DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XF119

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Site Characterization Surveys Off the Coast of New York

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; proposed incidental harassment authorization; request for comments.

SUMMARY: NMFS has received an application from Deepwater Wind, LLC, (DWW) for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to high-resolution geophysical (HRG) and geotechnical survey investigations associated with marine site characterization activities off the coast of New York in the area of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS–A 0486) (Lease Area) and along potential submarine cable routes to a landfall location in Easthampton, New York (''Submarine Cable Corridor'') (collectively the Lease Area and Submarine Cable Corridor are the Project Area). Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an IHA to DWW to incidentally take marine mammals during the specified activities.

DATES: Comments and information must be received no later than June 12, 2017.

ADDRESSES: Comments on DWW's IHA application should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910. The mailbox address for providing email comments is *itp.mccue@noaa.gov*.

Instructions: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments received electronically, including all attachments, must not exceed a 25-megabyte file size. Attachments to electronic comments will be accepted in Microsoft Word or Excel or Adobe PDF file formats only. All comments received are a part of the public record and will generally be posted to the Internet at *www.nmfs.noaa.gov/pr/permits/incidental/energy_other.htm* without change. All personal identifying information (*e.g.,* name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: Laura McCue, Office of Protected Resources, NMFS, (301) 427–8401. Electronic copies of the applications and supporting documents, as well as a list of the references cited in this document, may be obtained by visiting the Internet at: *www.nmfs.noaa.gov/pr/permits/incidental/energy_other.htm.* In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical area, the incidental, but not intentional, taking of small numbers of marine mammals provided that certain findings are made and the necessary prescriptions are established.

The incidental taking of small numbers of marine mammals shall be allowed if NMFS (through authority delegated by the Secretary) finds that the total taking by the specified activity during the specified time period will (i) have a negligible impact on the species or stock(s) and (ii) not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). Further, the permissible methods of taking, as well as the other means of effecting the least practicable adverse impact on the species or stock and its habitat (*i.e.,* mitigation) must be prescribed. Last, requirements pertaining to the monitoring and reporting of such taking must be set forth.

Where there is the potential for serious injury or death, the allowance of incidental taking requires promulgation of regulations under section 101(a)(5)(A). Subsequently, a Letter (or Letters) of Authorization may be issued as governed by the prescriptions established in such regulations, provided that the level of taking will be consistent with the findings made for the total taking allowable under the specific regulations. Under section 101(a)(5)(D), NMFS may authorize incidental taking by harassment only (*i.e.,* no serious injury or mortality), for periods of not more than one year, pursuant to requirements and conditions contained within an Incidental Harassment Authorization (IHA). The promulgation of regulations or issuance of IHAs (with their associated mitigation, monitoring, and reporting) requires notice and opportunity for public comment.

NMFS has defined ''negligible impact'' in 50 CFR 216.103 as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, we adversely affect the species or stock through effects on annual rates of recruitment or survival.

Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines ''harassment'' as: Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) 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 (Level B harassment).

Summary of Request

On December 1, 2016, NMFS received an application from DWW for the taking of marine mammals incidental to Spring 2017 geophysical survey investigations in the area of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS) lease area #OCS–A–0486 Lease Area and along potential submarine cable routes to a landfall location in Easthampton, New York (Project Area) designated and offered by the U.S. Bureau of Ocean Energy Management (BOEM), to support the development of an offshore wind project. DWW's request was for harassment only, and NMFS concurs that mortality is not expected to result from this activity, and an IHA is appropriate. NMFS determined that the application was adequate and complete on April 27, 2017.

The proposed geophysical survey activities would occur for 168 days beginning in June 2017, and geotechnical survey activities would take place in June 2017 and last for approximately 75 days. The following specific aspects of the proposed activities are likely to result in the take of marine mammals: Shallow and medium-penetration sub-bottom profiler (chirper, boomer, and sparker) used during the HRG survey, and vibracore and dynamically-positioned (DP) vessel thruster used in support of geotechnical survey activities. Take, by Level B Harassment only of individuals of 18 species of marine mammals and take by Level A harassment of 3 species is anticipated to result from the specified activities. No serious injury or mortality is expected from DWW's HRG and geotechnical surveys.

Description of the Specified Activity

Overview

DWW proposes to conduct a geophysical and geotechnical survey in the Project Area to support the characterization of the existing seabed and subsurface geological conditions in the Project Area. Surveys will include the use of the following equipment: Multi-beam depth sounder, side-scan sonar, sub-bottom profiler, vibracores, and cone penetration tests (CPTs).

Dates and Duration

HRG surveys are anticipated to commence in June 2017 and will last for approximately 168 days, including estimated weather down time. Geotechnical surveys requiring the use of the DP drill ship will take place in June 2017, at the earliest, and will last for approximately 75 days excluding weather downtime. Equipment is expected run continuously for 24 hours per day.

Specified Geographic Region

DWW's survey activities will occur in the approximately 97,498-acre Lease Area designated and offered by BOEM. The Lease Area falls within the Rhode Island Massachusetts Wind Energy Area (RI–MA WEA; Figure 1 of the IHA application) with water depths ranging from 31–45 meters (m) (102–148 feet (ft)).

Detailed Description of the Specified Activities

High-Resolution Geophysical (HRG) Survey Activities

Marine site characterization surveys will include the following HRG survey activities:

- Depth sounding (multibeam depth sounder) to determine water depths and general bottom topography;
- Seafloor imaging (sidescan sonar survey) to classify seabed sediment, and to identify natural (*e.g.* hard bottom substrate) and man-made acoustic targets (*e.g.* archeological or cultural objects) resting on the bottom as well as any anomalous natural seafloor features;
- Shallow penetration sub-bottom profiler (chirp) to map the near surface stratigraphy (top 0–5 meter (m) soils below seabed);
- Medium penetration sub-bottom profiler (boomer) to map deeper subsurface stratigraphy as needed (soils down to 75–100 m below seabed;
- Medium penetration sub-bottom profiler (sparker) to map deeper subsurface stratigraphy as needed (soils down to 75–100 m below seabed); and
- Marine magnetometer for the detection and mapping of all sizes of ferrous objects, including anchors, chains, cables, pipelines, ballast stone and other scattered shipwreck debris, munitions of all sizes (UXO), aircraft, engines and any other object with magnetic expression.

The HRG surveys are scheduled to begin, in June, 2017. Table 1 identifies the representative survey equipment that is being considered in support of the HRG survey activities. The make and model of the listed HRG equipment will vary depending on availability but will be finalized as part of the survey preparations and contract negotiations with the survey contractor. The final selection of the survey equipment will be confirmed prior to the start of the HRG survey program. Only the make and model of the HRG equipment may change, not the types of equipment or the addition of equipment with characteristics that might have effects beyond (*i.e.,* resulting in larger ensonified areas) those considered in this proposed IHA. None of the proposed HRG survey activities will result in the disturbance of bottom habitat in the Project Area; however, the geotechnical surveys may temporarily disrupt the bottom habitat during vibracoring or CPTs. The impacts to the impact are expected to be negligible (see *Potential Effects of the Specified Activity on Marine Mammals and their Habitat* section).

TABLE 1—SUMMARY OF REPRESENTATIVE DWW GEOPHYSICAL AND GEOTECHNICAL SURVEY EQUIPMENT

Equipment	Operating frequencies	Source level	Source depth	Beam width (degrees)	Pulse duration
Multibeam Depth Sounding					
Reson SeaBat 7125 Multibeam Echosounder.	200 kHz or 400 kHz	220 dB_{RMS}	4m below surface	0.5° beam by 128° coverage.	0.03 to 0.3 milliseconds (ms).
Reson Multibeam Echosounder (7125).[1]	200 kHz or 400 kHz	221 dB_{RMS}	1 meter below surface.	128°	30–300 µs.
RESON 7000[1]	200 & 400 kHz	162 dB_{RMS}	2–5m below surface.	140°	0.33 ms.
R2SONIC	200 & 400 kHz	162 dB_{RMS}	1 meter below surface.	1°'28	0.11 ms.
Shallow Sub-bottom Profiling (chirp)					
Teledyne Benthos Chirp III Sub-bottom Profiler.	2–7 kHz	217 dB_{RMS}	4m below surface	45°	0.2 ms.
EdgeTech Full-Spectrum (Chirp) Ssub-bottom Profiler Equipped with a SB216 Tow Vehicle.	2–16 kHz	140–180 dB (peak SPL, dB re 1µPa).	0.5–1 meter distance from transducer.	170°	45 to 120 ms.
Medium Penetration Sub-bottom Profiling (boomer)					
Applied Acoustics (Fugro provided specs for Fugro boomer).	0.1–10 kHz	175 dB_{RMS}	1–2m below surface.	60°	58 ms.

