate vicinity of the pile-driving. Furthermore, the implementation of mitigation and monitoring measures would minimize or eliminate the potential harmful effects on marine mammals and sea turtles (MMS, 2009b, 2008). The NMFS May 14, 2009 response to the MMS' request for consultation pursuant to the Endangered Species Act (ESA) determined that no listed whales or sea turtles would be exposed to any noise greater than 160 dB, provided that a conservative 1,000-meter radius safety exclusion zone would be established, monitored by marine mammal observers, in conjunction with start-up and shut-down procedures based on species presence and movement (Bluewater and Tetra Tech, 2010). In contrast, in their Biological Opinion of the Cape Wind project, the NMFS recommended a 750-meter radius safety exclusion zone around pile driving activities (NMFS, 2010).

The jacket foundations proposed to support the FISHERMEN'S offshore wind turbines are equivalent in structure and scale to those used for the meteorological stations as addressed by BOEM. Each of the foundations will be "pinned" to the bottom with (3) 48" diameter steel pilings driven to a below seabed depth of approximately 150 feet. For this project six foundations (a total of 18 pin pilings) will be installed. Depending on the sub-bottom characteristics of each piling location, the installation of each piling will require 2400 to 2700 blows using a Delmag D-100 or equivalent hydraulic hammer over a period of 4 to 6 hours. Pile driving will begin with a series of low energy blows to establish structure position and verticality as well as to allow any marine species an opportunity to leave the area before full energy blows commence. Once the piling process is stable, stroke energy is increased to full capacity at a rate of 30 strokes per minute.

Sound pressure levels (SPLs) in quiescent marine environments typically range between 95 and 100 dB re 1 µPa. During pile driving, SPLs at a 10-meter distance from the source may be in the range of 199 dB re 1 µPa (ICF Jones and Stokes, 2009) for frequencies ranging between 10 Hz and 2 kilohertz (kHz). Given these baseline values, the SPL at any distance from the source may be extrapolated using the Practical Spreading Loss model which provides an accepted method for determining sound transmission loss as a function of distance from the source or other location of known SPL:

$$\text{Transmission Loss (TL)} = F \log(R1/R2)$$

Where:

R1 = the distance t which the targeted location occurs

R2 = the distance from which transmission loss is calculated

F = site specific attenuation factor

For this New Jersey project location, an attenuation factor (F) of 15 has been used based on local bathymetry, water depth, pile type, and substrate type.

Using the Transmission Loss equation presented above, the distance at which generated sound pressure levels are dissipated to the 160 dB level is approximately 3,800 meters. The table below includes the Level B harassment threshold of 160 dB. Determination of root mean square (RMS) pressure levels was calculated by assuming a 7% reduction of the peak SPL to yield the RMS average over the impulse period.

Given an estimated SPL of 199 dB re 1 μPa at 10 meters from the source, anticipated Peak and RMS sound pressure levels at various distances from pile driving in each turbine location are given in the following table.

Distance from Source (m)	**Maximum Peak SPL (dB re 1 uPa)**	**RMS SPL (dB re 1 uPa)**
10	199	185
100	184	171
250	174	162
500	171	159
1000	169	157
3800	160	149

Under certain conditions bubble curtain sound attenuation systems can provide the potential for reducing RMS sound pressure levels by as much as 20 db (ICF Jones and Stokes, 2009). These systems are most effective in shallow water with little to no current so that the bubble streams remain intact throughout the water column surrounding the driven pile. In this application where the water depth is 40 feet and currents exceed 1 knot the effectiveness of employing a bubble curtain will likely be minimal as the bubble stream will be quickly dissipated.

This project does however offer a sound attenuation system through the jacket structure and pin piling design. Each piling to be driven will be inserted into a larger diameter leg of the foundation structure (jacket). The piling will be driven to depth through the leg, and then cut and welded to the top of the jacket leg at completion. During the driving process the piling will be encased within the leg which will serve as a sound mitigation device. FISHERMEN'S research to gather historical information on sound reduction effectiveness of other projects using jacket foundations has not yielded any results. However it is assumed that this approach will provide a significant reduction in sound pressure levels.

FISHERMEN'S proposes to mitigate impacts to mammals and pelagic species by performing the following actions:

- Vessel based marine mammal observers will patrol the project area looking for the presence of marine mammals. If mammals are observed within a 1,000-meter radius exclusionary area, pile driving energy will be reduced and maintained at a low level until 30 minutes after the mammals depart the area.

- A "soft start" approach to intial driving of each piling will be used wherein the driving energy is started at a relatively low level and then gradually increased to full capacity.

As the pile driving process for six turbine installations is anticipated to require a total of 12 to 18 hours of driving time, any impact or displacement of fish and mammals will be short in duration.

1.2.3.4 Noise Associated with Vessel Transit

Vessels will be transiting regularly throughout the construction period. These vessels will be shuttling personnel and supplies between the Beckett Street Terminal and the construction site. They will represent an additional source of noise along the transit path. Vessels transmit noise through water and cumulatively are a significant contributor to increases in ambient noise levels in many areas. The dominant source of vessel noise from the Project is propeller cavitation, although other ancillary noises may be produced. The intensity of noise from vessels is roughly related to ship size and speed. Ships underway with a full load, or towing or pushing a load, will produce more noise than unladen vessels. Vessel traffic associated with the Project is anticipated to produce noise levels of 150 to 170 dB re 1 µPa-m at frequencies below 1,000 Hz. A tug pulling a barge generates 164 dB re 1 µPa-m when empty and 170 dB re 1 µPa-m loaded. A tug and barge underway at 18 km/h can generate broadband source levels of 171 dB re 1 µPa-m. A small crew boat produces 156 dB re 1µPa-m at 90 Hz (NMFS, 2010).

Vessel noises are within the range of frequencies that marine mammals and sea turtles can detect. The noise produced by smaller vessels will be below the threshold of harassment from a non-continuous noise source (160 dB). Although the vessel noise is continuous, marine mammals and sea turtles will not be exposed continuously as the vessels will be transiting and only a small area will be esonified at a given time (NMFS, 2010). As such, any effects from noise associated with a smaller vessel will be discountable.

The noise associated with larger vessels with source levels between approximately 164 to 171 dB re 1 µPa-m is expected to diminish to below the 160 dB re 1 µPa-m threshold within short distances (NMFS, 2010). Based on the small number of vessel transits estimated to occur during the construction phase of the project and during the operations and maintenance phase of the project (two trips per week over a period of approximately 25 years) which will limit vessels from approaching within 100 meters of a whale and 500 meters of a right whale, it is extremely unlikely that any project vessel would come close enough to a marine mammal or sea turtle in a manner that would result in exposure to harassing levels of noise. As such, no marine mammals or sea turtles are expected to be exposure to injurious or harassing levels of sound. As no avoidance behaviors are anticipated, the distribution, abundance, and behavior of whales in the project area is not likely to be affected by noise associated with construction or maintenance vessels, and any effects will be insignificant or discountable.

1.2.3.5 Noise Associated with Turbine Operation

Once installed, the operation of the turbines is not expected to generate substantial sound levels above baseline sound in the area. Preliminary results from studies conducted in the United Kingdom suggest that in general, the level of noise created during the operation of offshore windfarms is very low and does not cause avoidance of the area by marine species (NMFS, 2010).

2.0 DATES, DURATION AND REGION OF ACTIVITY

Construction of the 20 MW Offshore Wind Energy Project is anticipated to commence in May 2012, pending final state and federal authorizations. Construction of the wind farm is anticipated to take a total of 4 months, with pile driving activities occurring over a minimum of 15 days and a maximum of 24 days for the installation of the foundations. **Table 2-1** below summarizes the permits and authorizations associated with this project for both pre-construction activities and project construction and operation.

Table 2-1: Municipal, State or Federal Approvals Required

Permit	Agency	Project Element	Status
Nationwide Permit (NWP) 6	USACOE	Pre-construction geotechnical survey	Permit received April 14, 2010
Nationwide Permit (NWP) 5	USACOE	Scientific measuring device on buoy	Permit received April 14, 2010
Waterfront Development Permit	NJDEP DLUR	Pre-construction geotechnical survey and buoy	Permit received October 26, 2009
Marine Mammal Protection Act (MMPA) Letter of Concurrence (LOC)	NOAA NMFS	Pre-construction geotechnical survey and buoy	Approval received April 21, 2010
Individual Permit	USACOE	20 MW Project construction	Approval pending
Waterfront Development Permit	NJDEP DLUR	20 MW Project construction	Permit received March 29, 2011
401 Water Quality Certificate	NJDEP DLUR	20 MW Project construction	Permit received March 29, 2011
Coastal Area Facility Review Act (CAFRA) Permit	NJDEP DLUR	20 MW Project construction	Permit received March 29, 2011
Tideland Lease, Grant or License	NJDEP Bureau of Tidelands Management	20 MW Project construction and operation	Permit received May 4, 2011
Private Aid to Navigation (PATON)	USCG	20 MW Project construction and operation	Approval Pending
Determination of No Hazard to Air Navigation	Federal Aviation Administration (FAA)	20 MW Project construction and operation	Received March 16, 2011
Soil Erosion and Sediment Plan Approval	Atlantic County Soil Conservation District	20 MW Project construction	Application to be developed

Table 2-2 below presents the project locations for the key elements of the wind farm.

Table 2-2: Project Location

Project Element	Latitude (N)	Longitude (W)	UTM Zone 18 (m) (X)	UTM Zone 18 (m) (Y)
Turbine 1	39.299946	-74.436928	548551.06	4350213.87
Turbine 2	39.304968	-74.426178	549474.41	4350776.99
Turbine 3	39.309981	-74.415444	550396.31	4351339.25
Turbine 4	39.314984	-74.404727	551316.61	4351900.50
Turbine 5	39.319995	-74.393988	552238.69	4352462.85
Turbine 6	39.325016	-74.383226	553162.55	4353026.28
Cable landfall	39.355918	-74.423930	549632.20	4356432.57
Cable change-over	39.350821	-74.421561	549839.94	4355868.23

3.0 SPECIES AND NUMBERS OF MARINE MAMMALS AND SEA TURTLES IN THE AREA

This section is divided into two main parts. The first part provides information on the potential marine mammal and sea turtle species in the offshore waters within and around the project area. The second part filters this information and provides data specific to the FISHERMEN'S project area. It is these more specific data that are carried over for the development of this IHA request.

3.1 POTENTIAL AREA-WIDE OFFSHORE MARINE MAMMALS AND SEA TURTLES (NOT PROJECT-AREA SPECIFIC)

According to the NJDEP, forty-two (42) marine mammal species and five (5) sea turtle species have confirmed or potential occurrences within the marine waters off the coast of New Jersey (NJDEP, 2010). Of these 47 species, the 20 presented in **Table 3-1** on the following page occur as a regular or normal part of the fauna in the northeast Atlantic Ocean and could possibly occur in the project area based on habitat preferences and known distributions (DoN, 2005).

Table 3-2 presents abundance information for these 20 species. It is based on a compilation of marine mammal and sea turtle stock assessment reports (SARs) that are mandated to be completed by the National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS) under the 1994 amendments to the Marine Mammal Protection Act (MMPA). The SAR's estimates for numbers of individuals are derived using various forms of information, including but not limited to DNA analysis, boat-side photograph identification, and aerial surveys. The following information was compiled by the National Oceanic and Atmospheric Administration (NOAA) and issued in December 2009 for the United States Atlantic Ocean and Gulf of Mexico (Waring et al., 2009).

Table 3-1. Marine Mammals and Sea Turtles Potentially Occurring in the Project Area

Common Name	Scientific Name	NJ State Conservation Status (a)	Time of Year Observed/Expected (b)	Potentially Present in Project Area	Observed Within EBS Study Area(b)
Whales					
North Atlantic Right Whale	*Eubalaena glacialis*	E*	Year round	Possible (b)	Yes
Humpback Whale	*Megaptera novaeangliae*	E*	Year round	Possible (b)	Yes
Minke Whale	*Balaenoptera acutorostrata*	LC	Winter/Summer	Possible (b)	Yes
Sei Whale	*Balaenoptera borealis*	E*	NA	Uncommon (c)	
Fin Whale	*Balaenoptera physalus*	E*	Year round	Possible (b)	Yes
Dolphins					
Bottlenose Dolphin	*Tursiops truncatus*	LC	May-August	Possible (b)	Yes
Atlantic Spotted Dolphin	*Stenella frontalis*	U	NA	Uncommon (c)	
Common Dolphin	*Delphinus delphis*	LC	November-March	Possible (b)	Yes
Atlantic White-sided Dolphin	*Lagenorhynchus acutus*	LC	NA	Uncommon (c)	
Risso's Dolphin	*Grampus griseus*	LC	NA	Uncommon (c)	
Long-finned Pilot Whale	*Globicephala melas*	U	NA	Uncommon (c)	
Short-finned Pilot Whale	*Globicephala macrorhynchus*	U	NA	Uncommon (c)	
Harbor Porpoise	*Phocoena phocoena*	LC	Fall-Spring	Possible (b)	Yes
Seals					
Harbor Seal	*Phoca vitulina*	LC	Year round	Possible (b)	Yes
Gray Seal	*Halichoerus grypus*	LC	NA	Possible (c)	
Sea Turtles					
Loggerhead Turtle	*Caretta caretta*	E*	Summer/Fall	Possible (d)	Yes
Leatherback Turtle	*Dermochelys coriacea*	E*	May-November	Possible (d)	Yes
Green Turtle	*Chelonia mydas*	E*	May-November	Possible (d)	
Kemp's Ridley	*Lepidochlelys kempi*	T*	May-November	Possible (d)	
Hawksbill Turtle	*Eretmochelys imbricata*	E*	Spring-Summer	Uncommon (d)	

(a) source: NJDEP, Endangered and Nongame Species Program and the USFWS (listed species designated as follows – * = federally listed, E = Endangered, U = Undetermined, LC = Least Concern)

(b) source: NJDEP, 2010. (NA = not observed in NJDEP 2010 study)

(c) source: DoN, 2005. (Uncommon means not commonly found close to shore in the Atlantic City operating area)

Table 3-2. Abundance of Marine Mammals and Sea Turtles in the Western North Atlantic

Common Name	Scientific Name	Estimated Number of Individuals
Whales		
North Atlantic right whale*	*Eubalaena glacialis*	345
Humpback whale*	*Megaptera novaeangliae*	847
Minke whale	*Balaenoptera acutorostrata*	3,312
Sei whale*	*Balaenoptera borealis*	386
Fin whale*	*Balaenoptera physalus*	2,269
Dolphins		
Bottlenose dolphin	*Tursiops truncatus*	81,588
Atlantic spotted dolphin	*Stenella frontalis*	50,978
Common dolphin	*Delphinus delphis*	120,743
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	63,368
Risso's dolphin	*Grampus griseus*	20,479
Pilot whale (long- and short-finned)**	*Globicephala spp.*	31,139
Harbor porpoise	*Phocoena phocoena*	89,054
Seals		
Harbor seal	*Phoca vitulina*	99,340
Grey seal	*Halichoerus grypus*	Unknown
Sea Turtles*		
Loggerhead Turtle*	*Caretta caretta*	44,560
Leatherback Turtle*	*Dermochelys coriacea*	35,860
Green Turtle*	*Chlonia mydas*	88,520
Kemp's Ridley	*Lepidochlelys kempi*	2,500
Hawksbill Turtle*	*Eretmochelys imbricata*	22,900

* Endangered
** The NMFS SAR combines the estimated number of individuals for both the long-finned and short-finned pilot whale.
*** Worldwide population numbers for sea turtles are not available. The population estimates are for the number of nesting females.

Of the species listed above, Risso's dolphin, long-finned pilot whale, short-finned pilot whale, gray seal, and harp seal are typically found in more pelagic or northern waters (Bluewater and Tetra Tech, 2010), and are thus unlikely in the project area. The sei whale is also typically found in more pelagic waters and is unlikely to be in the project area. The remaining marine mammal species all have a relatively greater potential to occur within or traverse the project area; however, the Atlantic white-sided dolphin, common dolphin, minke whale, North Atlantic right whale, humpback whale, and fin whale are predominantly found in more northern feeding grounds.

3.2 POTENTIAL SPECIES OF CONCERN (PROJECT-AREA SPECIFIC)

This section provides a brief overview and the results of the three marine mammal and sea turtle studies or surveys specifically performed in the FISHERMEN'S project area, and the resulting potential species of concern. These data are used to estimate the numbers and types of marine mammals and sea turtles using the waters in the project area. A large amount of survey effort was expended to develop these data sets, and the resulting empirical findings are considered to be a highly accurate assessment of the potential for marine mammals and sea turtles in the Project area.

3.2.1 NJDEP Ecological Baseline Study

The FISHERMEN'S project area is inclusive within the project area of a much larger, comprehensive EBS of the marine waters offshore of New Jersey (NJDEP, 2010). For a 24-month period from January 2008 through December 2009, this larger EBS study surveyed the marine environment offshore of New Jersey in order to collect baseline information on the distribution, abundance, and migratory patterns of avian wildlife, marine mammals, sea turtles, and other wildlife species. Avian wildlife data were collected using offshore and coastal shipboard surveys, aerial surveys, offshore and coastal radar surveys, Next Generation Radar (NEXRAD) and Thermal Imaging-Vertically Pointing Radar (TI-VPR) studies, shoal surveys, and sea watch surveys. Marine mammal and sea turtle data were collected using shipboard surveys, aerial surveys, and passive acoustic monitoring. Fish and fisheries resources were also assessed in these surveys. In addition to the data collected on biotic resources, physical parameters within the study area were measured, including wind speeds, water temperature, salinity, depth, chlorophyll, and dissolved organic matter (NJDEP, 2010). Data specific to the FISHERMEN'S project area were extracted from the EBS by GMI and Curry & Kerlinger (2011a) and were evaluated for this IHA request.

Figure 3-1 presents a depiction of the survey transect lines in relation to the FISHERMEN'S project area. The overall EBS study transects traversed a total of 18,183 kilometers (km). Within the Project area, the study transects traversed a total of 638 km of which 611 km were specifically dedicated to surveying for marine mammals and sea turtles (GMI and Curry & Kerlinger, 2011a).

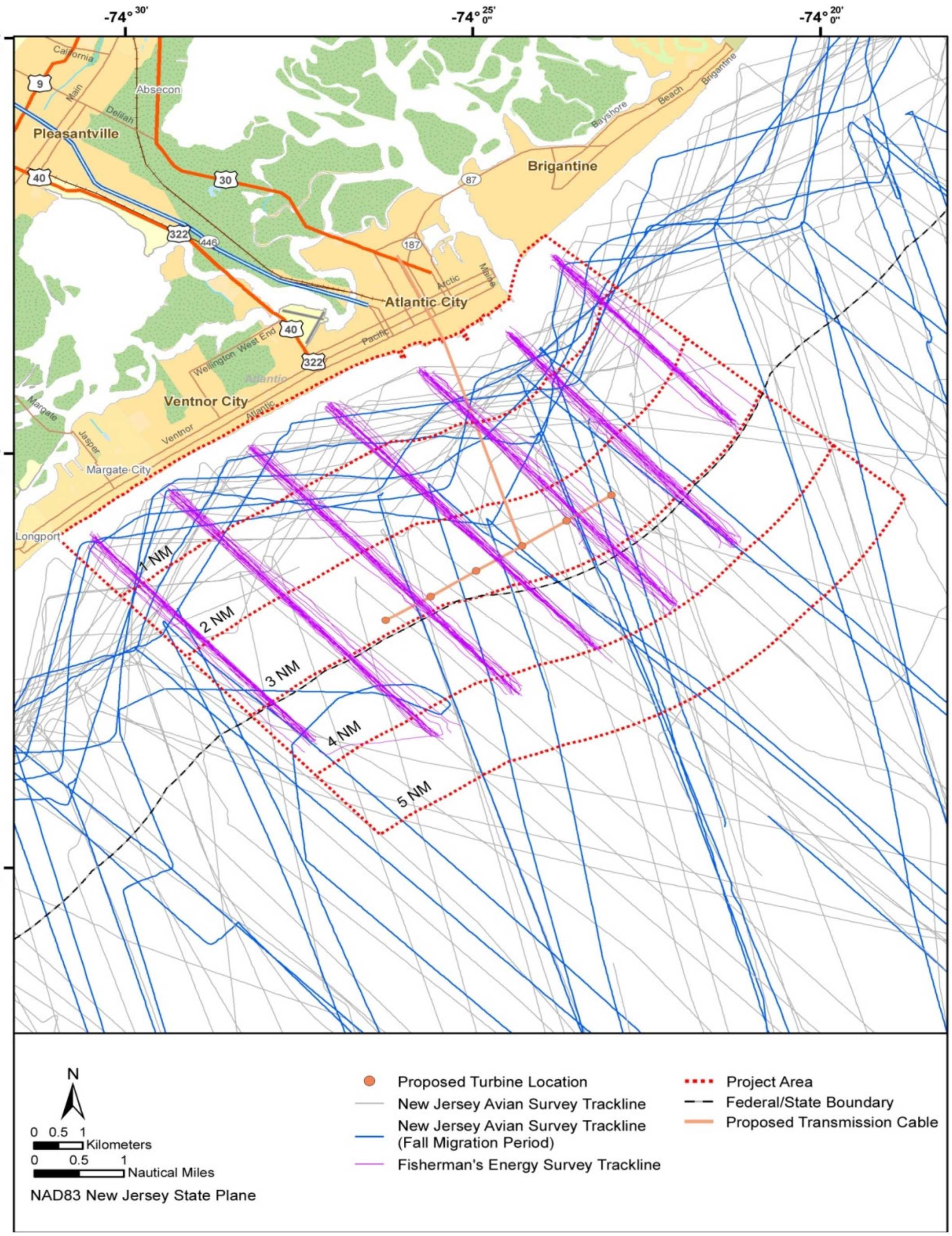


Figure 3-1
NJDEP EBS Survey Transects Through the FISHERMEN'S Project Area*
Source: GMI and Curry & Kerlinger (2011a)

**Surveys were conducted during both the spring and fall migration periods for avian wildlife; however, in order to avoid duplicative figures, only the fall migration period figure is presented here.*

The data extracted from the EBS study reveal that the bottlenose dolphin (*Tursiops truncatus*) was the only marine mammal observed in the FISHERMEN'S project area, all of which were observed either in the spring or summer (GMI and Curry & Kerlinger, 2011a). However, one observation of a single unidentified pinniped was also made. In addition, one unidentified sea turtle was observed near the FISHERMEN'S project area about 5 NM from the proposed turbines. **Figure 3-2** depicts the locations of these bottlenose dolphin sightings, **Table 3-3** presents a summary of individuals sighted, **Table 3-4** presents a summary of individual bottlenose dolphins, and **Appendix C** presents a copy of the extracted data report.

Table 3-3
Summary of Marine Mammal* Sightings

Survey Area Band	2-year	Fall	Winter	Spring	Summer
1	0	0	0	0	0
2	2	0	0	0	2
3	5	0	0	2	3
4	2	0	0	0	2
5	2	0	0	2	1
Totals	**11***	**0**	**0**	**3**	**8**

Source: GMI and Curry & Kerlinger (2011a)

* 10 of the 11 sightings are confirmed as bottlenose dolphin, and the number "10" is hereafter used to refer to the total number of bottlenose dolphin sightings in this study.

Table 3-4
Summary of Bottlenose Dolphin Individuals

Band	2-year	Fall	Winter	Spring	Summer
1	0	0	0	0	0
2	13*	0	0	0	12
3	30	0	0	13	17
4	33	0	0	0	33
5	12	0	0	10	2
Totals	**88***	**0**	**0**	**23**	**64**

Source: GMI and Curry & Kerlinger (2011a)

* 12 of the 13 individuals are confirmed as bottlenose dolphin, and the number "87" is hereafter used to refer to the total number of bottlenose dolphin individuals in this study.

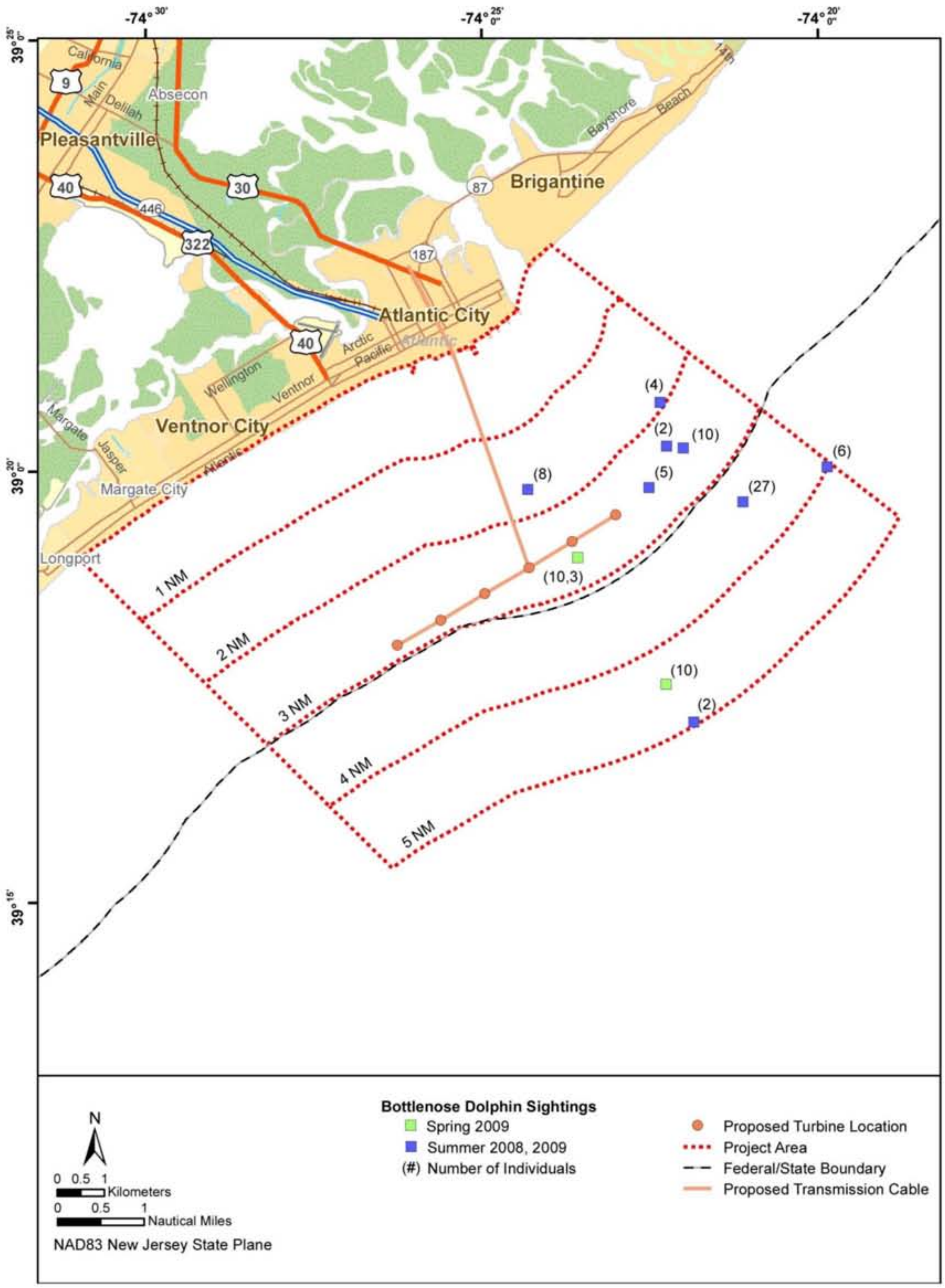


Figure 3-2
NJDEP EBS Sightings of Bottlenose Dolphins in the FISHERMEN'S Project Area
Source: GMI and Curry & Kerlinger (2011a)

3.2.2 Marine Mammal and Sea Turtle Observations

Marine mammal observers were onboard the vessels conducting the geophysical and geotechnical surveys of the project area. The presence of the marine mammal observers meets a requirement in the April 21, 2010 Letter of Concurrence received by FISHERMEN'S from the NMFA for the geophysical and geotechnical surveys.

To date, the documentation for thirteen (13) watches performed in January 2011 are available, none of which have resulted in the sighting of any marine mammal or sea turtle. **Appendix B** presents the log sheets from these observations

3.2.3 Pre-Construction Monitoring

FISHERMEN'S conducted pre-construction monitoring of the project area in order to fulfill the data needs identified in their March 2010 NJDEP Multiple Permit Application, and the NJDEP's species-survey requirements outlined in the Draft Technical Manual for Evaluating Wildlife Impacts of Wind Turbines Requiring Coastal Permits (NJDEP, 2009). The study area for the pre-construction monitoring comprised seven (7) survey track lines, spaced one (1) nautical mile (NM) apart, and included a 1.5-mile buffer zone around the proposed turbine locations extending in all directions. A total of 389 transects were surveyed totaling 140.9 survey hours over 1,404.6 NM (2,601.4 km) were surveyed from May 2010 through May 2011 (GMI and Curry & Kerlinger, 2011b).

Bottlenose dolphins were the most numerous marine mammals observed during the pre-construction monitoring survey. There was also one (1) sighting of fin whales (*Balaenoptera physalus*), three (3) sightings of a humpback whale (*Megaptera novaeangliae*), two (2) sightings of a harbor seal (*Phoca vitulina*), one sighting of a minke whale (*Balaenoptera acutorostrata*), four (4) sightings of harbor porpoises (*Phocoena phocoena*), and one (1) sighting of a loggerhead turtle (*Caretta caretta*). There were significantly fewer marine mammal sightings in the EBS when compared to the pre-construction monitoring surveys. This is attributed to the overall increase in survey effort for the pre-construction monitoring surveys, specifically within two (2) NM of the coast which was not well surveyed in the EBS. With respect to distance from the coastline, the EBS sightings were particularly clustered in waters greater than three (3) NM from the coast. However, as alluded to above, this result is strongly influenced by the lack of survey effort for marine mammals within two (2) NM of the coastline. **Figure 3-3** depicts the locations of all marine mammals and sea turtles observed during the pre-construction monitoring (May 2010 through May 2011), and **Table 3-5** presents a summary of these data combined with the NJDEP EBS data, and **Appendix D** presents a copy of the final report synthesizing these data.