TABLE 1—SUMMARY OF REPRESENTATIVE DWW GEOPHYSICAL AND GEOTECHNICAL SURVEY EQUIPMENT—Continued

Equipment	Operating frequencies	Source level	Source depth	Beam width (degrees)	Pulse duration
Applied Acoustics high-resolution (S-Boom System) medium penetration sub-bottom profiling system consisting of a CSP–D 2400HV power supply and 3-plate catamaran (600 joules/pulse).	0.250–8 kHz	222dB (re 1μPa at 2 meters).	0.5 meter below surface.	25°–35°	300–500 μs.
Medium Penetration Sub-bottom Profiling (sparker)					
800 Joule GeoResources Sparker	0.75–2.75 kHz	213 dB_{RMS} (186 dB_{SEL} for 1,000 Joul*).	4m below surface	omni directional 360°.	0.1 to 0.2 ms.
Applied Acoustics 100–1,000 joule Dura-Spark 240 System.	0.03 to 1.2 kHz	213 dB_{RMS} 186 dB_{SEL} for 1,000 Joul*.	0.5–1m below surface.	omni directional 360.	0.5–1.5 ms.
Side Scan Sonar					
EdgeTech 4200 Dual Frequency Side Scan Sonar System.	300 kHz and 900 kHz	215–220 dB	5–10m above seafloor.	horizontal 300 kHz: 0.5°; 900 kHz: 0.2° vertical (50°) l.	300 kHz up to 12 ms; 900 kHz up to 3 ms.
Side Scan Sonar: EdgeTech 4000[2] (spec provided for 4125).	410 kHz	225 dB_{RMS}	5–10m above seafloor.	400 kHz: 0.4°	10–20 ms.
EdgeTech 4200 Dual Frequency side scan sonar system.	300 kHz; 600 kHz	215–220 dB	5–10m above seafloor.	horizontal 300 kHz: 0.5°, 600 kHz: 0.26° vertical (50°).	300 kHz up to 12 ms; 600 kHz up to 5 ms.
Magnetometer (No sound is generated)					
G–882 Marine Magnetometer (self-oscillating split-beam nonradioactive cesium vapor).	N/A	N/A	N/A	highest sensitivity at 0.004 nT/ÖHz.	N/A.
SeaSPY	N/A	N/A	N/A	highest sensitivity at 0.01 nT/ÖHz.	N/A.
Vibracores					
Alpine Model P pneumatic Vibracore System3.	Unknown	Unknown	Seabed to 20ft above seabed.	omni directional 360.	duration of core.
Vibracore Operations: HPC or Rossfelder Corer4.	10–20 kHz	185 dB_{RMS}	46 meters	n/a	n/a.
CPTs					
Serafloor deployed 200kN CPT Rig	Unknown	Unknown	Seabed	omnidirectional 360.	duration of CPT.
Seabed CPT	n/a	n/a no effect	On seafloor	n/a	n/a.
DP Thruster System (possible during both geophysical and geotechnical surveys)					
DP Thruster/Propeller System	0.1 to 10 kHz	150 dB_{RMS}	12 m depth	Unknown	Unknown.

*BOEM, 2016, Table 10.

The HRG survey activities will be supported by a vessel approximately 100 to 200 ft in length and capable of maintaining course and a survey speed of approximately two to five knots while transiting survey lines

Given the size of the Lease Area (160,480 acres), to minimize cost, the duration of survey activities, and the period of potential impact on marine species, DWW has proposed conducting continuous HRG survey operations 24 hours per day. Based on 24-hour operations, the estimated duration of the survey activities would be approximately 168 days (including estimated weather down time).

Both NMFS and BOEM have advised that the deployment of HRG survey equipment, including the use of intermittent, impulsive sound-producing equipment operating below 200 kilohertz (kHz) (*e.g.,* sub-bottom profilers), has the potential to cause acoustic harassment to marine mammals. Based on the frequency ranges of the equipment to be used in support of the HRG survey activities (Table 1) and the hearing ranges of the marine mammals that have the potential to occur in the Lease Area during survey activities (Table 3), only the shallow and medium sub-bottom profilers (chirps, boomers, and sparkers), vibracores, and DP thruster systems fall within the established marine mammal hearing ranges and have the potential to result in Level B harassment of marine mammals.

Geotechnical Survey Activities

Marine site characterization surveys will involve the following geotechnical survey activities:

- Vibracores will be taken to determine the geological and geotechnical characteristics of the sediments; and
- Cone Penetration Testing (CPT) will be performed to determine stratigraphy and in-situ conditions of the sediments.

It is anticipated that the geotechnical surveys will take place no sooner than June 2017. Vibracore and CPT operations would utilize DP thrusters for about 60 percent of the time while holding on position and conducting the CPT or vibracore. Each CPT or vibracore would take about 15 to 30 minutes to conduct. Approximately 10 vibracores per day or 8 CPTs per day is expected, either one or the other (not both). Therefore, vibracores would run for approximately 5 hours per day assuming 10 per day at 0.5 hr per test. DP thrusters would be operating approximately 60% of the time or 3 hours per day for vibracore and 2.4 hours for CPT.

Geotechnical surveys are anticipated to be conducted from a 200-ft to 300-ft DP vessel/drill ship or a jack up barge with support of a tug boat. For purposes here, use of an approximately 200-ft to 300-ft DP vessel is assumed. All survey activities will be executed in compliance with Lease OCS–A–0486 (''Lease''), 30 CFR part 585 and the July 2015 *BOEM Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR part 585.* DP vessel thruster systems maintain their precise coordinates in waters through the use of automatic controls. These control systems use variable levels of power to counter forces from current and wind. Operations will take place over a 24-hour period to ensure cost, the duration of survey activities, and the period of potential impact on marine species are minimized. Based on 24-hour operations, the estimated duration of the geotechnical survey activities would be approximately 75 days excluding weather downtime.

Field studies conducted off the coast of Virginia (Tetra Tech, 2014) to determine the underwater noise produced by borehole drilling and CPTs confirm that these activities do not result in underwater noise levels that are harmful or harassing to marine mammals (*i.e.,* do not exceed NMFS' current Level A and Level B harassment thresholds for marine mammals). However, underwater noise produced by the thrusters associated with the DP geotechnical vessel (estimated frequency range 0.1 to 10 kHz) that will be used to support the geotechnical activities has the potential to result in Level B harassment (DONG 2016).

Proposed mitigation, monitoring, and reporting measures are described in in detail later in the document (Mitigation section and Monitoring and Reporting section).

Description of Marine Mammals in the Area of the Specified Activity

There are 36 species of marine mammals that potentially occur in the Northwest Atlantic Outer Continental Shelf (OCS) region (BOEM, 2014) (Table 2). The majority of these species are pelagic and/or northern species or are so rarely sighted that their presence in the Project Area is unlikely. Eighteen of these species are included in the take estimate for this project based on seasonal density in the Project area. The other 18 species are not included in the take request because they have low densities in the Project area, are rarely sighted there, and are considered very unlikely to occur in the area. Six marine mammal species are listed under the Endangered Species Act (ESA) and are known to be present, at least seasonally, in the waters off the Northwest Atlantic OCS: Blue whale, fin whale, humpback whale, North Atlantic right whale, sei whale, and sperm whale, of which only 5 are included in the take request (blue whales are not included). Many of these species are highly migratory and do not spend extended periods of time in a localized area. The waters off the Northwest Atlantic OC (including the Lease Area) are primarily used as a stopover point for these species during seasonal movements north or south between important feeding and breeding grounds.

Below is a description of the species that are both common in the waters of the OCS southeast of New York and have the highest likelihood of occurring, at least seasonally, in the Project Area.

Further information on the biology, ecology, abundance, and distribution of those species likely to occur in the Project Area can be found in section 4 of DWW's application, and the NMFS Marine Mammal Stock Assessment Reports (see Waring *et al.,* 2016), which are available online at: *http://www.nmfs.noaa.gov/pr/species/.*

TABLE 2—MARINE MAMMALS KNOWN TO OCCUR IN THE WATERS OFF THE NORTHWEST ATLANTIC OCS

Common name	Stock	NMFS MMPA and ESA status; strategic (Y/N) [1]	Stock abundance (CV, Nmin, most recent abundance survey) [2]	PBR [3]	Occurrence and seasonality in the NW Atlantic OCS
Toothed whale (Odontoceti)					
Atlantic white-sided dolphin *(Lagenorhynchus acutus).*	W. North Atlantic	-; N	48,819 (0.61; 30,403; n/a)	304	rare.
Atlantic spotted dolphin *(Stenella frontalis).*	W. North Atlantic	-; N	44,715 (0.43; 31,610; n/a)	316	rare.
Bottlenose dolphin *(Tursiops truncatus).*	W. North Atlantic, Offshore	-; N	77,532 (0.40; 56,053; 2011).	561	Common year round.
Clymene Dolphin *(Stenella clymene).*	W. North Atlantic	-; N	Unknown (unk; unk; n/a)	Undet	rare.
Pantropical Spotted Dolphin *(Stenella attenuata).*	W. North Atlantic	-; N	3,333 (0.91; 1,733; n/a)	17	rare.
Risso's dolphin *(Grampus griseus).*	W. North Atlantic	-; N	18,250 (0.46; 12,619; n/a)	126	rare.
Short-beaked common dolphin *(Delphinus delphis).*	W. North Atlantic	-; N	70,184 (0.28; 55,690; 2011).	557	Common year round.
Striped dolphin *(Stenella coeruleoalba).*	W. North Atlantic	-; N	54,807 (0.3; 42,804; n/a)	428	rare.