Table 3-5
Summary of Marine Mammals and Sea Turtles Observed within the FISHERMEN'S Project Area from 2008 through 2011 (EBS combined with Pre-Construction Monitoring)

Individuals				**Sightings**			
Band	**2008**	**2009**	**2010-2011**	**Band**	**2008**	**2009**	**2010-2011**
1	0	0	29	**1**	0	0	9
2	0	12	33	**2**	0	2	13
3	13	17	40	**3**	2	3	16
4	27	0	80	**4**	1	0	22
5	10	2	22	**5**	1	1	4
Total	**50**	**31**	**204**	**Total**	**4**	**6**	**64**

Common Name	**Sighting (2008)**	**Total Number (2008)**
Common bottlenose dolphin	9	45
Common Name	**Sighting (2009)**	**Total Number (2009)**
Pinniped, unknown	1	1
Common bottlenose dolphin	5	77
Common Name	**Sighting (2010)**	**Total Number (2010)**
Loggerhead turtle	1	1
Harbor seal	2	2
Minke whale	1	1
Fin whale	1	2
Humpback whale	3	3
Common bottlenose dolphin	76	260
Harbor porpoise	4	5
Mammal, inknown	1	1

Source: GMI and Curry & Kerlinger (2011b)

3.3 POTENTIAL SPECIES OF CONCERN

Based on the comprehensive data set presented in the previous sections, the potential marine mammal and sea turtle species of concern in the FISHERMEN'S project area are as follows:

- Bottlenose dolphin (predominant marine mammal in the study area)
- Fin whale (one sighting)
- Minke whale (one sighting)
- Humpback whale (three sightings)

- Harbor seal (two sightings)
- Harbor porpoise (four sightings)
- Loggerhead turtle (one sighting)

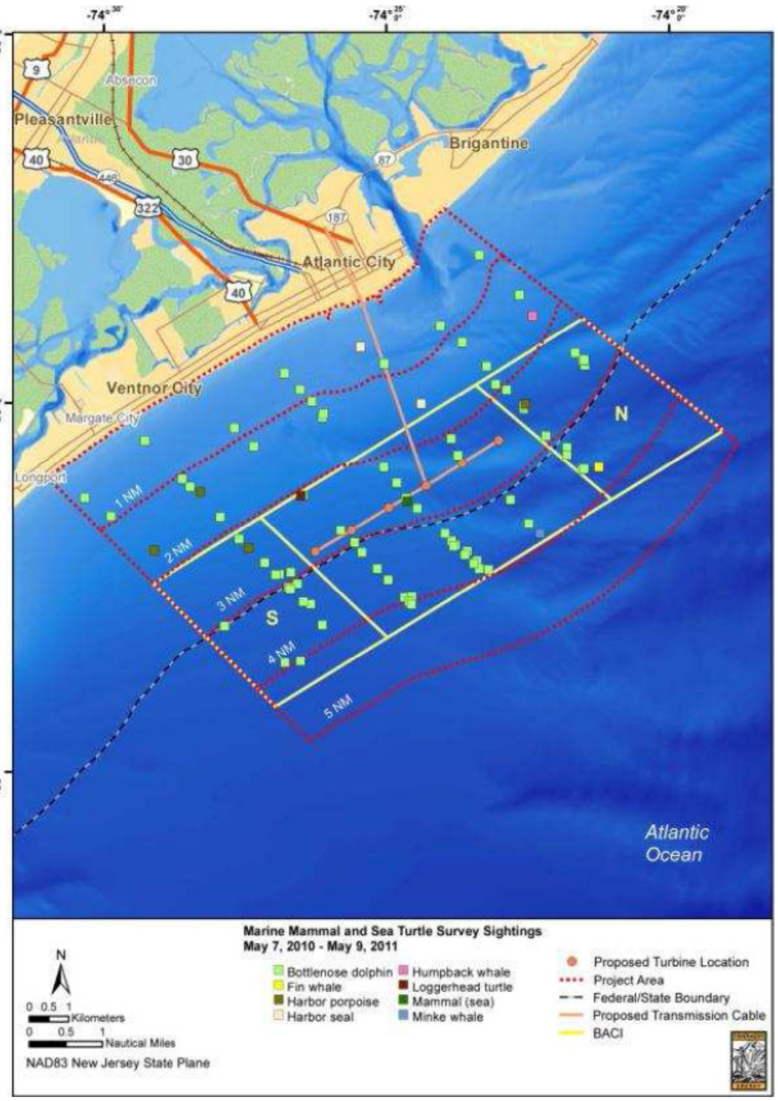


Figure 3-3
Pre-Construction Monitoring Marine Mammal and Sea Turtle Sightings (May 2010 through May 2011) in the FISHERMEN'S Project Area
Source: GMI and Curry & Kerlinger (2011b)

4.0 AFFECTED SPECIES STATUS AND DISTRIBUTION

The species statuses in relation to the Endangered Species Act of 1973 (ESA) is presented in **Table 4-1** below.

Table 4-1. ESA Status of Potential Marine Mammal and Sea Turtle Species

Common Name	Scientific Name	Federal Status
North Atlantic Right Whale	*Eubalaena glacialis*	Endangered
Humpback Whale	*Megaptera novaeangliae*	Endangered
Sei Whale	*Balaenoptera borealis*	Endangered
Fin Whale	*Balaenoptera physalus*	Endangered
Loggerhead Turtle	*Caretta caret*	Endangered
Leatherback Turtle	*Dermochelys coieacea*	Endangered
Green Turtle	*Chelonia mydas*	Endangered
Kemp's Ridley	*Lepidochelys kemi*	Threatened
Hawksbill Turtle	*Eretmochelys imbricate*	Endangered

As described in Section 3.0, of the 47 marine mammal and 5 sea turtle species reported to occur within the marine waters off the coast of New Jersey, 15 marine mammals and all 5 sea turtles have a possible occurrence in the project area based on habitat preferences and known distributions. Of these species, only the following were observed in the project area during the most recent comprehensive marine mammal and sea turtle survey of the project area (GMI and Curry & Kerlinger, 2011b), most of these observations being in the summer: bottlenose dolphin, fin whale, humpback whale, minke whale, harbor seal, harbor porpoise, and loggerhead sea turtle.

Of the species listed in **Table 3-1**, Risso's dolphin, long-finned pilot whale, short-finned pilot whale, gray seal, and harp seal are typically found in more pelagic or northern waters (Bluewater and Tetra Tech, 2010), and are thus unlikely in the project area. The sei whale is also typically found in more pelagic waters and is unlikely to be in the project area. The remaining marine mammal species all have a relatively greater potential to occur within or traverse the project area; however, the Atlantic white-sided dolphin, common dolphin, minke whale, North Atlantic right whale, humpback whale, and fin whale are predominantly found in more northern feeding grounds and are likely only to be transients in the project area during their annual migration periods.

Life history summaries for each of the marine mammals and sea turtles listed in **Table 3-1** are presented below.

4.1 BALEEN WHALES (MYSTICETI)

North Atlantic Right Whale (*Eubalaena glacialis*) – Endangered

The North Atlantic right whale is a federally listed baleen whale. Once abundant throughout the western Atlantic Ocean, this species is now the most endangered whale off the east coast of the United States (NOAA, 2006). The North Atlantic right whale has seen little to no recovery since commercial whaling ceased in 1935 and since being listed as a protected species. In March 2008, the NMFS listed the North Atlantic right whale as a discrete, endangered species (*E. glacialis*) under the ESA, separate from the North Pacific right whale (*E. japonica*). The NMFS determined that the North Atlantic right whale is in danger of extinction throughout its range because of (1) over-utilization for commercial, recreational, scientific, or educational purposes, (2) the inadequacy of existing regulatory mechanisms, and (3) other natural and manmade factors affecting its continued existence (NMFS, 2010).

Previous models estimated that the North Atlantic right whales population numbered 300 +/- 10%) (Best et al., 2001; Waring et al., 2006; Kraus et al., 2001). However, a review of the photo-ID database on October 18, 2008 indicated that 345 individually recognized right whales were known to be alive in 2005 (Waring et al., 2009). Prior to the protection of the species in the 1930's, the right whale population was thought to consist of 100 individuals. Pre-exploitation numbers of this species were estimated to be around 1,000 individuals (Waring et al., 2006).

North Atlantic right whales are known to congregate in six major habitats or areas including: coastal waters of the southeastern United States, Great South Channel, Georges Bank/Gulf of Maine, Cape Cod and Massachusetts Bays, Bay of Fundy, and the Scotian Shelf (Waring et al., 2006). The waters off of the New England coast are primary feeding habitat for this species, which they are known to inhabit year round. Their presence in this area is the highest in the Massachusetts Bay during the winter and spring months. These whales are also regularly sighted each year from March through June in the New York Bight, which according to Okeanos Foundation data, functions mainly as a migration pathway. Cow/calf pairs and solitary individuals occasionally feeding have been sighted in this area (USFWS, 1997). Some right whales move along the coast in nearshore waters past Cape Hatteras and Long Island toward the Great South Channel off Cape Cod Massachusetts, while others migrate north in offshore waters (CETAP, 1982). Several individuals have also been observed feeding in association with large blooms of calanoid copepods (Mayo and Marx, 1990).

Zooplankton (i.e., copepods) is the primary food source for North Atlantic right whales (Kelly, 1995). Right whales are considered grazers as they feed by swimming slowly with their mouths open. They can dive at least 1,000 feet (300 meters) and stay submerged for typically 10 to 15 minutes, while feeding on their prey below the surface (ACSonline, 2004).

Most ship strikes are fatal to the North Atlantic right whales (Jensen and Silber, 2004). North Atlantic right whales spend most of their time at the surface, feeding, resting, mating, and nursing, increasing their vulnerability to collisions. They also have difficulty maneuvering around boats and are the slowest swimming whales, only reaching speeds up to 10 miles (16 kilometers) per hour. Mariners should assume that North Atlantic right whales will not move out of their way nor will they be easy to detect from the bow of a ship as they are dark in color and maintain a low profile while swimming (WWF, 2005). Over the five-year period from 2003 to 2007, right whales had the highest proportion of entanglements and ship strikes relative to the number of reports for a species. Of 58 reports involving right whales, 20 were confirmed entanglements and 17 were confirmed ship strikes. These numbers are thought to be an underestimation (NMFS, 2010).

The New York Bight and Mid-Atlantic waters function mainly as a migration pathway for North Atlantic right whales (USFWS, 1997); therefore, only transient individuals would be expected to occur within the project area. No North Atlantic right whales were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of North Atlantic right whales in the project area is extremely unlikely.

Humpback Whale (*Megaptera novaeangliae*) – Endangered

The humpback whale is a federally listed baleen whale. Humpback whales inhabit all major ocean basins from the equator to subpolar latitudes. With the exception the northern Indian Ocean population, they generally follow a predictable migratory pattern in both hemispheres, feeding during the summer in the higher near-polar latitudes and migrating to lower latitudes in the winter where calving and breeding takes place (Perry et al., 1999).

Humpback whales were commercially exploited by whalers throughout their whole range until the mid 1900s contributing to their status as the fourth most numerically depleted cetacean in the world. In 1955, this species was protected in the North Atlantic by the International Whaling Commission (IWC) ban. Prior the commercial whaling, humpback populations were estimated to exceed 125,000 and the North Atlantic humpback whale stock was estimated in excess of 15,000 (Nowak, 2002; NMFS, 1991). Today only 10,000 to 12,000 humpbacks are thought to exist, which is less than 10 percent of the initial population exists (NMFS, 1991). According to the species stock assessment report, the Gulf of Maine stock is estimated at 847 individuals (Waring et al., 2009).

The humpback whale is found in all of the world's oceans, but is less common in arctic regions. There are 13 separate stocks of humpback whales worldwide (NMFS, 1991). Through genetic analysis of the whales inhabiting the Gulf of Maine, it was determined that the Gulf has its own feeding stock. Photographic studies suggest that the population composition of the mid-Atlantic is apparently dominated by Gulf of Maine whales; however, lack of recent photographic effort in Newfoundland makes it likely that the observed individuals under-represent the true presence of Canadian whales in the region (Waring et al., 2006).

Humpback whales typically inhabit waters over or on the continental shelf and around islands (NMFS, 1991; NMFS, 1993). They spend their spring, summer and autumn months off the coast of the eastern United States, with the highest populations near the Gulf of Maine. During these months they can be found relatively close to shore in waters with the highest biologic productivity where they feed intensively. Humpback whales are thought to feed mainly during migration and in summer feeding areas; very little feeding occurs while in their winter ranges. Major food sources for humpbacks in the Northern Atlantic Ocean include; small schooling fish, such as hearing, sand lance and capeline, and large zooplankton, such as krill (NMFS, 1991). While feeding, they swim below the thermocline to pursue their prey, so even though the surface temperatures might be warm, they are frequently swimming in cold water (NMFS, 1991). During the winter months humpback populations migrate offshore to the tropical waters of the West Indies for mating and calving; however some remain along the US Mid-Atlantic coast (NMFS, 2005a).

The leading causes of human related deaths among humpback whales are vessel strikes and gear entanglements. Between the years of 1997 to 2001 approximately three humpback whales were killed annually by anthropogenic factors such as vessel strikes or fishery related causes. A study conducted in the Mid-Atlantic region estimated that approximately 30 percent of humpback whale deaths are a result of vessel strikes (NMFS, 2005a). In one study, anthropogenic factors either contributed to or caused the death of 60 percent of the stranded whale carcasses that were examined (Wiley et al., 1995). Juvenile humpback whale stranding has increased along the coasts of Virginia and North Carolina suggesting that this area is an important winter habitat for young humpback whales and additional human disturbance could negatively impact this species (NMFS, 2005a). Another study found that humpbacks are also subject to bioaccumulation of toxins (Taruski et al., 1975). Humpback whales have exhibited a short-term avoidance of areas with increased whale-watching activity indicating that ambient noise levels may impact their utilization of certain habitats (Corkeron, 1995). A recovery plan for the humpback whale is currently in effect (NMFS, 1991).

Humpback whales inhabit waters mainly over the continental shelves and their migratory pathways likely follow direct, deep, offshore waters (NMFS, 1991; NMFS, 1993; Waring et al., 2009). Therefore, only transient individuals would be expected to occur within the project area. No humpback whales were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010) or the marine mammal and sea turtle observations during the geophysical and geotechnical survey; however there were three (3) sightings of this species during the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of humpback whales is possible in the project area during the spring, summer, and fall months, with their likelihood diminishing during the winter months (NMFS, 1991, 1993, 2005a).

Minke Whale (*Balaenoptera acutorostrata*)

Minke whales are the smallest and one of the most widely distributed of all the baleen whales. Currently, scientists recognize two subspecies of minke whale: the North Atlantic minke and the North Pacific minke. Minke whales off the eastern coast of the United States are considered to be part of the Canadian East Coast stock. According to the species stock report, the Canadian East Coast is estimated at 3,312 individuals (Waring et al., 2009).

Minke whales are found in the tropical and polar waters of the North Atlantic and North Pacific, typically inhabiting warmer waters during winter and migrate north to colder regions in summer. Some individuals migrate as a far north as the ice edge. Within their range they are frequently observed in coastal or shelf waters.

Minke whales are typically seen alone or in small groups, although large aggregations occasionally occur in feeding areas (Reeves et al., 2002). Minke populations are often segregated by sex, age, or reproductive condition. Minke whales are a curious species and often approach boats. They feed on schooling fish, such as herring, sand eel, capelin, cod, pollock, and mackerel, invertebrates including squid and copepods, and euphausiids. Minke whales typically feed below the surface of the water, and calves are usually not seen in adult feeding areas.

Similar to other baleen whales, minke whales are affected by ship strikes and gear entanglements such as bycatch from gillnets and purse seines. From 2000 to 2004, the estimated annual human-caused mortality was 2.8 minke whales per year (Waring et al., 2006). International trade in this species is currently banned; however, hunting for Minke whales continues today in the northeastern North Atlantic by Norway and in the North Pacific and Antarctic by Japan (Reeves et al., 2002). NMFS considered this species as "non-strategic" since annual fishery-related mortality and serious injury does not exceed the potential biological removal for this species (Waring et al., 2006).

Although Minke whales are among the most widely distributed of all the baleen whales, they tend to inhabit warmer waters during winter and travel north to colder regions in summer. Therefore, only transient individuals would be expected to occur within the project area. No minke whales were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010) or the marine mammal and sea turtle observations during the geophysical and geotechnical survey; however there was one (1) sighting of this species during the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of minke whales in the project area is possible, but extremely unlikely.

Sei whale (*Balaenoptera borealis*) – Endangered

The sei whale has been a federally endangered species since 1970, depleted under the Marine Mammal Protection Act (MMPA), classified as endangered by the International Union for Conservation of Nature (IUCN) and protected under Convention on International Trade in Endangered Species (CITES); however, no critical habitat has been designated for them. Sei whale populations were depleted worldwide by commercial hunting and whaling in the 19th and 20th centuries. After commercial whaling was prohibited in the 1970's, sei whale populations in the North Atlantic and North Pacific have recovered and are considered to be relatively abundant; however the population in the Southern Ocean still remains depleted. The current world wide population of sei whales is estimated to be about 80,000 individuals (NMFS, 2008) and the North Atlantic population is estimated near 10,000 (Horwood, 2002). According to the species stock assessment report, the Gulf of Maine stock is estimated at 386 individuals (Waring et al., 2009).

Sei whales are found in all world oceans and adjoining seas, with the exception of the polar and tropical regions. Sei whales inhabiting U.S. waters have been divided into three distinct stocks: the Hawaiian Stock, Eastern North Pacific Stock and the Nova Scotia Stock, formerly the Western North Atlantic Stock. The Nova Scotia stock inhabits the continental shelf and slope waters of the northeastern United States and extends northeast to south of Newfoundland (NMFS, 2007). Sei whales prefer the temperate, subtropic to subpolar offshore waters characteristic of the continental shelf edge region (NMFS, 2008; Waring et al., 1999). Like most baleen whales, this species usually feeds in sub-polar waters in summer and migrate to subtropical waters during the winter months where they mate and give birth (Bluewater and Tetra Tech, 2010; NMFS, 2008). In the North Atlantic, sei whales are typically found off Nova Scotia and Labrador during the summer months and as far south as Florida during the winter months (Leatherwood and Reeves, 1983). Aerial surveys conducted by NMFS found concentrations of sei whales along the northern edge of Georges Bank in the spring.

Sei whales display a general offshore pattern and are often found in the deeper offshore waters; however they have been reported to "invade" shallower inshore waters to exploit available food sources (NMFS, 2007). This species is largely planktivorous, mainly feeding on krill and copepods, but also feeds on small schooling fish and squid (NMFS, 2008).

This species spends the winter in subtropical waters mating and calving and migrates into cooler sub-polar waters for feeding during the spring, summer, and fall (Bluewater and Tetra Tech, 2010). Therefore, only transient individuals would be expected to occur within the project area. No sei whales were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of sei whales in the project area is extremely unlikely.

Fin whale (*Balaenoptera physalus*) – Endangered

Fin whales are federally endangered as a result of the depletion of its population from whaling (Reeves et al., 1998). A recovery plan for the fin whale has been written and is awaiting legal clearance (Waring et al., 2006). Fin whale populations were depleted in the mid-twentieth century due to commercial whaling, which ended in 1987 in the North Atlantic. The North Atlantic currently supports abundant populations of fin whales, which is not the case in the North Pacific and Southern Oceans (NMFS, 2006). According to the species stock assessment report, the population estimate for the western North Atlantic stock of fin whales is 2,269 (Waring et al. 2009).

There has been some controversy regarding the number of fin whale stocks along the eastern coast of the United States. The International Whaling Commission (IWC) recognizes one western North Atlantic stock, which consists of the whales inhabiting the waters off New England, north to Nova Scotia, and the southeastern coast of Newfoundland (Donovan, 1991). Breiwick, (1993), however, has identified two stocks, one that remains off of Nova Scotia and New England and another that remains in Newfoundland waters.

Fin whales are found in all oceans of the world and are common along the Atlantic coast from Cape Hatteras, North Carolina northward. Spatial patterns of habitat utilization by fin whales are very similar to those of humpback whales. From October through January, fin whales can be found in the Mid-Atlantic region where they mate and give birth. During the summer and fall there is evidence to suggest these populations migrate north into cooler temperate to polar waters to feed on krill and schooling fish (Reeves et al., 1998; NMFS, 2005b). Mass migratory movements along well defined migratory corridors have not been documented by sightings; however, acoustic evidence suggests that migration does occur, but is highly variable from year to year and individual to individual (NMFS, 2006). Fin whales are pelagic, but they have been spotted along coastal areas with water depths no less than 30 meters (NMFS, 2005b) Results from the Navy's SOSUS program (Clark, 1995) indicates a substantial deep-ocean distribution of fin whales. It is likely that fin whales occurring in the U. S. Atlantic Exclusive Economic Zone (EEZ) undergo migrations into Canadian waters, open-ocean areas, and perhaps even subtropical or tropical regions.

Fin whales are the most common large baleen whale species in the Gulf of Maine/Massachusetts Bay area. They have the largest standing stock and largest food requirements, thus having the largest impact on the ecosystem of any cetacean species (Hain et al., 1992). The waters off the New England coast are an important feeding ground for fin whales. They generally stay in deeper waters near the edge of the continental shelf (300 to 600 feet; 90 to 180 meters), but will migrate towards coastal areas if prey is available (NMFS, 1993; Reeves et al., 1998). Fin whales are known to herd prey such as sea lance, capelin, krill, herring, copepods, and squid for easier consumption (NMFS, 1993; EPA, 1993).

Similar to other baleen whale species, the biggest threats to fin whales are entanglements in gillnets and ship strikes. From 1997 to 2004, a total of nine fin whales of the western North Atlantic stock were killed by ship strikes and six were injured/killed from entanglement in fishing gear (Waring et al., 2004; Waring et al., 2006). Similar to humpback whales, an increase in ambient noise levels can also affected fin whales. Whales in the Mediterranean have demonstrated at least two different avoidance strategies after being disturbed by tracking vessels (Jahoda et al., 2003). Fin whales are the most observed cetacean species during whale-watching activities in the northeastern United States.

Fin whales spend their winters in subtropical or offshore waters mating and calving, then migrate into cooler temperate to polar waters for feeding during the spring, summer, and fall (Reeves et al., 1998). Therefore, only transient individuals would be expected to occur within the project area. No fin whales were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), or the marine mammal and sea turtle observations during the geophysical and geotechnical survey; however, there was one (1) sighting of this species during the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of fin whales in the project area is possible, but expected to occur only as transients from October to January where they have been reported to occur in the Mid-Atlantic region (Reeves et al., 1998; NMFS, 2005b).

4.2 TOOTHED WHALES (ODONTONCITI)

Bottlenose dolphin (*Tursiops truncatus*) – Strategic

Bottlenose dolphins are found in oceans and peripheral seas at both tropical and temperate latitudes. In North America, bottlenose dolphins are found in surface waters with temperatures ranging from 10 to 32°C (50 to 90°F). Their ability to occupy a wide variety of habitats has caused this species to be regarded as possibly the most adaptable cetacean (Reeves et al., 2002).

There are two distinct bottlenose dolphin populations: shallow water, which is believed to consist of a complete mosaic of stocks, and deepwater populations. The shallow water, coastal population is found along the inner continental shelf and around islands and often moves into or resides in bays, estuaries and the lower reaches of rivers (NMFS, 2001; McLellan et al., 2003; Reeves et al., 2002). The deepwater population is the only one found in the northern latitudes of the North Atlantic, typically in Gulf Stream waters. During the spring and summer months, the deepwater population extends along the entire continental shelf-break from Georges Bank to Cape Hatteras. In the late summer and fall it has been observed in the Gulf of Maine. The NMFS species stock assessment report estimates the population of western North Atlantic offshore bottlenose dolphin stock to be 29,774 individuals (Waring et al., 2004). Stocks of the shallow water, coastal population within the Northern Migratory Management Unit located from New Jersey through Virginia have been estimated to be approximately 81,588 individuals (Waring et al. 2008).

Bottlenose dolphins feed on a large variety of organisms, which is dependent upon their habitat. The shallow water, coastal population tends to feed on benthic fish and invertebrates. In contrast, the deepwater population consumes pelagic or mesopelagic fish such as croakers, sea trout, mackerel, mullet, and squid (Reeves et al., 2002). Bottlenose dolphins appear to be active both during the day and night. Their activities are influenced by the seasons, time of day, tidal state, and physiological factors such as reproductive seasonality (Wells and Scott, 2002).

The biggest threat to the bottlenose dolphin population is bycatch, as they are frequently caught in fishing gear, gillnets, purse seines, and shrimp trawls (Waring et al., 2006). Pollution, habitat alternation, boat collisions, human disturbance and bioaccumulation of toxins also adversely impact this species. Scientists have found a strong correlation between dolphins with elevated levels of PCBs and illness, indicating certain pollutants may weaken their immune system (ACSonline, 2004). NMFS considers this species as "strategic", but not listed as threatened or endangered under the EAS, since the average annual fishery-related mortality and serious injury exceeds the potential biological removal for this species in the North Carolina Winter Mixed stocks. The management units are "strategic" stocks due to the depleted listing under the MMPA (Waring et al., 2006).

As discussed in Section 3.0, the bottlenose dolphin was the only marine mammal observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010) and the pre-construction monitoring survey (GMI and Curry & Kerlinger, 2011b). All of these observations were made during either the spring or summer months. Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of bottlenose dolphins in the project area throughout the year is likely.

Spotted dolphin (*Stenella attenuata/frontalis*) – Non-Strategic

There are two species of spotted dolphin in the Atlantic Ocean: the Atlantic spotted dolphin (*Stenella frontalis*), and the pantropical spotted dolphin (*S. attenuate*) (Perrin et al., 1987). It can be difficult to differentiate between these two species where they co-exist (Waring et al., 2006). The estimated abundance of Atlantic spotted dolphins has been reported at 30,772 individuals, based upon continental shelf surveys conducted from 1998 through 2001. According to the species stock report, the population estimate for the western North Atlantic common dolphin is 50,978 individuals (Waring et al. 2007).

The Atlantic spotted dolphin prefers tropical to warm temperate waters along the continental shelf 10 to 200 meters (33 to 650 feet) deep to slope waters greater than 500 meters (1640 feet) deep. Their diet consists of a wide variety of fish and squid, as well as benthic invertebrates (Herzing, 1997).

Between 1998 and 2003, no fishing-related mortality of a spotted dolphin was reported (Yeung, 1999; Yeung, 2001; Garrison, 2003; Garrison and Richards, 2004). NMFS considers this species as "non-strategic" because average annual fishery-related mortality and serious injury does not exceed the potential biological removal for this species (Waring et al., 2006).

Spotted dolphins prefer tropical and warm temperate waters making interactions with spotted dolphins unlikely in the project area. Recent surveys in the VACAPES OPAREA, which includes waters off Delaware through North Carolina, by the Navy indicate higher abundance of spotted dolphin in deep, continental slope waters east of North Carolina, but few, if any, in the vicinity of the project area (DoN, 2007a). No spotted dolphins were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of spotted dolphins in the project area is extremely unlikely.

Common dolphin (*Delphinus delphis*) – Non-Strategic

Common dolphins can be found either along the 200- to 2,000-meter (650- to 6,500-foot) isobaths over the continental shelf and in pelagic waters of the Atlantic and Pacific Oceans. They are present in the western Atlantic from Newfoundland to Florida. The short-beaked common dolphin is especially common along shelf edges and in areas with sharp bottom relief such as seamounts and escarpments (Reeves et al., 2002). They show a strong affinity for areas with warm, saline surface waters. Off the coast of the eastern United States, they are particularly abundant in continental slope waters from Georges Bank southward to about 35° north (Reeves et al., 2002) and usually inhabit tropical and warm-temperate waters (Waring et al., 2006). According to the species stock report, the population estimate for the western North Atlantic common dolphin is 120,743 individuals (Waring et al. 2007).

Common dolphins typically gather in schools consisting of smaller groups of 30 or fewer dolphins, but schools of hundreds of thousands have also been observed. This species is active at the surface and commonly see riding the bow of a ship (Reeves et al., 2002). The main food source of common dolphins is small schooling fish and squid. They have been known to feed on fish escaping from fishermen's nets or fish that are discarded from boats (NMFS, 1993).

Similar to other dolphin species, the common dolphin is also subject to bycatch. This species has been caught in gillnets, pelagic trawls, and during longline fishery activities, resulting in 160 deaths between 2003 and 2007 (Waring et al., 2009). NMFS considers this species as 'non-strategic"; however the current status of this stock is listed as unknown (Waring et al., 2009).

Common dolphins are more commonly encountered in deeper waters along the continental shelf and are typically more pelagic. Due to the limited location and duration of the pile-driving activities as well as the transient nature of this species, interaction with the common dolphin within the project area is unlikely. During pile-driving activities, individuals in the project area would likely leave the area until activities are complete. Recent surveys in the Northeast Study Area (New Jersey through Maine) inclusive of the Atlantic City OPAREA, which includes waters off Delaware through North Carolina, by the Navy indicate higher abundance of common dolphin in deep, continental slope waters throughout the Mid-Atlantic region, but few, if any, in the vicinity of the project area (DoN, 2007a and b). Common dolphins were not observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of common dolphins in the project area is extremely unlikely.