TABLE 2—MARINE MAMMALS KNOWN TO OCCUR IN THE WATERS OFF THE NORTHWEST ATLANTIC OCS—Continued

Common name	Stock	NMFS MMPA and ESA status; strategic (Y/N) [1]	Stock abundance (CV, Nmin, most recent abundance survey) [2]	PBR [3]	Occurrence and seasonality in the NW Atlantic OCS
Spinner Dolphin *(Stenella longirostris)*.	W. North Atlantic	-; N	Unknown (unk; unk; n/a)	Undet	rare.
White-beaked dolphin *(Lagenorhynchus albirostris)*.	W. North Atlantic	-; N	2,003 (0.94; 1,023; n/a)	10	rare
Harbor porpoise *(Phocoena phocoena)*.	Gulf of Maine/Bay of Fundy	-; N	79,833 (0.32; 61,415; 2011).	706.	Common year round
Killer whale *(Orcinus orca)*	W. North Atlantic	-; N	Unknown (unk; unk; n/a)	Undet	rare.
False killer whale *(Pseudorca crassidens)*.	W. North Atlantic	-; Y	442 (1.06; 212; n/a)	2.1	rare.
Long-Finned pilot whale *(Globicephala melas)*.	W. North Atlantic	-; Y	5,636 (0.63; 3,464; n/a)	35	rare.
Short-finned pilot whale *(Globicephala macrorhynchus)*.	W. North Atlantic	-; Y	21,515 (0.37; 15,913; n/a)	159	rare.
Sperm whale *(Physeter macrocephalus)*.	North Atlantic	E; Y	2,288 (0.28; 1,815; n/a)	3.6	Year round in continental shelf and slope waters, occur seasonally to forage.
Pygmy sperm whale *(Kogia breviceps)*.	W. North Atlantic	-; N	3,785 [b] (0.47; 2,598; n/a)	26	rare.
Dwarf sperm whale *(Kogia sima)*.	W. North Atlantic	-; N	3,785 [b] (0.47; 2,598; n/a)	26	rare.
Cuvier's beaked whale *(Ziphius cavirostris)*.	W. North Atlantic	-; N	6,532 (0.32; 5,021; n/a)	50	rare.
Blainville's beaked whale *(Mesoplodon densirostris)*.	W. North Atlantic	-; N	7,092 [c] (0.54; 4,632; n/a)	46	rare.
Gervais' beaked whale *(Mesoplodon europaeus)*.	W. North Atlantic	-; N	7,092 [c] 0.54; 4,632; n/a)	46	rare.
True's beaked whale *(Mesoplodon mirus)*.	W. North Atlantic	-; N	7,092 [c] (0.54; 4,632; n/a)	46	rare.
Sowerby's Beaked Whale *(Mesoplodon bidens)*.	W. North Atlantic	-; N	7,092 [c] (0.54; 4,632; n/a)	46	rare.
Melon-headed whale *(Peponocephala electra)*.	W. North Atlantic	-; N	Unknown (unk; unk; n/a)	Undet	rare.
Baleen whales (Mysticeti)					
Minke whale *(Balaenoptera acutorostrata)*.	Canadian East Coast	-; N	2,591 (0.81; 1,425; n/a)	162	Year round in continental shelf and slope waters, occur seasonally to forage.
Blue whale *(Balaenoptera musculus)*.	W. North Atlantic	E; Y	Unknown (unk; 440; n/a)	0.9	Year round in continental shelf and slope waters, occur seasonally to forage.
Fin whale *(Balaenoptera physalus)*.	W. North Atlantic	E; Y	1,618 (0.33; 1,234; n/a)	2.5	Year round in continental shelf and slope waters, occur seasonally to forage.
Humpback whale *(Megaptera novaeangliae)*.	Gulf of Maine	-; N	823 (0; 823; n/a)	2.7	Common year round.
North Atlantic right whale *(Eubalaena glacialis)*.	W. North Atlantic	E; Y	440 (0; 440; n/a)	1	Year round in continental shelf and slope waters, occur seasonally to forage.
Sei whale *(Balaenoptera borealis)*.	Nova Scotia	E; Y	357 (0.52; 236; n/a)	0.5	Year round in continental shelf and slope waters, occur seasonally to forage.
Earless seals (Phocidae)					
Gray seals *(Halichoerus grypus)*.	North Atlantic	-; N	505,000 (unk; unk; n/a)	Undet	Unlikely.

TABLE 2—MARINE MAMMALS KNOWN TO OCCUR IN THE WATERS OFF THE NORTHWEST ATLANTIC OCS—Continued

Common name	Stock	NMFS MMPA and ESA status; strategic (Y/N)[1]	Stock abundance (CV, Nmin, most recent abundance survey)[2]	PBR[3]	Occurrence and seasonality in the NW Atlantic OCS
Harbor seals *(Phoca vitulina)*.	W. North Atlantic	-; N	75,834 (0.15; 66,884; 2012).	2,006	Common year round.
Hooded seals *(Cystophora cristata)*.	W. North Atlantic	-; N	Unknown (unk; unk; n/a)	Undet	rare.
Harp seal *(Phoca groenlandica)*.	North Atlantic	-; N	Unknown (unk; unk; n/a)	Undet	rare.

[1] ESA status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR (see footnote 3) or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

[2] CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance. In some cases, CV is not applicable. For certain stocks, abundance estimates are actual counts of animals and there is no associated CV. The most recent abundance survey that is reflected in the abundance estimate is presented; there may be more recent surveys that have not yet been incorporated into the estimate. All values presented here are from the 2016 draft Atlantic SARs.

[3] Potential biological removal, defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population size (OSP).

North Atlantic Right Whales

The western North Atlantic stock of this species ranges from the calving grounds in the southeastern United States to feeding grounds in New England waters and into Canadian waters (Waring *et al.,* 2015). Surveys have demonstrated the existence of seven areas where western North Atlantic right whales congregate seasonally, including north of the action area off Georges Bank, Cape Cod, and Massachusetts Bay (Waring *et al.,* 2015). In the late fall months (*e.g.* October), right whales generally disappear from the feeding grounds in the North Atlantic and move south to their breeding grounds. Average group size for this stock was between 2.9 and 5.5 animals, with a maximum group size estimate during the project dates of 3.8 individuals (Parks *et al.,* 2007c).

The current abundance estimate for this stock is 440 individuals with PBR at 1 individual (Waring *et al.,* 2016). This stock is listed as endangered under the ESA and is therefore considered strategic and depleted under the MMPA. Critical habitat for this stock is a designated habitat that includes portions of Cape Cod Bay and Stellwagen Bank, the Great South Channel (each off the coast of Massachusetts), and waters adjacent to the coasts of Georgia and the east coast of Florida. These areas were determined to provide critical feeding, nursery, and calving habitat for the North Atlantic population of northern right whales. This critical habitat was revised in 2006 to include two foraging areas in the North Pacific Ocean—one in the Bering Sea and one in the Gulf of Alaska (71 FR 38277, July 6, 2006).

Humpback Whales

Humpback whales are found worldwide in all oceans. In the western North Atlantic, humpback whales feed during spring, summer, and fall over a geographic range encompassing the eastern coast of the United States (including the Gulf of Maine), and farther north into Canadian waters. In the winter, they migrate to lower latitudes to breed. However, acoustic recordings made in Stellwagen Bank National Marine Sanctuary in 2006 and 2008 detected humpback song in almost all months, including throughout the winter, which confirms the presence of male humpback whales in the area (a mid-latitude feeding ground) through the winter in these years (Waring *et al.,* 2015). Their distribution in New England waters has been largely correlated to abundance of prey species.

The current abundance estimate for this stock is 823 animals with PBR at 1.3 (Waring *et al.,* 2016). Commercial exploitation caused the population to decrease in the 20th century. This stock is characterized by a positive trend in size (Waring *et al.,* 2015). Although recent estimates of abundance indicate a stable or growing humpback whale population, the stock may be below optimum substainable population (OSP) in the U.S. Atlantic EEZ. The main threat to this stock is interactions with fisheries and vessel collisions. This stock is not listed under the ESA but is considered strategic under the MMPA.

Fin Whale

Fin whales are common in waters of the U. S. Atlantic Exclusive Economic Zone (EEZ), principally from Cape Hatteras northward (Waring *et al.,* 2016). Fin whales are present north of 35-degree latitude in every season and are broadly distributed throughout the western North Atlantic for most of the year (Waring *et al.,* 2016). This area (east of Montauk Point) represents a major feeding ground for fin whales from March through October. Fin whales are found in small groups of up to 5 individuals (Brueggeman *et al.,* 1987).

The current abundance estimate for the western North Atlantic stock of fin whales is 1,618 with PBR at 2.5 animals (Waring *et al.,* 2016). This stock is listed as endangered under the ESA resulting in strategic and depleted status under the MMPA. The main threats to this stock are fishery interactions and vessel collisions (Waring *et al.,* 2016).

Sei Whale

The Nova Scotia stock of sei whales can be found in deeper waters of the continental shelf edge waters of the northeastern U.S. and northeastward to south of Newfoundland. The southern portion of the species' range during spring and summer includes the Gulf of Maine and Georges Bank. Spring is the period of greatest abundance in U.S. waters, with sightings concentrated along the eastern margin of Georges Bank and into the Northeast Channel area, and along the southwestern edge of Georges Bank in the area of Hydrographer Canyon (Waring *et al.,* 2015). Sei whales occur in shallower waters to feed.

The current abundance estimate for this stock is 357 animals with PBR at 0.5 (Waring *et al.,* 2016). This stock is listed as engendered under the ESA and is considered strategic and depleted under the MMPA. The main threats to this stock are interactions with fisheries and vessel collisions.