Atlantic white-sided dolphin (*Lagenorhynchus acutus*) – Non-Strategic

NMFS recognizes three stocks of the Atlantic white-sided dolphin in the western North Atlantic: a Gulf of Maine stock, a Gulf of St. Lawrence stock, and a Labrador Sea stock (Waring et al., 2006). The Gulf of Maine stock occupies both the Gulf of Maine (usually in the southwestern portion) and Georges Bank year round. Dolphins of the Gulf of Maine stock are also found in the New York Bight. Sightings of Atlantic white-sided dolphins south of Georges Bank, in the vicinity of Hudson Canyon, have also occurred year-round but at low densities (Waring et al., 2006). The Gulf of Maine stock is estimated at approximately 63,368 individuals and population estimates in U.S. shelf waters suggest around 30,000 individuals (Waring et al., 2009). An additional 12,000 individuals have been estimated to spend the summer months in the Gulf of St. Lawrence (Reeves et al., 2002).

The Atlantic white-sided dolphin is typically found in the cool temperate and subpolar waters of the North Atlantic along the continental shelf at a depth of 330 feet (100 meters). The range of this species extends between the Gulf Stream and the Labrador current to as far south as North Carolina (Bulloch, 1993; Reeves et al., 2002). Atlantic white-sided dolphins are highly social and are commonly seen feeding with fin whales. Food sources for this species include a variety of fish such as herring, hake, smelt, capelin, and cod, as well as squid (NMFS, 1993).

Similar to other dolphin species, the biggest human-induced threat to the Atlantic white-sided dolphin is bycatch, since they are occasionally caught in fishing gillnets and trawling equipment. Between 2000 and 2004 an average of 24 dolphins were killed each year were killed by human activities (Waring et al., 2006). The NMFS considers this species as "non-strategic" since the average annual fishery-related mortality and serious injury does not exceed the potential biological removal for this species (Waring et al., 2006).

There is insufficient data to estimate abundance of the Atlantic white-sided dolphin off the U.S. East Coast (DoN, 2007a and b). Sightings of the Atlantic white-sided dolphin in the vicinity of Hudson Canyon and points south have occurred at low densities (Waring et al., 2006). Therefore, interactions with Atlantic white-sided dolphin are not expected in the project area. No Atlantic white-sided dolphins were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of Atlantic white-sided dolphins in the project area is extremely unlikely.

Risso's dolphin (*Grampus griseus*) – Non-Strategic

Risso's dolphin (*Grampus griseus*) is an offshore dolphin that prefers temperate to tropical waters along the continental shelf edge. Inshore appearances of this species are uncommon (Reeves et al., 2002). During the spring, summer and fall Risso's dolphins are present from Cape Hatteras to Georges Bank. During the winter months they are present throughout the Mid-Atlantic Bight extending out into the ocean waters (Payne et al., 1984). Risso's dolphins are typically seen in groups of 12 to 40 individuals; however occasionally loose aggregations of 100 to 200, up to several thousand, are seen (Reeves et al., 2002). According to the species stock report, the population estimate for the Risso's dolphin is 20,479 individuals (Waring et al. 2009).

Similar to other dolphin species, Risso's dolphin has been subject to bycatch as they have been caught in gillnets and pelagic longline fishery activities. Between 2004 and 2007 a total of 26 dolphins were killed by these fishing activities (Waring et al., 2009). NMFS considers this species as "non-strategic"; however, the current status of this stock is listed as unknown (Waring et al., 2009).

The preference of this species for oceanic waters along the continental shelf edge makes interactions with Risso's dolphin unlikely in the project area. Recent surveys in the VACAPES OPAREA, which includes waters off Delaware through North Carolina, by the Navy indicate higher abundance of Risso's dolphin in deep, continental slope waters throughout the Mid- Atlantic region, but few, if any, in the vicinity of the project area (DoN, 2007a). No Risso's dolphins were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of Risso's dolphins in the project area is extremely unlikely.

Long-finned pilot whale (*Globicephala melas*) – Strategic / Short-finned pilot whale (*Globicephala macrorhynchus*) – Non-Strategic

The long-finned pilot whale is divided into two subspecies: the Northern and Southern subspecies. The Southern subspecies is found in the southern oceans with northern limits of Brazil and South Africa. The Northern subspecies, ranges from North Carolina to Greenland and could be encountered within the project area (Reeves et al., 2002; Wilson and Ruff, 1999).

The short-finned pilot whale is found primarily throughout tropical and subtropical deep waters of the world. Because long-finned and short-finned pilot whales are difficult to identify at sea, seasonal abundance estimates are reported in SARs for both (Waring et al. 2009). According to the species stock report, the population estimate of both the long-finned and short-finned pilot whales pilot whales from Maryland to the Bay of Fundy is 31,139 individuals (Waring et al. 2009).

The long-finned pilot whale is typically found along the edge of the continental shelf at a depth of 330 to 3,300 feet (100 to 1,000 meters). They prefer areas along the shelf of high relief or submerged banks in cold or temperate shoreline waters. In the western North Atlantic, long-finned pilot whales are pelagic. During the winter and spring they occur in especially high densities over the continental slope. During the summer and autumn months (May through October) they follow the squid and mackerel populations inshore and onto the shelf (Reeves et al., 2002), which frequently includes the central and northern Georges Bank, Great South Channel, and Gulf of Maine areas (May and October) (NMFS, 1993).

Long-finned pilot whales primarily feed on squid but will eat fish (e.g., herring) and invertebrates (e.g., octopus, cuttlefish) if squid are not available. Shrimp are also ingested, particularly by younger whales and occasionally other fish species. These whales forage for prey at depths of 600 to 1,650 feet (200 to 500 meters), although they can forage deeper if necessary (Reeves et al., 2002). Long-finned pilot whales are a very social species that travel in pods of roughly 20 individuals, thought to consist of adult females and their offspring, while following prey.

Short-finned pilot whales feed primarily on squid, but they also feed on octopus and fish, all from deep water of approximately 1,000 feet or more (NMFS, 2010). Their primary foraging habitats contain high densities of squid. Short-finned pilot whales are found in groups of about 25 to 50 animals (NMFS, 2010).

Both species of pilot whales are subject to bycatch during fisheries activities such as gillnet fishing, pelagic trawling, longline fishing, and purse seine fishing. Between 1997 and 2001 approximately 215 pilot whales were killed or seriously injured each year by human activities. Strandings involving hundreds of individuals are not unusual and demonstrate that these large schools have a high degree of social cohesion (Reeves et al., 2002). NMFS rates the long-finned pilot whale as "strategic" because the 1997 to 2001 estimated average annual fishery-related mortality exceeds the potential biological removal (Waring et al., 2007). NMFS rates the short-finned pilot whale as a non-strategic stock because the 2003-2007 estimated average annual human related mortality does not exceed potential biological removal (Waring et al. 2009)

Recent surveys by the Navy in the Northeast Study Area (New Jersey through Maine) inclusive of the Atlantic City OPAREA, which includes waters off Delaware through North Carolina, indicate higher abundance of pilot whales in deep, continental slope waters throughout the Mid-Atlantic region, with the highest abundance found in oceanic waters east of North Carolina, but few, if any, in the vicinity of the project area (DoN, 2007a and b). No long-finned pilot whales or short-finned pilot whales were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of long-finned or short-finned pilot whales in the project area is extremely unlikely.

Harbor porpoise (*Phocoena phocoena*) – Non-Strategic

The harbor porpoise inhabits shallow, coastal waters, is often found in bays, estuaries, and harbors. In the western Atlantic, they range from Cape Hatteras north to Greenland. During the fall, winter and spring months they are found off the coast of New Jersey. After April, they migrate north towards the Gulf of Maine and Bay of where they tend to congregate in the southwestern Gulf of Maine, Great South Channel, Jeffreys Ledge, and coastal Maine. According to the species stock report, the population of harbor porpoises in the Gulf of Maine/Bay of Fundy stock is 89,054 individuals (Waring et al. 2009).

Roughly 365 harbor porpoises are killed by human-related activities each year. The most common threat to the harbor porpoise is from incidental mortality from fishing activities, particularly bottom-set gillnets. It has been demonstrated that the porpoise echolocation system is capable of detecting net fibers however the incidental mortality due to fishing activities indicates that they must not have the "system activated" or else they fail to recognize the nets (Reeves et al., 2002). In 1999, a Take Reduction Plan to reduce harbor porpoise bycatch in U.S. Atlantic gillnets was implemented. The portion of the plan that pertains to the Gulf of Maine focuses on sink gillnets and other gillnets that are used to catch groundfish in New England waters. The plan implements time and area closures, including complete closures, as well as requiring pingers of multispecies gill nets. In 2001, the harbor porpoise was removed from the candidate species list for the ESA after a review of the biological status of the stock indicated that a classification of "Threatened" was not warranted (Waring et al., 2004). In 2002, the NMFS downgraded the species from "strategic" to "non-strategic" since the current average annual fishery-related mortality and serious injury does not exceed its potential biological removal (Waring et al., 2006).

Although harbor porpoises are known to occur off the coast of New Jersey, the limited location and duration of the pile-driving activities as well as the transient nature of this species makes interactions with the harbor porpoise within the project area unlikely. During pile-driving activities, individuals in the project area would likely leave the area until activities are complete. Additionally, there is insufficient data to estimate abundance of the Atlantic white-sided dolphin off the U.S. East Coast in the Southeast region (DoN, 2007a and b). No harbor porpoises were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010) or the marine mammal and sea turtle observations during the geophysical and geotechnical survey; however, there were four (4) sighting of this species during the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of harbor porpoises in the project area is possible.

4.3 EARLESS SEALS (PHOCIDAE)

Harbor seal (*Phoca vitulina*) – Non-Strategic

Harbor seals are the most abundant seals in eastern United States waters. They are commonly found in all nearshore waters of the Atlantic Ocean and adjoining seas located north of northern Florida; however, their "normal" southern range is thought to extend south only to the waters off the coast of New Jersey. In the western North Atlantic, they inhabit the waters from the eastern Canadian Arctic and Greenland, south to southern New England and New York. Occasionally they are observed as far south as South Carolina. Some individuals spend all year in eastern Canada and Maine, while others migrate to southern New England in late September where they stay until late May. According to the species stock report, the population estimate for the western North Atlantic stock of harbor seals is 99,340 (ESS and Battelle, 2006; NMFS, 1993; Waring et al., 2009).

Harbor seals are generally intolerant of close contact with other seals, with the exception of mothers and their pups. During the molting season, which occurs between spring and autumn, depending on geographic location they are gregarious. They may haul out to molt at a tide bar, sandy or cobble beach, or exposed intertidal reef. During this haul out period, they spend most of their time sleeping, scratching, yawning, and scanning for potential predators such as humans, foxes, coyotes, bears, and raptors (Reeves et al., 2002). In late autumn and winter, following the reproductive and molting seasons, harbor seals may be at sea continuously for several weeks or more, presumably feeding to recover body mass and to fatten up for the next breeding season (Reeves et al., 2002).

Harbor seals are opportunistic feeders feeding on squid and small schooling fish (i.e., herring, alewife, flounder, redfish, cod, yellowtail flounder, sand eel, and hake). They spend about 85 percent of the day diving, much of which is presumed to be active foraging, in the water column or on the seabed. They dive to depths of about 30 to 500 feet (10 to 150 meters), depending on location. Harbor seals forage in a variety of marine habitats, including deep fjords, coastal lagoons and estuaries, high-energy, rocky coastal areas, and the mouths of freshwater rivers and streams, occasionally traveling several hundred miles upstream (Reeves et al., 2002). They lay out on sandy and pebble beaches, intertidal rocks and ledges, and sandbars, and occasionally on ice floes in bays near calving glaciers.

Historically, harbor seals have been hunted for several hundred to several thousand years. They are still killed legally in Canada, Norway, and the United Kingdom to protect fish farms or local fisheries (Reeves et al., 2002). According to the stock assessment reports, an estimated four seals were taken in gillnets each year between 2000 and 2004 in the Mid Atlantic region (Waring et al., 2006). The NMFS considers harbor seals to be "non-strategic" since the average annual fishery related mortality and serious injury for this species does not exceed the potential biological removal for this species (Waring et al., 2006).

During the NJDEP EBS, strip transects were flown along the coastline (at low tide) when it was possible to assess the presence/absence of pinnipeds near the NJDEP Study Area (Study Area). No haulout sites were detected during these aerial surveys. There are three well known, long-term haulout sites in New Jersey. The one closest to the Study Area is in Great Bay approximately 13 miles to the north of the project area.(Slocum et al. 2005; Slocum and Davenport 2009). Harbor seal abundance at this haulout has increased since 1994 and shows strong seasonality (Slocum et al. 1999; Slocum et al. 2005). Pinnipeds were sighted in the Study Area during the shipboard surveys. A single sighting of an individual harbor seal was recorded during the survey period. This seal was observed in shallow waters (18 m [59 ft]) 9.9 km (5.3 NM) east of Little Egg Inlet in June 2008. Two unidentified pinnipeds were recorded near Ocean City, New Jersey in April 2008 and were probably harbor seals but species identification could not be confirmed.

Although harbor seals are known to occur off the coast of New Jersey, the limited location and duration of the pile-driving activities as well as the transient nature of this species makes interactions with the harbor porpoise within the project area unlikely. No harbor seals were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010) or the marine mammal and sea turtle observations during the geophysical and geotechnical survey; however, there were two (2) sightings of this species during the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of harbor seals in the project area is possible, but highly unlikely.

Gray seal (*Halichoerus grypus*) – Non-Strategic

Gray seals inhabit both sides of the North Atlantic in temperate and subarctic waters (King, 1983). Scientists recognize three primary populations of this species in the northern Atlantic Ocean. The gray seals that reside in Nantucket Sound are part of the eastern Canada stock, which can be found from northernmost Cape Chidley in Labrador to most recently Long Island Sound (Katona et al., 1993).

Pupping colonies have been identified at Muskegat Island (Nantucket Sound), Monomoy National Wildlife Refuge, and in eastern Maine (Rough, 1995). According to the species stock report, the population estimate for the total western North Atlantic stock of gray seal populations are not available (Waring et al. 2009). According to a survey conducted in 2004 the Canadian gray seal population was estimated between 208,720 and 223,220 (Waring et al. 2009).

Gray seals form colonies on rocky island, mainland beaches or land-fast ice and ice pack flows were they gather to breed, molt, and rest in groups of several hundred or more. Some seals give birth in sea cavesor on sea ice, especially in the Baltic Sea. This species prefers haul out and breeding sites that are surrounded by rough seas and riptides where boating is hazardous. Gray seals molt in late spring or early summer and may spend several weeks ashore during this time

Gray seals are thought to be solitary when feeding and telemetry data indicates that feeding habitats are variable. When feeding, most seals remain within 45 miles (72 kilometers) of their haul out sites. They generally feed on fish (i.e., skates, alewife, sand eel, and herring) and invertebrates. Some seals may forage seasonally in waters close to colonies, while others may migrate long distances from their breeding areas to feed in pelagic waters between the breeding and molting seasons (Reeves et al., 2002).
The biggest threats to gray seals are entanglements in gillnets or plastic debris (Waring et al., 2004). Between 1997 and 2000, approximately 300 gray seals were killed each year by human related activities (Waring et al., 2004). NMFS considers gray seals to be "non-strategic" since average annual fishery-related mortality and serious injury does not exceed the potential biological removal for this species; (Waring et al., 2004).

No gray seals were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of gray seals in the project area is extremely unlikely.

Harp seal (*Pagophilus groenlandicus*) – Non-Strategic

Harp seals are typically found in the pack ice of the North Atlantic and Arctic Oceans, ranging from Newfoundland to northern Russia. Harp seals are a highly migratory species that travel from their northern whelping sites to waters off eastern Canada and the northeastern United States. Sightings of this species in waters ranging from Maine to New Jersey (their southern most point of migration) have increased in recent years and usually occur in January through May (Katona et al., 1993; Stevick and Fernald, 1998; McAlpine, 1999; Lacoste and Stenson, 2000; Harris et al., 2002). According to the species stock report, the population estimate for the harp seal is 5.5 million individuals (Waring et al., 2009).

Harp seals aggregate in large numbers (up to several thousand seals) on pack ice during the breeding in February and March and when while molting in late spring. Large groups of harp seals may travel and feed together during extensive seasonal migrations.

Historically, harp seals have been hunted for several hundred to several thousand years. Other human-caused mortalities include boat strikes, fishing gear interactions, power plant entrainment, oil spills, harassment, and shooting. The loss of sea ice is also a potential threat to their habitat. Between 2000 and 2004, approximately 406,600 harp seals were killed (Waring et al., 2006). Currently, the population is stable and the NMFS considers this species and "non-strategic" because average annual fishery-related mortality and serious injury does not exceed the potential biological removal for this species (Waring et al., 2006).

Although harp seals are widely distributed, they are more commonly encountered in deeper northern, Arctic waters. No harp seals were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of harp seals in the project area is extremely unlikely.

4.4 SEA TURTLES (CHELONIIDAE)

Leatherback Turtle (*Dermochelys coriacea*)

The leatherback turtle is the largest living sea turtle. Adult leatherbacks range from 130 to 180 cm in length, and weigh between 200 and 700 kilograms (NMFS and USFWS 1992). There are an estimated 20,000 to 30,000 leatherbacks in the North Atlantic Ocean (Coren 2000). An estimated 100 to 900 leatherbacks reside in the continental shelf waters off the northeast U.S. coast every summer (Shoop and Kenney 1992). The wider distribution of leatherbacks, when compared to other sea turtles, is likely due to their highly evolved thermoregulatory capabilities. Leatherbacks can maintain body core temperatures well above the ambient water temperature. A variety of studies have shown that leatherbacks have a range of anatomical and physiological adaptations that enable them to regulate internal body temperatures (Mrosovsky and Pritchard 1971; Greer et al. 1973; Neill and Stevens 1974; Paladino et al. 1990). There is limited information available regarding the habitats utilized by post-hatchling and early juvenile leatherbacks, as these age classes are entirely oceanic (NMFS and USFWS 1992). Late juvenile and adult leatherback turtles are known to range from mid-ocean to the continental shelf (Schroeder and Thompson 1987; Shoop and Kenney 1992; Grant and Ferrell 1993; Epperly et al. 1995). Juvenile and adult foraging habitats include both coastal feeding areas in temperate waters and offshore feeding areas in tropical waters (Frazier 2001). Leatherback turtles predominantly feed upon gelatinous zooplankton such as jellyfish and salps (Bjorndal 1997); however, a wide variety of other prey items are known (NMFS and USFWS 1992). Leatherbacks feed throughout the water column from the surface to depths as far as 1,200 m (Eisenberg and Frazier 1983; Davenport 1988). The movements of adult leatherbacks appear to be linked to the seasonal availability of their prey and the requirements of their reproductive cycle (Collard 1990; Davenport and Balazs 1991). Leatherback nesting in the western North Atlantic is restricted to coarse-grained beaches in subtropical and tropical latitudes (NMFS and USFWS 1992). Nesting occurs along the coasts of South, Central, and North America from Brazil to Mexico and throughout the West Indies, with significant populations in French Guiana, Suriname, and Costa Rica (Ernst et al. 1994). Along the Atlantic coast of the U.S., leatherback turtles nest annually on beaches from southern Florida to Georgia (Ernst et al. 1994).

GMI (2009) had 10 sightings of this species in their 2008 survey. The individuals were observed in waters ranging from 59 to 102 feet in depth. No leatherback turtles were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of leatherback turtle in the project area is extremely unlikely.

Loggerhead Turtle (*Caretta caretta*)

Loggerheads are large, hard-shelled sea turtles. The mean straight carapace length of adult loggerheads in southeast U.S. waters is approximately 92 cm and the average weight is 113 kilograms (NMFS and USFWS 1991a). The loggerhead turtle occurs worldwide in habitats ranging from coastal estuaries to waters far beyond the continental shelf (Dodd 1988). Loggerheads are primarily oceanic as post-hatchlings and early juveniles, often occurring in Sargassum drift lines (Carr 1987; Witherington 1994a; Bolten and Balazs 1995). As pelagic immatures, loggerheads apparently shift to a different mid-water feeding habitat (Brongersma 1972; Bolten et al. 1994, 1998). As adults and later juveniles, loggerheads most often occur on the continental shelf and along the shelf break of the U.S. Atlantic and Gulf coasts. They are also known to inhabit coastal estuaries and bays along both coasts (CETAP 1982; Shoop and Kenney 1992). The diet of a loggerhead turtle changes with age and size of the turtle. The gut contents of post-hatchlings found in masses of Sargassum contained parts of Sargassum, zooplankton, jellyfish, larval shrimp and crabs, and gastropods (Carr and Meylan 1980; Richardson and McGillivary 1991; Witherington 1994b). Juvenile and subadult loggerhead turtles are omnivorous, foraging on pelagic crabs, mollusks, jellyfish, and vegetation captured at or near the surface (Dodd 1988). Adult loggerheads are generalized carnivores that forage on nearshore benthic invertebrates (Dodd 1988). Loggerhead turtles nest almost exclusively in warm-temperate regions (TEWG 2000). Females typically nest on continental coastlines adjacent to warm-temperate currents (Dodd 1988). In the western North Atlantic Ocean, there are at least five demographically independent loggerhead nesting groups or subpopulations: (1) Northern: North Carolina, South Carolina, Georgia, and northeast Florida (approximately 7,500 nests in 1998); (2) South Florida: occurring from 29°N on the east coast to Sarasota on the west coast (approximately 83,400 nests in 1998); (3) Florida Panhandle: Eglin Air Force Base and the beaches near Panama City, Florida (approximately 1,200 nests in 1998); (4) Yucatán: the eastern shore of the Yucatán Peninsula, Mexico (approximately 1,000 nests in 1998); and (5) Dry Tortugas: near Key West, Florida (approximately 200 nests per year) (Encalada et al. 1998; TEWG 2000; Epperly et al. 2001).

GMI (2009) reported a total of 10 loggerhead turtle sightings throughout their study Area. The water depth of sightings ranged from 56 to 102 ft. No loggerhead turtles were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010) or the marine mammal and sea turtle observations during the geophysical and geotechnical survey. However, there was one (1) sighting of a loggerhead turtle during the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of loggerhead turtles in the project area is possible, but highly unlikely.

Kemp's Ridley Turtle (*Lepidochelys kempii*)

The Kemp's Ridley turtle is the smallest living sea turtle. The mean straight carapace length of an adult is 65 cm, and the average weight is 45 kg (USFWS and NMFS 1992). There are currently no population estimates for Kemp's Ridley turtles in the North Atlantic Ocean (Weber 1995). Kemp's Ridley turtles occur in open-ocean and Sargassum habitats of the North Atlantic Ocean as post-hatchlings and small juveniles. They move to benthic, nearshore feeding grounds along the U.S. Atlantic and Gulf coasts as large juveniles and adults. Habitats frequently utilized by Kemp's Ridley turtles in the continental U.S. include warm-temperate to subtropical sounds, bays, estuaries, tidal passes, shipping channels (Lutcavage and Musick 1985; Landry and Costa 1999). Kemp's Ridley turtles feed primarily on portunids and other types of crabs, but are also known to eat mollusks, shrimp, fish, and plant material (Ernst et al. 1994; Márquez 1994). Scientists have developed a habitat suitability index (HSI) model for Kemp's Ridley turtles based on what is known of its habitat preferences. In addition to water temperature, habitat factors of critical importance to this species include water depth and prey abundance. In this theoretical, quantitative model, the most optimal habitats for Kemp's Ridley turtles are those with a bottom depth of less than 10 m and a sea-surface-temperature between 22° and 32°C (Coyne et al. 1998). Nesting occurs primarily on a single nesting beach at Rancho Nuevo, Tamaulipas, Mexico (USFWS and NMFS 1992), with a few additional nests in Texas, Florida, South Carolina, and North Carolina (Meylan et al. 1990; Weber 1995; Foote and Mueller 2002). Kemp's Ridley turtles that nest in south Texas today are likely a mixture of returnees from the experimental imprinting and head-starting project and others from the wild stock (Shaver and Caillouet 1998).

GMI (2009) did not observe this species in their 2008 survey. No Kemp's Ridley turtles were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of Kemp's Ridley turtles in the project area is extremely unlikely.

Green Sea Turtle *(Chelonia mydas)*

The green turtle is the largest hard-shelled sea turtle; adults commonly reach 100 cm in carapace length and 150 kilograms in weight (NMFS and USFWS 1991b). There is no estimate of the total number of green turtles in the North Atlantic Ocean. Early juvenile green turtles are believed to reside in oceanic waters for a period of three to seven years (Balazs 2004). Once they reach a carapace length of 20 to 25 cm, green turtles then migrate to shallow nearshore areas where they spend the majority of their lives as late juveniles and adults (NMFS and USFWS 1991b; Ernst et al. 1994; Bjorndal and Bolten 1998). The optimal habitats for benthic age classes (i.e., late juveniles and adults) are warm waters that are quiet and shallow (3 to 5 m), possess an abundance of submerged aquatic vegetation (seagrasses and/or algae), and are located in close proximity to nearshore reefs or rocky areas that are used for resting (Ernst et al. 1994). Post-hatchlings and early juveniles are more omnivorous, feeding on a variety of algae, invertebrates, and small fishes (Ernst et al. 1994). Late juvenile and adult green turtles feed primarily on seagrasses (e.g., turtle grass, manatee grass, shoal grass, and eelgrass), macroalgae, and reef-associated organisms (Burke et al. 1992; Ernst et al. 1994; Bjorndal 1997). The major Atlantic nesting colonies are located at Ascension Island, Aves Island, and on the beaches of Costa Rica and Suriname (NMFS and USFWS 1991b). Most nesting in North America occurs in southern Florida and Mexico (Meylan et al. 1995), with scattered records in the Florida Panhandle, Alabama, Georgia, and the Carolinas (Peterson et al. 1985; Schwartz 1989; NMFS and USFWS 1991b; USAF 1996). Green turtles rank second behind loggerheads in the number of nests laid on U.S. beaches per year (Dodd 1995; Meylan et al. 1995).

GMI (2009) did not observe this species in their 2008 survey. No green sea turtles were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of green sea turtles in the project area is extremely unlikely.

Hawksbill Sea Turtle (Eretmochelys imbricata)

The hawksbill turtle is a small to medium-sized sea turtle. Adults range between 65 and 90 cm in carapace length and typically weigh around 80 kilograms (Witzell 1983; NMFS and USFWS 1993). Very little is known about the status or abundance of this species along the U.S. Atlantic coast aside from the recognition that hawksbill populations are neither declining nor showing indications of recovery (Dodd 1995; Plotkin 1995). Hawksbill turtles inhabit oceanic waters as post-hatchlings and early juveniles, where they are sometimes associated with floating patches of sargassum (Parker 1995). Hawksbills recruit to benthic foraging grounds at 20 to 25 cm (Meylan 1988). The primary feeding habitats of benthic-stage juveniles and adults are tropical, nearshore waters that are associated with coral reefs or mangroves. Adults may occupy somewhat deeper waters (to 24 m) than late juveniles (to 12 m). Major foraging populations in U.S. waters occur in the vicinity of the coral reefs surrounding Mona Island, Puerto Rico and Buck Island, St, Croix (van Dam and Diez 1996; Starbird et al. 1999). Little is known about post-hatchling and early juvenile diets (Witzell 1983). Scientists believe that hawksbills are omnivorous during the later juvenile stage, feeding on encrusting organisms such as sponges, tunicates, bryozoans, algae, mollusks, and a variety of other items such as crustaceans and jellyfish (Bjorndal 1997). Adult hawksbills are more specialized, feeding primarily on sponges, which comprise as much as 95 percent of their diet in some locations (Witzell 1983; Meylan 1988). Hawksbill turtles nest in multiple, small, scattered colonies, with the most significant nesting in the western North Atlantic Ocean occurring along the Yucatán Peninsula, Mexico (Garduño et al. 1999). Hawksbill nesting within the continental U.S. is restricted to beaches in southern Florida and the Florida Keys, although even there it is extremely rare (Dodd 1995). The nesting season of hawksbills is the longest of all sea turtles; nesting may occur year-round. In the western North Atlantic, nesting occurs primarily between spring and late fall, with a peak in nesting activity between July and October (Witzell 1983).

GMI (2009) did not observe this species in their 2008 survey. No hawksbill turtles were observed in the FISHERMEN'S project area during the 24-month EBS study (GMI, 2010; NJDEP, 2010), the marine mammal and sea turtle observations during the geophysical and geotechnical survey, or the pre-construction monitoring study (GMI and Curry & Kerlinger, 2011b). Based on the extracted data from the 24-month NJDEP EBS study, the results of the marine mammal and sea turtle observations conducted during the geophysical and geotechnical survey, and eight months of pre-construction monitoring performed to date, the presence of hawksbill turtles in the project area is extremely unlikely.

5.0 TYPE OF INCIDENTAL TAKE REQUESTED

FISHERMEN'S requests the non-lethal taking of a small number of marine mammals and sea turtles pursuant to Section 101(a)(5) of the MMPA to authorize the potential non-lethal incidental takes by Level B harassment during the construction of the 20MW Offshore Wind Energy Project for a period of sixty (60) days between June 1, 2012 and July 30, 2012. The pile-driving activities outlined in Section 1.0 have the potential to take marine mammals or sea turtles by harassment. Takes by harassment will potentially result when marine mammals or sea turtles near the pile-driving are exposed to pulsed sounds generated by the hammers striking the foundations. The effects will depend on the marine mammal or sea turtle species, the behavior of the animal at the time of reception of the stimulus, and the distance and level of the received sound. No take by serious injury or lethal takes are anticipated given the nature of the operations and the mitigation measures that are planned.