Minke Whale

Minke whales can be found in temperate, tropical, and high-latitude waters. The Canadian East Coast stock can be found in the area from the western half of the Davis Strait (45° W.) to the Gulf of Mexico (Waring *et al.,* 2016). This species generally occupies waters less than 100 m deep on the continental shelf. There appears to be a strong seasonal component to minke whale distribution in which spring to fall are times of relatively widespread and common occurrence, and when the whales are most abundant in New England waters, while during winter the species appears to be largely absent (Waring *et al.,* 2016).

The current abundance estimate for this stock is 2,591 animals with PBR at 162 (Waring *et al.,* 2016). The main threats to this stock are interactions with fisheries, strandings, and vessel collisions. This stock is not listed under the ESA and is not considered strategic under the MMPA.

Sperm Whale

The distribution of the sperm whale in the U.S. EEZ occurs on the continental shelf edge, over the continental slope, and into mid-ocean regions (Waring *et al.,* 2014). The basic social unit of the sperm whale appears to be the mixed school of adult females plus their calves and some juveniles of both sexes, normally numbering 20–40 animals in all. There is evidence that some social bonds persist for many years (Christal *et al.,* 1998). This species forms stable social groups, site fidelity, and latitudinal range limitations in groups of females and juveniles (Whitehead 2002). In summer, the distribution of sperm whales includes the area east and north of Georges Bank and into the Northeast Channel region, as well as the continental shelf (inshore of the 100-m isobath) south of New England. In the fall, sperm whale occurrence south of New England on the continental shelf is at its highest level, and there remains a continental shelf edge occurrence in the mid-Atlantic bight. In winter, sperm whales are concentrated east and northeast of Cape Hatteras.

The current abundance estimate for this stock is 2,288 with PBR at 3.6 animals (Waring *et al.,* 2016). This stock is listed as endangered under the ESA and is considered depleted and a strategic stock under the MMPA. The main threat to this species is interactions with fisheries.

False Killer Whale

False killer whales can be found in warm temperate and tropical waters, and have been sighted in U.S. Atlantic waters from southern Florida to Maine (Waring *et al.,* 2015). This species tends to be in offshore waters but at times inhabit waters closer to shore.

The current abundance estimate for this stock is 442 animals with PBR at 2.1 (Waring *et al.,* 2016). This species is not listed under the ESA but is considered a strategic stock under the MMPA. The main threat to this species include interactions with fisheries.

Cuvier's Beaked Whale

Cuvier's beaked whale distribution is poorly known. Sightings of this species have occurred principally along the continental shelf edge in the Mid-Atlantic region off the northeast U.S. coast, and most sightings were in late spring or summer.

The current abundance estimate for this stock is 6,532 animals with PBR at 50 (Waring *et al.,* 2016). This species is not listed under the ESA and is not considered strategic or depleted under the MMPA. The main threat to this species is interactions with fisheries and stranding associated with Naval activities (Waring *et al.,* 2014).

Long-Finned Pilot Whale

Long-finned pilot whales can be found from North Carolina and north to Iceland, Greenland and the Barents Sea (Waring *et al.,* 2016). In U.S. Atlantic waters this species is distributed principally along the continental shelf edge off the northeastern U.S. coast in winter and early spring and in late spring, pilot whales move onto Georges Bank and into the Gulf of Maine and more northern waters and remain in these areas through late autumn (Waring *et al.,* 2016).

The current abundance estimate for this stock is 5,636 animals with PBR at 35 (Waring et al., 2016). This species is not listed under the ESA but is considered strategic under the MMPA. The main threats to this species include interactions with fisheries and habitat issues including exposure to high levels of polychlorinated biphenyls and chlorinated pesticides, and toxic metals including mercury, lead, cadmium, and selenium (Waring *et al.,* 2016).

Atlantic White-Sided Dolphin

White-sided dolphins are found in temperate and sub-polar waters of the North Atlantic, primarily in continental shelf waters to the 100-m depth contour from central West Greenland to North Carolina (Waring *et al.,* 2016). There are three stock units: Gulf of Maine, Gulf of St. Lawrence and Labrador Sea stocks (Palka *et al.,* 1997). The Gulf of Maine population of white-sided dolphins is most common in continental shelf waters from Hudson Canyon (approximately 39° N.) to Georges Bank, and in the Gulf of Maine and lower Bay of Fundy. Sighting data indicate seasonal shifts in distribution (Northridge *et al.,* 1997). During January to May, low numbers of white-sided dolphins are found from Georges Bank to Jeffreys Ledge (off New Hampshire), with even lower numbers south of Georges Bank, as documented by a few strandings collected on beaches of Virginia to South Carolina. From June through September, large numbers of white-sided dolphins are found from Georges Bank to the lower Bay of Fundy. From October to December, white-sided dolphins occur at intermediate densities from southern Georges Bank to southern Gulf of Maine (Payne and Heinemann 1990). Sightings south of Georges Bank, particularly around Hudson Canyon, occur year round but at low densities.

The current abundance estimate for this stock is 48,819 animals with PBR at 304 (Waring *et al.,* 2016). This stock is not listed under the ESA and is not considered strategic or depleted under the MMPA. The main threat to this species is interactions with fisheries.

White-Beaked Dolphin

The white-beaked dolphin is found in waters from southern New England to southern Greenland and Davis Straits but are concentrated in the western Gulf of Maine and around Cape Cod (Waring *et al.,* 2007). They prefer waters primarily offshore on the continental shelf, possibly due to the prey species located there.

The current abundance estimate for this stock is 1,023 animals with PBR at 10 (Waring *et al.,* 2016). This species is not listed under the ESA and is not considered depleted or strategic under the MMPA. The main threat to this stock is interaction with fisheries.

Short-Beaked Common Dolphin

The short-beaked common dolphin is found world-wide in temperate to subtropical seas. In the North Atlantic, short-beaked common dolphins are commonly found over the continental shelf between the 100-m and 2000-m isobaths and over prominent underwater topography and east to the mid-Atlantic Ridge (Waring *et al.,* 2016). Only the western North Atlantic stock may be present in the Lease Area.

The current abundance estimate for this stock is 70,184 with PBR at 557 (Waring *et al.,* 2016). The main threat to this species is interactions with fisheries. This species is not listed under the ESA and is not considered strategic or depleted under the MMPA.

Atlantic Spotted Dolphin

Atlantic spotted dolphins are found in tropical and warm temperate waters ranging from southern New England, south to Gulf of Mexico and the Caribbean to Venezuela (Waring *et al.,* 2014). This stock regularly occurs in continental shelf waters south of Cape Hatteras and in continental shelf edge and continental slope waters north of this region (Waring *et al.,* 2014). There are two forms of this species, with the larger ecotype inhabiting the continental shelf and is usually found inside or near the 200 m isobaths (Waring *et al.,* 2014).

The current abundance estimate for this stock is 44,715 animals with PBR at 316 (Waring et al., 2016). This species is not listed under the ESA and is not considered depleted or strategic under the MMPA. The main threat to this species is interactions with fisheries.

Striped Dolphin

The striped dolphin is found in warm-temperate to tropical seas around the world. In the western North Atlantic, they are found from Nova Scotia to at least Jamaica and in the Gulf of Mexico with preference over continental slope waters (Waring *et al.,* 2014). In the Northeast, they are distributed along the continental shelf edge from Cape Hatteras to the southern margin of Georges Bank, and also occur offshore over the continental slope and rise in the mid-Atlantic region (Waring *et al.,* 2014). They were most often observed in waters between 20 and 27 degrees Celsius and deeper than 900 m (Waring *et al.,* 2014).

The current abundance estimate for this stock is 54,807 animals with PBR at 428 (Waring *et al.,* 2016). This stock is not listed under the ESA and is not considered a strategic or depleted stock under the MMPA. The main threat to this species is interactions with fisheries.

Common Bottlenose Dolphin

There are two distinct bottlenose dolphin morphotypes: The coastal and offshore forms in the western North Atlantic (Waring *et al.,* 2016). The offshore form is distributed primarily along the outer continental shelf and continental slope in the Northwest Atlantic Ocean from Georges Bank to the Florida Keys and is the only type that may be present in the Lease Area.

The current abundance estimate for the Western north Atlantic stock is 77,532 with PBR at 561 (Waring *et al.,* 2016). The main threat to this species is interactions with fisheries. This species is not listed under the ESA and is not considered strategic or depleted under the MMPA.

Harbor Porpoise

In the Lease Area, only the Gulf of Maine/Bay of Fundy stock may be present. This stock is found in U.S. and Canadian Atlantic waters and are concentrated in the northern Gulf of Maine and southern Bay of Fundy region, generally in waters less than 150 m deep (Waring *et al.,* 2016). They are seen from the coastline to deep waters (>1800 m; Westgate *et al.* 1998), although the majority of the population is found over the continental shelf (Waring *et al.,* 2016). Average group size for this stock in the Bay of Fundy is approximately 4 individuals (Palka 2007).

The current abundance estimate for this stock is 79,883, with PBR at 706 (Waring *et al.,* 2016). The main threat to this species is interactions with fisheries, with documented take in the U.S. northeast sink gillnet, mid-Atlantic gillnet, and northeast bottom trawl fisheries and in the Canadian herring weir fisheries (Waring *et al.,* 2016). This species is not listed under the ESA and is not considered strategic or depleted under the MMPA.