The Minerals Management Service (MMS) Environmental Assessment (EA) conducted for the *Issuance of Leases for Wind Resource Data Collection on the Outer Continental Shelf Offshore Delaware and New Jersey* (MMS, 2009) and associated Biological Assessment (BA) (MMS, 2008) for MMS Lease Number OCS-A-0475, concluded that noise generated from pile-driving activities would result in minimal to negligible behavioral harassment and would not result in injury, death, or population level effects to marine mammals or sea turtles. The MMS specifically concluded that because of the limited location and duration of pile-driving activities, it is expected that few individuals would be present within the project area and that marine mammals and sea turtles would likely leave the immediate vicinity of pile-driving. Furthermore, the implementation of mitigation and monitoring measures would minimize or eliminate the potential harmful effects on marine mammals and sea turtles (MMS, 2009). A NMFS May 14, 2009 response (NOAA, 2009) to the MMS request for consultation pursuant to the ESA had determined that a 1,000-meter radius safety exclusion zone monitored by marine mammal observers, when coupled with start-up and shut-down procedures based on species presence and movement, would result in no listed whale (or sea turtles) to be exposed to any noise greater than 160 dB. A preliminary exclusion zone for marine mammals and sea turtles of 1000 meters will be established around each pile driving site in order to reduce the potential for serious injury or mortality of these species. Once pile driving begins, the actual generated sound levels will be measured and a new exclusion zone may be proposed based on the results of these field-verified measurements. This new exclusion zone will be based on the field inputs calculating the actual distance from the pile driving source where underwater sound levels are anticipated to equal or exceed 160 dB re 1 µPa rms (impulse). Any new exclusion zone radius will be based on the most conservative measurement (i.e., the largest safety zone configuration), include an additional 'buffer' area extending out of the 160 dB zone and will be submitted to NMFS and the USACOE before implementing. Once approved, this zone will be used for all subsequent pile driving and will be periodically re-evaluated based on the regular sound monitoring described in the Field Verification of Exclusion Zone section. Based on this information, listed species are not likely to be exposed to levels of construction-related noise that will result in injury or disturbance, and any acoustic effects of the proposed activities will be insignificant and discountable.

6.0 NUMBERS OF MARINE MAMMALS AND SEA TURTLES THAT MIGHT BE TAKEN

As discussed in Section 3.1, the results of (1) the 24-month EBS study conducted from January 2008 through December 2009 (NJDEP, 2010), (2) the marine mammal and sea turtle observations performed concurrently with geophysical and geotechnical surveys over eight months from May through August 2010 (**Appendix B**), and (3) the marine wildlife surveys performed to date as part of the one-year pre-construction monitoring (**Appendix C**), the bottlenose dolphin, humpback whale, fin whale, harbor porpoise, harbor seal, minke whale, and loggerhead turtle were the only marine mammal/sea turtle species observed in the project area (GMI and Curry & Kerlinger, 2011b). The data from the pre-construction survey between May 2010 and May 2011 (GMI and Curry & Kerlinger, 2011b) reported the following numbers of marine mammals and sea turtles in the project area:

- 260 bottlenose dolphins
- 3 humpback whales
- 2 fin whales
- 1 minke whale
- 2 harbor seals
- 5 harbor porpoise
- 1 loggerhead turtle

These numbers were used as a site-specific density estimate for the project area over a 12-month (365-day) period. Six days of pile driving equates to approximately 0.02 or 2% of the year. This proportion was then used to estimate the realistic number of non-lethal takes of the above species to arrive at the following take estimate resulting from the FISHERMEN'S project:

- 5 bottlenose dolphins

Furthermore, the number of individuals observed in the 12-month pre-construction monitoring survey encompasses the entire survey area of approximately 24 square nautical miles, whereas the area occupied by the exclusion zones will be significantly less, approximately 5 square nautical miles.

7.0 EFFECTS TO MARINE MAMMAL SPECIES OR STOCKS

Consideration of negligible impact is required for the NMFS to authorize the incidental take of marine mammals and sea turtles. In 50 CFR § 216.103, the NMFS defines negligible impact to be "an impact resulting from a specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stocks (of marine mammals or sea turtles) through effects on annual rates of recruitment or survival." Based upon best available data regarding the marine mammal and sea turtle species that are likely to occur in the FISHERMEN'S project area, the exposure to marine mammal and sea turtle species and stocks due to the implementation of this project would result in short-term minimal effects and would not likely affect the overall annual recruitment or survival of the species for the following reasons:

1. The potential acoustic exposures from FISHERMEN'S pile-driving activities are within the non-injurious behavioral effects zone (Level B harassment).
2. The potential for take as estimated in Section 6.0 represent conservative estimates of harassment based upon worst-case construction scenarios without taking into consideration the ameliorative effects of standard mitigation and monitoring measures.
3. The protective measures as described in Sections 11.0 and 13.0 will effectively minimize the potential for Level A interactions with marine mammals and sea turtles.

This conclusion is further supported by the finding of the MMS EA and BA conducted for the *Issuance of Leases for Wind Resource Data Collection on the Outer Continental Shelf Offshore Delaware and New Jersey* (MMS, 2008, 2009; also see Section 5.0) that determined impacts to marine mammals and sea turtles resulting from pile-driving activities would be short-term and consist of minimal to negligible behavioral harassment effects. The MMS further notes that marine mammals and sea turtles are mobile and are expected to quickly leave an area when pile driving is initiated. In addition, MMS acknowledges that while pile driving may disturb more than one individual, short-term construction activities are not expected to result in population-level effects and individuals would likely return to normal behavioral patterns after pile driving has ceased or after the animal has left the construction area (MMS, 2008; 2009).

8.0 MINIMIZATION OF ADVERSE EFFECTS TO SUBSISTENCE USES

There are no traditional subsistence hunting areas in the FISHERMEN'S project area.

9.0 EFFECTS TO MARINE MAMMALS AND SEA TURTLES FROM LOSS OR MODIFICATION TO HABITAT AND THE LIKELIHOOD OF RESTORATION

The project involves activities that will disturb the sea floor which will affect benthic communities, which in turn can cause effects to marine mammals and sea turtles by reducing the numbers or altering the composition of the species assemblages associated with sustaining marine mammal and sea turtle food sources. The activities that may affect the sea floor and result in the loss of foraging resources for marine mammals and sea turtles include the following:

- Submarine electric cable installation
- Foundation installation
- Anchoring of vessels
- Scour protection installation

These effects may be divided into two categories, (1) loss of benthic resources and habitat, and (2) habitat shift.

9.1 LOSS OF BENTHIC RESOURCES AND HABITAT

Implementation of the project will result in both temporary disturbance and permanent loss of benthic habitat. The effects to benthic resources and habitat will be limited to the area within the project footprint and along the cable route where sediment disturbing activities will occur.

The installation of the submarine electric cable will result in temporary impacts to approximately 3.7 acres. This area estimate accounts for the 5-foot wide trench that will be jetted in-between the nearly 3.4 mile long turbine string and along a portion of cable route that runs from the turbines to the change over point, approximately 1,600 feet off shore, where HDD will then be employed. In contrast, the Cape Wind project will result in temporary impacts to 866 acres.

The jetting process will affect benthic resources and habitat in the following two ways: (1) entrainment of microorganisms and (2) displacement or burial of other benthic resources (NMFS, 2010). This is likely to result in a temporary loss of forage items and a temporary reduction in the amount of benthic habitat available for foraging marine mammals and sea turtles, or marine mammal and sea turtle prey resources that are dependent upon benthic resources.

Egg and larval stages of demersal species would experience some mortality due to burial. The temporary displacement of benthic habitats is also likely to result in the mortality and/or dispersal of other benthic organisms in the footprint of the construction activities. However, as reported for Cape Wind, since the jetting and cable laying process occurs very slowly (less than 1 knot), most mobile organisms (e.g. crabs, finfish) are likely to be able to avoid the area where the jet plow is occurring (NMFS, 2010). The cable route has been designed to avoid submerged aquatic vegetation (SAV), therefore effects to SAV are not anticipated.

Impacts associated with cable installation, vessel anchoring, anchor line sweep, and the pontoon on the jet plow device would be temporary and localized. Impacts from anchor line sweep would primarily affect the sediments to a depth of between 3 and 6 inches. Anchoring locations would have disturbances to the sediment to a depth of 4 to 6 feet at each anchor deployment, leaving a temporary irregularity to the seafloor with a localized mortality of infauna (NMFS, 2010). Jet plow embedment would directly disturb sediments to a depth of approximately 9 feet.

In the Biological Opinion of the Cape Wind project, the NMFS report that modeling was presented by BOEM in the Draft Environmental Impact Statement (DEIS) which estimated seabed scar recovery from jet plow cable burial operations, using the assumption that 3 percent of the sediments in the jetted cross section could be injected back into the water column and that the coarse sediment column is returned to the trench (NMFS, 2010). Based on bedload transport rates for Horseshoe Shoal and throughout Nantucket Sound, recovery rates for jetting scars along the cable route were estimated to be between 0.2 and 38 days. These modeling findings can be appropriately extrapolated to the FISHERMEN'S project area to the extent that it is expected that seabed scars will be filled in given time through wave action and sedimentation. Recovery will be even quicker if a storm event occurs.

While there is likely to be some direct and indirect loss of marine mammal and sea turtle forage items, the amount of habitat affected represents a very small percentage of the available foraging habitat in the Project area. As reported in the Cape Wind Biological Opinion (NMFS, 2010) marine mammals and sea turtles may temporarily shift their foraging efforts to other areas within or around the Project area. While this would affect the movements of individual marine mammals and sea turtles, it is likely to be temporary and is not likely to affect the ability of the marine mammal or sea turtle to find adequate nourishment or result in any injury or mortality.

The installation of the foundations and associated scour protection will result in the permanent loss of approximately 0.16 acres of benthic habitat; however, the loss of this habitat is not likely to have a measurable adverse impact on normal marine mammal and sea turtle foraging activity. The total impacted area represents less than 1% of the nearly 30 acres of similar bottom habitat in the Project area. This acreage, even when added to the acreage of the proposed submarine electric cable of 3.7 acres, results in a total footprint of approximately 3.86 acres, which is significantly smaller than the 866-acre footprint of the permitted Cape Wind project (NMFS, 2010). Similar to the discussion above, marine mammals and sea turtles are likely to find suitable foraging habitat in alternate areas nearby, and any effects from the permanent loss of habitat resulting from the proposed project will be offset by the addition of vertical habitat from the foundation structure and the increase in heterogeneous habitat offered by the scour protection.

9.2 HABITAT SHIFT

The presence of six foundations and associated scour protection in the Project area has the potential to shift the area immediately surrounding each foundation from sediment and open water habitat to a structure-oriented system. This may create localized changes, namely the establishment of "fouling communities" within the Project area and an increased availability of shelter among the foundations (NMFS, 2010). The foundations will represent a source of new substrate with vertical orientation in an area that has a limited amount of such habitat, and as such may attract finfish and benthic organisms, potentially affecting marine mammals and sea turtles by causing changes to prey distribution and/or abundance.

Although the foundations and scour protection would create additional attachment sites for benthic organisms that require fixed substrates, and this may attract certain finfish, the additional amount of surface area being introduced would be a minor addition to the hard substrate that is already present. This small amount of additional surface area in relation to the total Project area is not expected to alter the species composition in the Project area. While the increase in structure and localized alteration of species distribution around the foundations may affect the localized movement of marine mammals and sea turtles, and provide additional sheltering and foraging opportunities, these effects are beneficial or insignificant.

The National Fishing Enhancement Act of 1984 called for the development of a National Artificial Reef Plan which was adopted in 1985. The Plan stressed the function of the materials used for reef development and their compatibility, durability and stability to provide habitat for small organisms, attaching epifauna and larger species that are important for recreational and commercial fisheries. The foundations and scour protection meet those criteria and will create additional habitat for marine fish and invertebrates.

10.0 THE EFFECTS OF HABITAT LOSS OR MODIFICATION ON MARINE MAMMALS AND SEA TURTLES

As discussed in Section 9.0, given the relatively small footprint of the FISHERMEN'S project, the increase in vertical and heterogeneous habitat at each foundation, the temporary nature of the disturbance resulting from the cable installation, the deep burial of the submarine electric cable, and the ability of the sea floor environment to return to pre-disturbance conditions, it is reasonable to conclude that effects to marine mammals and sea turtles from loss or modification of habitat will be insignificant or discountable.

11.0 MEANS OF EFFECTING THE LEAST PRACTICABLE IMPACT UPON AFFECTED SPECIES OR STOCKS, THEIR HABITAT AND THEIR AVAILABILITY FOR SUBSISTENCE USES

FISHERMEN'S has committed to a comprehensive set of mitigation measured during pile driving. These measures include the following:

- Safety exclusion zone implementation
- Field verification of the safety zone
- Visual monitoring program
- Ramp-up procedures
- Shut-down procedures
- Time-of-Day restrictions

Section 13.0 provides more detailed information about the mitigation, monitoring, and reporting procedures that are an integral part of the planned activities.

12.0 THE EFFECTS OF PILE-DRIVING ACTIVITIES OFF THE COAST OF NEW JERSEY ON SPECIES OR STOCK OF MARINE MAMMALS AND SEA TURTLES AVAILABLE FOR ARCTIC SUBSISTENCE USES

Potential impacts to species or stocks of marine mammals or sea turtles will be limited to individuals located in the Northeast Region of the United States, and will not include Arctic marine mammals. Given that the FISHERMEN'S project is not located in Arctic waters, the activities associated with the 20 MW Offshore Wind Energy Project will not have an adverse effect on the availability of marine mammals for subsistence uses allowable under the MMPA.

13.0 MONITORING AND REPORTING

This section outlines the specific mitigation, monitoring, and reporting measures to minimize or eliminate potential impacts to marine mammals and sea turtles. They are divided into the following five sections: (1) those required during all phases of the project; (2) those required during pre-construction site assessment; (3) those required during construction; (4) those required during operation and maintenance; and (5) those required during decommissioning.

13.1 REQUIREMENTS FOR ALL PHASES OF THE PROJECT

As noted in Section 2.3 of the DEIS, the construction phase of the proposed action will temporarily increase the number of vessels within the vicinity of the construction area. This increased traffic will occur between the Beckett Street Terminal and the project area for large vessels, with some increase in traffic between Atlantic City and the construction site for smaller vessels. Vessels delivering construction materials or crews to the site will also be present in the area between the mainland and the project area. The barges, tugs and vessels delivering construction materials generally will travel at speeds well below 10 knots (18.5 km/h) (most barge and jack up traffic will travel at about 5 knots) and may range in size from 90 to 400 ft (27.4 to 122 m), while the vessels carrying construction crews will be traveling at a about 21 knots (39 km/h) and will typically be 50 ft to 80 (15 to 17 m) in length. During construction phase some of the personnel carrier vessels will have propellers, but the permanent service vessel is currently planned to be outfitted with water jet drives, rather than propellers.