Harbor Seal

The harbor seal is found in all nearshore waters of the North Atlantic and North Pacific Oceans and adjoining seas above about 30° N. (Burns 2009). In the western North Atlantic, they are distributed from the eastern Canadian Arctic and Greenland south to southern New England and New York, and occasionally to the Carolinas (Waring *et al.,* 2016). Haulout and pupping sites are located off Manomet, MA and the Isles of Shoals, ME, but generally do not occur in areas in southern New England (Waring *et al.,* 2016).

The current abundance estimate for this stock is 75,834, with PBR at 2,006 (Waring et al., 2016). The main threat to this species is interactions with fisheries. This species is not listed under the ESA and is not considered strategic or depleted under the MMPA.

Gray Seal

There are three major populations of gray seals found in the world; eastern Canada (western North Atlantic stock), northwestern Europe and the Baltic Sea. The gray seals that occur in the Project Area belong to the western North Atlantic Stock, which ranges from New Jersey to Labrador. Current estimates of the total western North Atlantic gray seal population are not available, although portions of stock have been calculated for select time periods. Models estimate that the total minimum Canadian gray seal population is at 505,000 individuals (Waring *et al.,* 2016). Present data are insufficient to calculate the minimum population estimate for U.S. waters; however, based on genetic analyses from the Canadian and U.S. populations, all individuals were placed into one population providing further evidence that this stock is one interbreeding population (Wood *et al.,* 2011). Current population trends show that gray seal abundance is likely increasing in the U.S. Atlantic EEZ (Waring *et al.,* 2016). Although the rate of increase is unknown, surveys conducted since their arrival in the 1980s indicate a steady increase in abundance in both Maine and Massachusetts (Waring *et al.,* 2016). It is believed that recolonization by Canadian gray seals is the source of the U.S. population (Waring *et al.,* 2016). Gray seals are not listed under the ESA, and the stock is not considered strategic or depleted under the MMPA.

Gray seals start to group up in the fall and pupping generally occurs from mid-December to early February (USFWS 2015). Monomoy NWR is the largest haul-out site for gray seals on the U.S. Atlantic seaboard (USFWS 2015). Gray seals are known to use Monomoy NWR and Nantucket NWR land and water year round, with higher numbers accumulating during the winter and spring when pupping and molting occur. Gray seal pupping on Monomoy NWR was limited in the past but has been increasing rapidly in recent years. By early spring, upwards of 19,000 gray seals can be found hauled out on Monomoy NWR (B. Josephson, NOAA, personal communication). While many of these seals use Monomoy NWR for breeding, others make their way to the refuge to molt. By late spring, gray seal abundance continues to taper until the fall.

Potential Effects of the Specified Activity on Marine Mammals and Their Habitat

This section includes a summary and discussion of the ways that components of the specified activity may impact marine mammals and their habitat. The ''Estimated Take'' section later in this document will include a quantitative analysis of the number of individuals that are expected to be taken by this activity. The *Negligible Impact Analyses and Determination* section will consider the content of this section, the *Estimated Take by Incidental Harassment* section, and the *Proposed*

Mitigation section, to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and how those impacts on individuals are likely to impact marine mammal species or stocks.

Background on Sound

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and is generally characterized by several variables. Frequency describes the sound's pitch and is measured in hertz (Hz) or kilohertz (kHz), while sound level describes the sound's intensity and is measured in decibels (dB). Sound level increases or decreases exponentially with each dB of change. The logarithmic nature of the scale means that each 10-dB increase is a 10-fold increase in acoustic power (and a 20-dB increase is then a 100-fold increase in power). A 10-fold increase in acoustic power does not mean that the sound is perceived as being 10 times louder, however. Sound levels are compared to a reference sound pressure (micro-Pascal) to identify the medium. For air and water, these reference pressures are ''re: 20 μPa'' and ''re: 1 μPa,'' respectively. Root mean square (RMS) is the quadratic mean sound pressure over the duration of an impulse. RMS is calculated by squaring all of the sound amplitudes, averaging the squares, and then taking the square root of the average (Urick 1975). RMS accounts for both positive and negative values; squaring the pressures makes all values positive so that they may be accounted for in the summation of pressure levels. This measurement is often used in the context of discussing behavioral effects, in part because behavioral effects, which often result from auditory cues, may be better expressed through averaged units rather than by peak pressures.

Acoustic Impacts

HRG survey equipment use and use of the vibracore and DP thruster during the geophysical and geotechnical surveys may temporarily impact marine mammals in the area due to elevated in-water sound levels. Marine mammals are continually exposed to many sources of sound. Naturally occurring sounds such as lightning, rain, sub-sea earthquakes, and biological sounds (*e.g.,* snapping shrimp, whale songs) are widespread throughout the world's oceans. Marine mammals produce sounds in various contexts and use sound for various biological functions including, but not limited to: (1) Social interactions; (2) foraging; (3) orientation; and (4) predator detection. Interference with producing or receiving these sounds may result in adverse impacts. Audible distance, or received levels of sound depend on the nature of the sound source, ambient noise conditions, and the sensitivity of the receptor to the sound (Richardson *et al.,* 1995). Type and significance of marine mammal reactions to sound are likely dependent on a variety of factors including, but not limited to, (1) the behavioral state of the animal (*e.g.,* feeding, traveling, etc.); (2) frequency of the sound; (3) distance between the animal and the source; and (4) the level of the sound relative to ambient conditions (Southall *et al.,* 2007).

When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Current data indicate that not all marine mammal species have equal hearing capabilities (Richardson *et al.,* 1995; Southall *et al.,* 1997; Wartzok and Ketten, 1999; Au and Hastings, 2008).

Animals are less sensitive to sounds at the outer edges of their functional hearing range and are more sensitive to a range of frequencies within the middle of their functional hearing range. For mid-frequency cetaceans, functional hearing estimates occur between approximately 150 Hz and 160 kHz with best hearing estimated to occur between approximately 10 to less than 100 kHz (Finneran *et al.,* 2005 and 2009, Natchtigall *et al.,* 2005 and 2008; Yuen *et al.,* 2005; Popov *et al.,* 2010 and 2011; and Schlundt *et al.,* 2011).

On August 4, 2016, NMFS released its Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NMFS, 2016; 81 FR 51694). This new guidance established new thresholds for predicting onset of temporary (TTS) and permanent (PTS) threshold shifts for impulsive (*e.g.,* explosives and impact pile drivers) and non-impulsive (*e.g.,* vibratory pile drivers) sound sources. These acoustic thresholds are presented using dual metrics of cumulative sound exposure level (SELcum) and peak sound level (PK) for impulsive sounds and SELcum for non-impulsive sounds. The lower and/or upper frequencies for some of these functional hearing groups have been modified from those designated by Southall *et al.* (2007), and the revised generalized hearing ranges are presented in the new Guidance. The functional hearing groups and the associated frequencies are indicated in Table 3 below.

TABLE 3—MARINE MAMMAL HEARING GROUPS AND THEIR GENERALIZED HEARING RANGE

Hearing group	Generalized hearing range *
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz.
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz.
High-frequency (HF) cetaceans (true porpoises, *Kogia,* river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* and *L. australis*).	275 Hz to 160 kHz.
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz.
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz.

* Represents the generalized hearing range for the entire group as a composite (*i.e.,* all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall *et al.,* 2007) and PW pinniped (approximation).

When sound travels (propagates) from its source, its loudness decreases as the distance traveled by the sound increases. Thus, the loudness of a sound at its source is higher than the loudness of that same sound a kilometer (km) away. Acousticians often refer to the loudness of a sound at its source (typically referenced to one meter from the source) as the source level and the loudness of sound elsewhere as the received level (*i.e.,* typically the receiver). For example, a humpback whale 3 km from a device that has a source level of 230 dB may only be exposed to sound that is 160 dB loud, depending on how the sound travels through water (*e.g.,* spherical spreading (6 dB reduction with doubling of distance) was used in this example). As a result, it is important to understand the difference between source levels and received levels when discussing the loudness of sound in the ocean or its impacts on the marine environment.

As sound travels from a source, its propagation in water is influenced by various physical characteristics, including water temperature, depth, salinity, and surface and bottom properties that cause refraction, reflection, absorption, and scattering of sound waves. Oceans are not homogeneous and the contribution of each of these individual factors is extremely complex and interrelated. The physical characteristics that determine the sound's speed through the water will change with depth, season, geographic location, and with time of day (as a result, in actual active sonar operations, crews will measure oceanic conditions, such as sea water temperature and depth, to calibrate models that determine the path the sonar signal will take as it travels through the ocean and how strong the sound signal will be at a given range along a particular transmission path). As sound travels through the ocean, the intensity associated with the wavefront diminishes, or attenuates. This decrease in intensity is referred to as propagation loss, also commonly called transmission loss.

As mentioned previously in this document, nine marine mammal species (seven cetaceans and two pinnipeds) are likely to occur in the Project Area. Of the seven cetacean species likely to occur in the Lease Area, four are classified as low-frequency cetaceans (*i.e.,* minke whale, fin whale, humpback whale, and North Atlantic right whale), two are classified as mid-frequency cetaceans (*i.e.,* Atlantic white-sided dolphin and short-beaked common dolphin), and one is classified as a high-frequency cetacean (*i.e.,* harbor porpoise) (Southall *et al.,* 2007). A species' functional hearing group is a consideration when we analyze the effects of exposure to sound on marine mammals.

Hearing Impairment

Marine mammals may experience temporary or permanent hearing impairment when exposed to loud sounds. Hearing impairment is classified by TTS and PTS. There are no empirical data for onset of PTS in any marine mammal; therefore, PTS-onset must be estimated from TTS-onset measurements and from the rate of TTS growth with increasing exposure levels above the level eliciting TTS-onset. PTS is presumed to be likely if the hearing threshold is reduced by ≥40 dB (that is, 40 dB of TTS). PTS is considered auditory injury (Southall *et al.,* 2007) and occurs in a specific frequency range and amount. Irreparable damage to the inner or outer cochlear hair cells may cause PTS; however, other mechanisms are also involved, such as exceeding the elastic limits of certain tissues and membranes in the middle and inner ears and resultant changes in the chemical composition of the inner ear fluids (Southall *et al.,* 2007). Given the higher level of sound and longer durations of exposure necessary to cause PTS as compared with TTS, it is considerably less likely that PTS would occur during the proposed HRG and geotechnical survey.

Temporary Threshold Shift (TTS)

TTS is the mildest form of hearing impairment that can occur during exposure to a loud sound (Kryter 1985). While experiencing TTS, the hearing threshold rises, and a sound must be stronger in order to be heard. At least in terrestrial mammals, TTS can last from minutes or hours to (in cases of strong TTS) days, can be limited to a particular frequency range, and can occur to varying degrees (*i.e.,* a loss of a certain number of dBs of sensitivity). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the noise ends.

Marine mammal hearing plays a critical role in communication with conspecifics and in interpretation of environmental cues for purposes such as predator avoidance and prey capture. Depending on the degree (elevation of threshold in dB), duration (*i.e.,* recovery time), and frequency range of TTS and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious. For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that takes place during a time when the animals is traveling through the open ocean, where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during a time when communication is critical for successful mother/calf interactions could have more serious impacts if it were in the same frequency band as the necessary vocalizations and of a severity that it impeded communication. The fact that animals exposed to levels and durations of sound that would be expected to result in this physiological response would also be expected to have behavioral responses of a comparatively more severe or sustained nature is also notable and potentially of more importance than the simple existence of a TTS.

Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin, beluga whale (*Delphinapterus leucas*), harbor porpoise, and Yangtze finless porpoise (*Neophocaena phocaenoides*)) and three species of pinnipeds (northern elephant seal (*Mirounga angustirostris*), harbor seal, and California sea lion (*Zalophus californianus*)) exposed to a limited number of sound sources (*i.e.,* mostly tones and octave-band noise) in laboratory settings (*e.g.,* Finneran *et al.,* 2002 and 2010; Nachtigall *et al.,* 2004; Kastak *et al.,* 2005; Lucke *et al.,* 2009; Mooney *et al.,* 2009; Popov *et al.,* 2011; Finneran and Schlundt, 2010). In general, harbor seals (Kastak *et al.,* 2005; Kastelein *et al.,* 2012a) and harbor porpoises (Lucke *et al.,* 2009; Kastelein *et al.,* 2012b) have a lower TTS onset than other measured pinniped or cetacean species. However, even for these animals, which are better able to hear higher frequencies and may be more sensitive to higher frequencies, exposures on the order of approximately 170 dB rms or higher for brief transient signals are likely required for even temporary (recoverable) changes in hearing sensitivity that would likely not be categorized as physiologically damaging (Lucke *et al.,* 2009). Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species. There are no data available on noise-induced hearing loss for mysticetes. For summaries of data on TTS in marine mammals or for further discussion of TTS onset thresholds, please see Finneran (2016).

Scientific literature highlights the inherent complexity of predicting TTS onset in marine mammals, as well as the importance of considering exposure duration when assessing potential impacts (Mooney *et al.,* 2009a, 2009b; Kastak *et al.,* 2007). Generally, with sound exposures of equal energy, quieter sounds (lower SPL) of longer duration were found to induce TTS onset more than louder sounds (higher SPL) of shorter duration (more similar to sub-bottom profilers). For intermittent sounds, less threshold shift will occur than from a continuous exposure with the same energy (some recovery will occur between intermittent exposures) (Kryter *et al.,* 1966; Ward 1997). For sound exposures at or somewhat above the TTS-onset threshold, hearing sensitivity recovers rapidly after exposure to the sound ends; intermittent exposures recover faster in comparison with continuous exposures of the same duration (Finneran *et al.,* 2010). NMFS considers TTS as Level B harassment that is mediated by physiological effects on the auditory system; however, NMFS does not consider TTS-onset to be the lowest level at which Level B harassment may occur.

Animals in the Project Area during the HRG survey are unlikely to incur TTS hearing impairment due to the characteristics of the sound sources, which include low source levels (208 to 221 dB re 1 μPa-m) and generally very short pulses and duration of the sound. Even for high-frequency cetacean species (*e.g.,* harbor porpoises), which may have increased sensitivity to TTS (Lucke *et al.,* 2009; Kastelein *et al.,* 2012b), individuals would have to make a very close approach and also remain very close to vessels operating these sources in order to receive multiple exposures at relatively high levels, as would be necessary to cause TTS. Intermittent exposures—as would occur due to the brief, transient signals produced by these sources—require a higher cumulative SEL to induce TTS than would continuous exposures of the same duration (*i.e.,* intermittent exposure results in lower levels of TTS) (Mooney *et al.,* 2009a; Finneran *et al.,* 2010). Moreover, most marine mammals would more likely avoid a loud sound source rather than swim in such close proximity as to result in TTS. Kremser *et al.* (2005) noted that the probability of a cetacean swimming through the area of exposure when a sub-bottom profiler emits a pulse is small—because if the animal was in the area, it would have to pass the transducer at close range in order to be subjected to sound levels that could cause temporary threshold shift and would likely exhibit avoidance behavior to the area near the transducer rather than swim through at such a close range. Further, the restricted beam shape of the sub-bottom profiler and other HRG survey equipment makes it unlikely that an animal would be exposed more than briefly during the passage of the vessel. Boebel *et al.* (2005) concluded similarly for single and multibeam echosounders; and, more recently, Lurton (2016) conducted a modeling exercise and concluded similarly that likely potential for acoustic injury from these types of systems is negligible but that behavioral response cannot be ruled out. Animals may avoid the area around the survey vessels, thereby reducing exposure. Any disturbance to marine mammals is likely to be in the form of temporary avoidance or alteration of opportunistic foraging behavior near the survey location.

It is possible that animals in the Project Area may experience TTS during the use of DP vessel thrusters during the geotechnical survey due to the duration and nature of the noise (continuous, up to 75 days). However, the fact that the DP drill ship is stationary during the geotechnical survey activities makes it less likely that animals would remain in the area long enough to incur TTS. As is the case for the HRG survey activities, animals may avoid the area around the survey vessel, thereby reducing exposure. Any disturbance to marine mammals is more likely to be in the form of temporary avoidance or alteration of opportunistic foraging behavior near the survey location.

Masking

Masking is the obscuring of sounds of interest to an animal by other sounds, typically at similar frequencies. Marine mammals are highly dependent on sound, and their ability to recognize sound signals amid other sound is important in communication and detection of both predators and prey (Tyack 2000). Background ambient sound may interfere with or mask the ability of an animal to detect a sound signal even when that signal is above its absolute hearing threshold. Even in the absence of anthropogenic sound, the marine environment is often loud. Natural ambient sound includes contributions from wind, waves, precipitation, other animals, and (at frequencies above 30 kHz) thermal sound resulting from molecular agitation (Richardson *et al.,* 1995).

Background sound may also include anthropogenic sound, and masking of natural sounds can result when human activities produce high levels of background sound. Conversely, if the background level of underwater sound is high (*e.g.,* on a day with strong wind and high waves), an anthropogenic sound source would not be detectable as far away as would be possible under quieter conditions and would itself be masked. Ambient sound is highly variable on continental shelves (Thompson, 1965; Myrberg, 1978; Chapman *et al.,* 1998; Desharnais *et al.,* 1999). This results in a high degree of variability in the range at which marine mammals can detect anthropogenic sounds.

Although masking is a phenomenon which may occur naturally, the introduction of loud anthropogenic sounds into the marine environment at frequencies important to marine mammals increases the severity and frequency of occurrence of masking. For example, if a baleen whale is exposed to continuous low-frequency sound from an industrial source, this would reduce the size of the area around that whale within which it can hear the calls of another whale. The components of background noise that are similar in frequency to the signal in question primarily determine the degree of masking of that signal. In general, little is known about the degree to which marine mammals rely upon detection of sounds from conspecifics, predators, prey, or other natural sources. In the absence of specific information about the importance of detecting these natural sounds, it is not possible to predict the impact of masking on marine mammals (Richardson *et al.,* 1995). In general, masking effects are expected to be less severe when sounds are transient than when they are continuous. Masking is typically of greater concern for those marine mammals that utilize low-frequency communications, such as baleen whales, because of how far low-frequency sounds propagate.

Marine mammal communications would not likely be masked appreciably by the sub-profiler signals given the directionality of the signal and the brief period when an individual mammal is likely to be within its beam. And while continuous sound from the DP thruster when in use is predicted to extend 500 m to the 120 dB threshold, the generally short duration of DP thruster use and low source levels, coupled with the likelihood of animals to avoid the sound source, would result in very little opportunity for this activity to mask the communication of local marine mammals for more than a brief period of time.