The following specific measures are meant to reduce the potential for vessel harassments or collisions with marine mammals and sea turtles during all phases of the project.

1. All vessels associated with the construction, operation, maintenance, and decommissioning of the project will be required to abide by (1) the NMFS Northeast Regional Viewing Guidelines, as updated through the life of the project:
   (http://www.nmfs.noaa.gov/pr/pdfs/education/viewing_northeast.pdf)
   and (2) the MMS Gulf of Mexico Region's Notice to Lessee (NTL) No. 2007-G04:
   (http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g04.pdf)
2. All vessel operators must undergo training to ensure they are familiar with the above requirements. These training requirements must be written into any contractor agreements.

3. All construction related vessels will transit at speeds of 10 knots or less, regardless of the time of year.
4. Smaller maintenance support vessels, will operate at speeds not exceeding 24 knots.

13.2 REQUIREMENTS DURING PRE-CONSTRUCTION SITE ASSESSMENT GEOPHYSICAL AND GEOTECHNICAL SURVEYS

As previously discussed, **Appendix A** presents a copy of the NMFS Letter of Concurrence received by FISHERMEN'S for the pre-construction geophysical and geotechnical surveys, which indicates that the taking of marine mammals and sea turtles is not likely to occur.

13.3 REQUIREMENTS DURING CONSTRUCTION

Acoustic harassment from construction activities holds the greatest potential for disturbance and impacts to marine mammals and sea turtles. Section 1.2 of this IHA request describes the noise hazards associated with pile driving in detail. FISHERMEN'S proposes the following specific measures to reduce or eliminate the potential for adverse impacts on marine mammals and sea turtles during the construction phase of the project:

- *Pre-Construction Briefing:* Prior to the start of construction, a briefing will be held between the construction supervisors and crews, the marine mammal observer(s) (see further below), and FISHERMEN'S. The purpose of the briefing will be to establish responsibilities of each party, define the chains of command, discuss communication procedures, provide an overview of monitoring purposes, and review operational procedures. The Resident Engineer will have the authority to stop or delay any construction activity, if deemed necessary. New personnel will be briefed as they join the work in progress.

- *Requirements for Pile Driving:* The following measures will be implemented during the conduct of pile driving activities related to turbine foundations:

    - <u>Establishment of Exclusion Zone:</u> A preliminary exclusion zone for marine mammals and sea turtles will be established around each pile driving site in order to reduce the potential for serious injury or mortality of these species. Once pile driving begins, the actual generated sound levels will be measured (see requirements below for *Field Verification* *of Zone*) and a new exclusion zone will be established based on the results of these field-verified measurements. This new exclusion zone will be based on the field inputs calculating the actual distance from the pile driving source where underwater sound levels are anticipated to equal or exceed 160 dB re 1 µPa rms (impulse). Based on the outcome of the field-verified sound levels and the calculated or measured distances as noted above, the applicant can either: (1) retain the original zone or (2) establish a new zone based on field-verified measurements demonstrating the distance from the pile driving source where underwater SPLs are anticipated to equal or exceed the received the 160 dB re 1 µPa rms (impulse). Any new exclusion zone radius must be based on the most conservative measurement (i.e., the largest safety zone configuration), include an additional 'buffer' area extending out of the 160 dB zone and be approved by BOEM and NMFS before implementing. Once approved, this zone will be used for all subsequent pile driving and will be periodically re-evaluated based on the regular sound monitoring described in the *Field Verification of Exclusion Zone* section described below.

- <u>Field Verification of Exclusion Zone:</u> Field verification of the exclusion zone will take place during pile driving of the first three jacket foundations. The results of the measurements from the first three foundations can then be used to establish a new exclusion zone which is greater than or less than the original zone depending on the results of the field tests.

- Acoustic measurements will take place during the driving of the last half (deepest segment) for any given jacket foundation leg. One reference location will be established at a distance of 100 m (328 ft) from the pile driving. Sound measurements will be taken at the reference location at two depths (a depth near the mid-water column and a depth near the bottom of the water column but at least 1 m (3 ft) above the bottom) during the driving of the last half (deepest segment) for any given jacket leg. Two additional in-water spot measurements will be conducted at appropriate depths (near mid water column), generally 500 m (1,640 ft) and 750 in (2,461 ft) in two directions either west, east, south or north of the pile driving site. These will be conducted at the same two depths as the reference location measurements. In cases where such measurements cannot be obtained due to obstruction by land mass, structures or navigational hazards, measurements will be conducted at alternate spot measurement locations. Measurements will be made at other locations either nearer or farther as necessary to establish the approximate distance for the zones. Each measuring system shall consist of a hydrophone with an appropriate signal conditioning connected to a sound level meter and an instrument grade digital audiotape recorder (DAT). Overall SPLs shall be measured and reported in the field in dB re 1 μPa rms (impulse). An infrared range finder will be used to determine distance from the monitoring location to the foundation. The recorded data will be analyzed to determine the amplitude, time history and frequency content of the impulse.

- Visual Monitoring of Exclusion Zone: Monitoring of the exclusionary areas will be conducted by two qualified NMFS approved observers, each monitoring 180 degrees of the field of vision.[1]. Observers will be stationed aboard a dedicated support vessel which will also be used for supporting direct measurements of underwater sound pressure levels. During pile driving activity the vessel will patrol within the entire exclusionary zone while continuously searching for the presence of marine mammals.

  Observer(s) will begin monitoring at least 30 minutes prior to soft start of the pile driving. Pile driving will not begin until the zone is clear of all marine mammals and sea turtles for at least 30 minutes. Monitoring will continue through the pile driving period and end approximately 30 minutes after pile driving is completed.

  The driving of each piling is estimated to take 4–6 hours from first strike until target penetration is reached. During the scheduled installation period daylight conditions will exist for approximately 15 hours per day. If pile driving commences at first light it is anticipated that 3-4 pilings may be driven each day. From an engineering standpoint it is important to understand that any significant stoppage of driving progress will allow time for displaced sediments along the piling surface areas to consolidate and bind. Any attempts to restart the driving of a stopped piling may be unsuccessful and create a situation where a piling is permanently bound in a partially driven position.

[1] Observer qualifications will include direct field experience on a marine mammal/sea turtle observation vessel and/or aerial surveys in the Atlantic Ocean/Gulf of Mexico. All observers will receive NMFS-approved marine mammal observer training and be approved in advance by NMFS after a review of their qualifications.

Once the driving process has started it is unlikely that any marine mammals will approach the sound source. Therefore while in the event that a pile driving task has not been completed prior to darkness (observer's threshold for detecting marine mammals) Fishermen's wishes to continue the driving of that particular pile to completion. Once completed no further driving will continue until the next morning, 30 minutes after the observers begin monitoring and declare that no marine mammals are present within the exclusionary area. Fishermen's would not initiate the driving of a new pile in later than two hours prior to sunset.

Data on all observations will be recorded based on standard marine mammal observer collection data. These data will include the following: dates and locations of construction operations; time of observation, location and weather; details of marine mammal sightings or sea turtle (e.g., species, numbers, and behavior); and details of any observed taking (behavioral disturbances or injury/mortality). Any significant observations concerning impacts on marine mammals and sea turtles will be transmitted to NMFS and BOEM within 48 hours. Any observed takes of listed marine mammals or sea turtles resulting in injury or mortality will be immediately reported to NMFS and BOEM.

- Required Mitigation Should Marine Mammals or Sea Turtles Enter the Exclusion Zone: The exclusion zone around the pile driving activity must be monitored for the presence of marine mammals and sea turtles before, during, and after any pile driving activity. The exclusion zone will be monitored for 30 minutes prior to the soft start of pile driving. If the safety radius is obscured by fog or poor visibility conditions, pile driving will not be initiated until the entire safety radius is visible for the 30 minute period. If marine mammals or sea turtles are observed within the zone during the 30 minute period and before the soft start begins, pile driving of the segment will be delayed until they move out of the area and until at least an additional 30 minutes have passed without a marine mammal or sea turtle sighting. Monitoring of the zone will continue for 30 minutes following completion of the pile driving activity.

BOEM recognizes that once the pile driving of a segment begins it cannot be stopped until that segment has reached its predetermined depth due to the nature of the sediments underlying the project area. If pile driving stops and then resumes, it would potentially have to occur for a longer time and at increased energy levels. In sum, this would simply amplify impacts to marine mammals and sea turtles, as they would endure potentially higher SPLs for longer periods of time. Jacket segment lengths and wall thickness have been specially designed so that when work is stopped between segments (but not during a single segment), the jacket tip is never resting in highly resistant sediment layers.

From an engineering standpoint it is important to understand that any significant stoppage of driving progress will allow time for displaced sediments along the piling surface areas to consolidate and bind. Any attempts to restart the driving of a stopped piling may be unsuccessful and create a situation where a piling is permanently bound in a partially driven position. It is expected that while conducting pile driving operations any marine mammals in the area will move away from the sound source. However in the event that a marine mammal is observed within the exclusionary area during pile driving operations, mammal observers will immediately report the sighting to the construction manager. Upon this notification, Fishermen's would propose that the hammer striking energy will be reduced by 50% to a "soft start" level effectively reducing the size of the exclusionary area and mammal exposure to sound energy. By maintaining pile driving at the 50% energy level, some level of momentum in piling penetration is maintained while reducing risk to marine mammals.

After decreasing pile driving energy observers will continue to monitor mammal behavior within the original exclusionary zone and determine if the mammal is moving towards or away from the area. If the mammal continues to move towards the sound source then piling operations will be halted. Any driving operations will not resume until observers reports that the original exclusionary has remained clear of marine mammals for a minimum of 30 minutes since last sighting.

- The type of hammer proposed for use during this project may be represented as the Delmag D100 diesel pile hammer. At full capacity the hammer exerts 360,000 joules of energy. At 50% power the hammer exerts approximately 180,000 joules. Referring to studies of SPL's generated by diesel hammers exerting in the range of 180,000 joules of energy, it is estimated that the peak 180 dB isopleth would be less than 100m from the source and the 160 dB isopleth would be at 950 meters range. The 180 dB RMS sound pressure level would be less than 100m from the source, the 160 dB RMS is estimated to be at approximately 300 meters.

FISHERMEN'S is fully committed to preventing 180 dB exposure to any marine mammal, and 160 dB exposure to ESA-listed species. While we have confidence that the protection and mitigation measures proposed will prevent harassments, FISHERMEN'S is committed to temporary but complete stoppage of pile driving if necessary to prevent excessive exposure to all species.

- Implementation of Soft Start: A "soft start" will be required at the beginning of each pile installation in order to provide additional protection to marine mammals and sea turtles near the project area by allowing them to vacate the area prior to the commencement of pile driving activities. The soft start requires an initial set of 3 strikes from the impact hammer at 40 percent energy with a one minute waiting period between subsequent 3-strike sets. If marine mammals or sea turtles are sighted within the exclusion zone prior to pile-driving, or during the soft start, the Resident Engineer (or other authorized individual) will delay pile-driving until the animal has moved outside the exclusion zone.

- Compliance with Equipment Noise Standards: All construction equipment will comply as much as possible with applicable equipment noise standards of the U.S. Environmental Protection Agency, and all construction equipment will have noise control devices no less effective than those provided on the original equipment.

- *Reporting for Construction Activities:* The following reports must be submitted during construction:

  - Prior to any re-establishment of the exclusion zone, a report must be provided to USACOE, NJDEP, and NMFS detailing the field verification measurements and proposal for the new exclusion zone. This includes information, such as: a fuller account of the levels, durations, and spectral characteristics of the impact and vibratory pile driving sounds; and the peak, rms, and energy levels of the sound pulses and their durations as a function of distance, water depth, and tidal cycle. Any new zone may not be implemented until BOEM and NMFS have reviewed and approved any changes.

- Weekly status reports will be provided to USACOE, and NJDEP, and NMFS that include a summary of the previous week's monitoring activities and an estimate of the number of marine mammals and sea turtles that may have been taken as a result of pile driving activities. These reports will include information, such as: dates and locations of construction operations, details of listed marine mammal and sea turtle sightings (dates, times, locations, activities, associated construction activities), and estimates of the amount and nature of marine mammal and sea turtle takings. NMFS and BOEM may reduce or increase the frequency of this reporting throughout the time period of pile driving activities dependent upon the outcome of these initial weekly reports.

- Any observed injury or mortality to a marine mammal or sea turtle must be reported to NMFS and BOEM within 24 hours of observation. Any significant observations concerning impacts on marine mammals and sea turtles will be transmitted to NMFS and BOEM within 48 hours.

- A final technical report within 120 days after completion of the pile driving and construction activities will be provided to BOEM and NMFS that provides full documentation of methods and monitoring protocols, summarizes the data recorded during monitoring, estimates the number of marine mammals and sea turtles that may have been taken during construction activities, and provides an interpretation of the results and effectiveness of all monitoring tasks.

- *Requirements for Cable Laying:* The following measures will be implemented during the conduct of cable laying activities:

  - The applicant must contact NMFS and BOEM within 24-hours of the commencement of jet plowing activities and again within 24-hours of the completion of the activity.
  - All interactions with marine mammals or sea turtles during cable laying activities must be reported to NMFS and BOEM within 24 hours.

- A final report must be submitted to NMFS and BOEM within 60 days of completing cable laying activities which summarizes the results and any takes of marine mammal and sea turtle species.

13.4 REQUIREMENTS DURING OPERATION/MAINTENANCE

Nedwell et al. (In press) measured and assessed the underwater noise and potential impacts to marine life during the construction and operations/maintenance phases of four offshore wind parks located in U.K. waters. For the operations/maintenance phase, they concluded that in general the level of underwater noise from the operation of a wind facility was very low and not above ambient levels even in close proximity to the turbines. Therefore, the underwater noise from the operation of offshore wind farms was unlikely to result in any behavioral response for the marine mammals and fish assessed in this study.

A final status report will be provided to USACOE, NJDEP, and NMFS at the conclusion of the construction of the project that includes a summary of the construction activities implanted as part of the turbine installation and cable laying. In addition, any observed injury or mortality to a marine mammal or sea turtle must be reported to NMFS and BOEM within 24 hours of observation. Any significant observations concerning impacts on marine mammals or sea turtles will be transmitted to NMFS and BOEM within 48 hours.

13.5 REQUIREMENTS DURING DECOMMISSIONING

Essentially, the decommissioning process is the reverse of the construction process (absent pile driving), and the impacts from decommissioning would likely mirror those of construction. In addition, vessel activity during decommissioning would be essentially the same as that required during construction. Therefore, the mitigation measures outlined for construction will be required.

14.0 REFERENCES

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APPENDIX A

NMFS Letter of Concurrence

APPENDIX B

Marine Mammal Observation Log Sheets

APPENDIX C

Extracted Data Report from the EBS Study

APPENDIX D

Pre-Construction Monitoring Report