Non-Auditory Physical Effects (Stress)

Classic stress responses begin when an animal's central nervous system perceives a potential threat to its homeostasis. That perception triggers stress responses regardless of whether a stimulus actually threatens the animal; the mere perception of a threat is sufficient to trigger a stress response (Moberg 2000; Sapolsky *et al.,* 2005; Seyle 1950). Once an animal's central nervous system perceives a threat, it mounts a biological response or defense that consists of a combination of the four general biological defense responses: Behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses.

In the case of many stressors, an animal's first and sometimes most economical (in terms of biotic costs) response is behavioral avoidance of the potential stressor or avoidance of continued exposure to a stressor. An animal's second line of defense to stressors involves the sympathetic part of the autonomic nervous system and the classical ''fight or flight'' response which includes the cardiovascular system, the gastrointestinal system, the exocrine glands, and the adrenal medulla to produce changes in heart rate, blood pressure, and gastrointestinal activity that humans commonly associate with ''stress.'' These responses have a relatively short duration and may or may not have significant long-term effect on an animal's welfare.

An animal's third line of defense to stressors involves its neuroendocrine systems; the system that has received the most study has been the hypothalamus-pituitary-adrenal system (also known as the HPA axis in mammals or the hypothalamus-pituitary-interrenal axis in fish and some reptiles). Unlike stress responses associated with the autonomic nervous system, virtually all neuro-endocrine functions that are affected by stress—including immune competence, reproduction, metabolism, and behavior—are regulated by pituitary hormones. Stress-induced changes in the secretion of pituitary hormones have been implicated in failed reproduction (Moberg 1987; Rivier 1995), altered metabolism (Elasser *et al.,* 2000), reduced immune competence (Blecha 2000), and behavioral disturbance. Increases in the circulation of glucocorticosteroids (cortisol, corticosterone, and aldosterone in marine mammals; see Romano *et al.,* 2004) have been equated with stress for many years.

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and distress is the biotic cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose a risk to the animal's welfare. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other biotic function, which impairs those functions that experience the diversion. For example, when mounting a stress response diverts energy away from growth in young animals, those animals may experience stunted growth. When mounting a stress response diverts energy from a fetus, an animal's reproductive success and its fitness will suffer. In these cases, the animals will have entered a pre-pathological or pathological state which is called ''distress'' (Seyle 1950) or ''allostatic loading'' (McEwen and Wingfield, 2003). This pathological state will last until the animal replenishes its biotic reserves sufficient to restore normal function. Note that these examples involved a long-term (days or weeks) stress response exposure to stimuli.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses have also been documented fairly well through controlled experiments; because this physiology exists in every vertebrate that has been studied, it is not surprising that stress responses and their costs have been documented in both laboratory and free-living animals (for examples see, Holberton *et al.,* 1996; Hood *et al.,* 1998; Jessop *et al.,* 2003; Krausman *et al.,* 2004; Lankford *et al.,* 2005; Reneerkens *et al.,* 2002; Thompson and Hamer 2000). Information has also been collected on the physiological responses of marine mammals to exposure to anthropogenic sounds (Fair and Becker 2000; Romano *et al.,* 2002; Wright *et al.,* 2008). For example, Rolland *et al.* (2012) found that noise reduction from reduced ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. In a conceptual model developed by the Population Consequences of Acoustic Disturbance (PCAD) working group, serum hormones were identified as possible indicators of behavioral effects that are translated into altered rates of reproduction and mortality.

Studies of other marine animals and terrestrial animals would also lead us to expect some marine mammals to experience physiological stress responses and, perhaps, physiological responses that would be classified as ''distress'' upon exposure to high frequency, mid-frequency and low-frequency sounds. For example, Jansen (1998) reported on the relationship between acoustic exposures and physiological responses that are indicative of stress responses in humans (for example, elevated respiration and increased heart rates). Jones (1998) reported on reductions in human performance when faced with acute, repetitive exposures to acoustic disturbance. Trimper *et al.* (1998) reported on the physiological stress responses of osprey to low-level aircraft noise while Krausman *et al.* (2004) reported on the auditory and physiology stress responses of endangered Sonoran pronghorn to military overflights. Smith *et al.* (2004a, 2004b), for example, identified noise-induced physiological transient stress responses in hearing-specialist fish (*i.e.,* goldfish) that accompanied short- and long-term hearing losses. Welch and Welch (1970) reported physiological and behavioral stress responses that accompanied damage to the inner ears of fish and several mammals.

Hearing is one of the primary senses marine mammals use to gather information about their environment and to communicate with conspecifics. Although empirical information on the relationship between sensory impairment (TTS, PTS, and acoustic masking) on marine mammals remains limited, it seems reasonable to assume that reducing an animal's ability to gather information about its environment and to communicate with other members of its species would be stressful for animals that use hearing as their primary sensory mechanism. Therefore, we assume that acoustic exposures sufficient to trigger onset PTS or TTS would be accompanied by physiological stress responses because terrestrial animals exhibit those responses under similar conditions (NRC 2003). More importantly, marine mammals might experience stress responses at received levels lower than those necessary to trigger onset TTS. Based on empirical studies of the time required to recover from stress responses (Moberg 2000), we also assume that stress responses are likely to persist beyond the time interval required for animals to recover from TTS and might result in pathological and pre-pathological states that would be as significant as behavioral responses to TTS.

In general, there are few data on the potential for strong, anthropogenic underwater sounds to cause non-auditory physical effects in marine mammals. Such effects, if they occur at all, would presumably be limited to short distances and to activities that extend over a prolonged period. The available data do not allow identification of a specific exposure level above which non-auditory effects can be expected (Southall *et al.,* 2007). There is no definitive evidence that any of these effects occur even for marine mammals in close proximity to an anthropogenic sound source. In addition, marine mammals that show behavioral avoidance of survey vessels and related sound sources are unlikely to incur non-auditory impairment or other physical effects. NMFS does not expect that the generally short-term, intermittent, and transitory HRG and geotechnical activities would create conditions of long-term, continuous noise and chronic acoustic exposure leading to long-term physiological stress responses in marine mammals.

Behavioral Disturbance

Behavioral disturbance may include a variety of effects, including subtle changes in behavior (*e.g.,* minor or brief avoidance of an area or changes in vocalizations), more conspicuous changes in similar behavioral activities, and more sustained and/or potentially severe reactions, such as displacement from or abandonment of high-quality habitat. Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g.,* species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day), as well as the interplay between factors (*e.g.,* Richardson *et al.,* 1995; Wartzok *et al.,* 2003; Southall *et al.,* 2007; Weilgart 2007; Archer *et al.,* 2010). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison *et al.,* 2012), and can vary depending on characteristics associated with the sound source (*e.g.,* whether it is moving or stationary, number of sources, distance from the source). Please see Appendices B–C of Southall *et al.* (2007) for a review of studies involving marine mammal behavioral responses to sound.

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al.,* 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. It is important to note that habituation is appropriately considered as a ''progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial,'' rather than as, more generally, moderation in response to human disturbance (Bejder *et al.,* 2009). The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. As noted, behavioral state may affect the type of response. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al.,* 1995; NRC 2003; Wartzok *et al.,* 2003). Controlled experiments with captive marine mammals have shown pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al.,* 1997; Finneran *et al.,* 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic airguns or acoustic harassment devices) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds 2002; see also Richardson *et al.,* 1995; Nowacek *et al.,* 2007).

Available studies show wide variation in response to underwater sound; therefore, it is difficult to predict specifically how any given sound in a particular instance might affect marine mammals perceiving the signal. If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (*e.g.,* Lusseau and Bejder 2007; Weilgart 2007; NRC 2005). However, there are broad categories of potential response, which we describe in greater detail here, that include alteration of dive behavior, alteration of foraging behavior, effects to breathing, interference with or alteration of vocalization, avoidance, and flight.

Changes in dive behavior can vary widely and may consist of increased or decreased dive times and surface intervals as well as changes in the rates of ascent and descent during a dive (*e.g.,* Frankel and Clark, 2000; Costa *et al.,* 2003; Ng and Leung, 2003; Nowacek *et al.;* 2004; Goldbogen *et al.,* 2013a,b). Variations in dive behavior may reflect interruptions in biologically significant activities (*e.g.,* foraging) or they may be of little biological significance. The impact of an alteration to dive behavior resulting from an acoustic exposure depends on what the animal is doing at the time of the exposure and the type and magnitude of the response.

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (*e.g.,* bubble nets or sediment plumes), or changes in dive behavior. As for other types of behavioral response, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (*e.g.,* Croll *et al.,* 2001; Nowacek *et al.;* 2004; Madsen *et al.,* 2006; Yazvenko *et al.,* 2007). A determination of whether foraging disruptions incur fitness consequences would require information on or estimates of the energetic requirements of the affected individuals and the relationship between prey availability, foraging effort and success, and the life history stage of the animal.

Variations in respiration naturally vary with different behaviors and alterations to breathing rate as a function of acoustic exposure can be expected to co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may be representative of annoyance or an acute stress response. Various studies have shown that respiration rates may either be unaffected or could increase, depending on the species and signal characteristics, again highlighting the importance in understanding species differences in the tolerance of underwater noise when determining the potential for impacts resulting from anthropogenic sound exposure (*e.g.,* Kastelein *et al.,* 2001, 2005b, 2006; Gailey *et al.,* 2007).

Marine mammals vocalize for different purposes and across multiple modes, such as whistling, echolocation click production, calling, and singing. Changes in vocalization behavior in response to anthropogenic noise can occur for any of these modes and may result from a need to compete with an increase in background noise or may reflect increased vigilance or a startle response. For example, in the presence of potentially masking signals, humpback whales and killer whales have been observed to increase the length of their songs (Miller *et al.,* 2000; Fristrup *et al.,* 2003; Foote *et al.,* 2004), while right whales have been observed to shift the frequency content of their calls upward while reducing the rate of calling in areas of increased anthropogenic noise (Parks *et al.,* 2007b). In some cases, animals may cease sound production during production of aversive signals (Bowles *et al.,* 1994).

Avoidance is the displacement of an individual from an area or migration path as a result of the presence of a sound or other stressors, and is one of the most obvious manifestations of disturbance in marine mammals (Richardson *et al.,* 1995). For example, gray whales are known to change direction—deflecting from customary migratory paths—in order to avoid noise from seismic surveys (Malme *et al.,* 1984). Avoidance may be short-term, with animals returning to the area once the noise has ceased (*e.g.,* Bowles *et al.,* 1994; Goold 1996; Stone *et al.,* 2000; Morton and Symonds 2002; Gailey *et al.,* 2007). Longer-term displacement is possible, however, which may lead to changes in abundance or distribution patterns of the affected species in the affected region if habituation to the presence of the sound does not occur (*e.g.,* Blackwell *et al.,* 2004; Bejder *et al.,* 2006; Teilmann *et al.,* 2006).

A flight response is a dramatic change in normal movement to a directed and rapid movement away from the perceived location of a sound source. The flight response differs from other avoidance responses in the intensity of the response (*e.g.,* directed movement, rate of travel). Relatively little information on flight responses of marine mammals to anthropogenic signals exist, although observations of flight responses to the presence of predators have occurred (Connor and Heithaus 1996). The result of a flight response could range from brief, temporary exertion and displacement from the area where the signal provokes flight to, in extreme cases, marine mammal strandings (Evans and England 2001). However, it should be noted that response to a perceived predator does not necessarily invoke flight (Ford and Reeves 2008) and whether individuals are solitary or in groups may influence the response.

Behavioral disturbance can also impact marine mammals in more subtle ways. Increased vigilance may result in costs related to diversion of focus and attention (*i.e.,* when a response consists of increased vigilance, it may come at the cost of decreased attention to other critical behaviors such as foraging or resting). These effects have generally not been demonstrated for marine mammals, but studies involving fish and terrestrial animals have shown that increased vigilance may substantially reduce feeding rates (*e.g.,* Beauchamp and Livoreil 1997; Fritz *et al.,* 2002; Purser and Radford 2011). In addition, chronic disturbance can cause population declines through reduction of fitness (*e.g.,* decline in body condition) and subsequent reduction in reproductive success, survival, or both (*e.g.,* Harrington and Veitch 1992; Daan *et al.,* 1996; Bradshaw *et al.,* 1998). However, Ridgway *et al.* (2006) reported that increased vigilance in bottlenose dolphins exposed to sound over a five-day period did not cause any sleep deprivation or stress effects.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (24-hour cycle). Disruption of such functions resulting from reactions to stressors such as sound exposure are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al.,* 2007). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered particularly severe unless it could directly affect reproduction or survival (Southall *et al.,* 2007). Note that there is a difference between multi-day substantive behavioral reactions and multi-day anthropogenic activities. For example, just because an activity lasts for multiple days does not necessarily mean that individual animals are either exposed to activity-related stressors for multiple days or, further, exposed in a manner resulting in sustained multi-day substantive behavioral responses.

Marine mammals are likely to avoid the HRG survey activity, especially the naturally shy harbor porpoise, while the harbor seals might be attracted to them out of curiosity. However, because the sub-bottom profilers and other HRG survey equipment operate from a moving vessel, and the maximum radius to the 160 dB harassment threshold is less than 500 m, the area and time that this equipment would be affecting a given location is very small. Further, once an area has been surveyed, it is not likely that it will be surveyed again, therefore reducing the likelihood of repeated HRG-related impacts within the survey area. And while the drill ship using DP thrusters will generally remain stationary during geotechnical survey activities, the short duration (up to 75 days) of the DP thruster use would likely result in only short-term and temporary avoidance of the area, rather than permanent abandonment, by marine mammals.

We have also considered the potential for severe behavioral responses such as stranding and associated indirect injury or mortality from DWW's use of HRG survey equipment, on the basis of a 2008 mass stranding of approximately one hundred melon-headed whales in a Madagascar lagoon system. An investigation of the event indicated that use of a high-frequency mapping system (12-kHz multibeam echosounder) was the most plausible and likely initial behavioral trigger of the event, while providing the caveat that there is no unequivocal and easily identifiable single cause (Southall *et al.,* 2013). The investigatory panel's conclusion was based on (1) very close temporal and spatial association and directed movement of the survey with the stranding event; (2) the unusual nature of such an event coupled with previously documented apparent behavioral sensitivity of the species to other sound types (Southall *et al.,* 2006; Brownell *et al.,* 2009); and (3) the fact that all other possible factors considered were determined to be unlikely causes. Specifically, regarding survey patterns prior to the event and in relation to bathymetry, the vessel transited in a north-south direction on the shelf break parallel to the shore, ensonifying large areas of deep-water habitat prior to operating intermittently in a concentrated area offshore from the stranding site; this may have trapped the animals between the sound source and the shore, thus driving them towards the lagoon system. The investigatory panel systematically excluded or deemed highly unlikely nearly all potential reasons for these animals leaving their typical pelagic habitat for an area extremely atypical for the species (*i.e.,* a shallow lagoon system). Notably, this was the first time that such a system has been associated with a stranding event. The panel also noted several site- and situation-specific secondary factors that may have contributed to the avoidance responses that led to the eventual entrapment and mortality of the whales. Specifically, shoreward-directed surface currents and elevated chlorophyll levels in the area preceding the event may have played a role (Southall *et al.,* 2013). The report also notes that prior use of a similar system in the general area may have sensitized the animals and also concluded that, for odontocete cetaceans that hear well in higher frequency ranges where ambient noise is typically quite low, high-power active sonars operating in this range may be more easily audible and have potential effects over larger areas than low frequency systems that have more typically been considered in terms of anthropogenic noise impacts. It is, however, important to note that the relatively lower output frequency, higher output power, and complex nature of the system implicated in this event, in context of the other factors noted here, likely produced a fairly unusual set of circumstances that indicate that such events would likely remain rare and are not necessarily relevant to use of lower-power, higher-frequency systems more commonly used for HRG survey applications. The risk of similar events recurring may be very low, given the extensive use of active acoustic systems used for scientific and navigational purposes worldwide on a daily basis and the lack of direct evidence of such responses previously reported.

Tolerance

Numerous studies have shown that underwater sounds from industrial activities are often readily detectable by marine mammals in the water at distances of many km. However, other studies have shown that marine mammals at distances more than a few km away often show no apparent response to industrial activities of various types (Miller *et al.,* 2005). This is often true even in cases when the sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales, toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to underwater sound from sources such as airgun pulses or vessels under some conditions, at other times, mammals of all three types have shown no overt reactions (*e.g.,* Malme *et al.,* 1986; Richardson *et al.,* 1995; Madsen and Mohl 2000; Croll *et al.,* 2001; Jacobs and Terhune 2002; Madsen *et al.,* 2002; Miller *et al.,* 2005). In general, pinnipeds seem to be more tolerant of exposure to some types of underwater sound than are baleen whales. Richardson *et al.* (1995) found that vessel sound does not seem to strongly affect pinnipeds that are already in the water. Richardson *et al.* (1995) went on to explain that seals on haul-outs sometimes respond strongly to the presence of vessels and at other times appear to show considerable tolerance of vessels, and Brueggeman *et al.* (1992) observed ringed seals (*Pusa hispida*) hauled out on ice pans displaying short-term escape reactions when a ship approached within 0.16–0.31 mi (0.25–0.5 km). Due to the relatively high vessel traffic in the Lease Area it is possible that marine mammals are habituated to noise (*e.g.,* DP thrusters) from project vessels in the area.

Vessel Strike

Ship strikes of marine mammals can cause major wounds, which may lead to the death of the animal. An animal at the surface could be struck directly by a vessel, a surfacing animal could hit the bottom of a vessel, or a vessel's propeller could injure an animal just below the surface. The severity of injuries typically depends on the size and speed of the vessel (Knowlton and Kraus 2001; Laist *et al.,* 2001; Vanderlaan and Taggart 2007).

The most vulnerable marine mammals are those that spend extended periods of time at the surface in order to restore oxygen levels within their tissues after deep dives (*e.g.,* the sperm whale). In addition, some baleen whales, such as the North Atlantic right whale, seem generally unresponsive to vessel sound, making them more susceptible to vessel collisions (Nowacek *et al.,* 2004). These species are primarily large, slow moving whales. Smaller marine mammals (*e.g.,* bottlenose dolphin) move quickly through the water column and are often seen riding the bow wave of large ships. Marine mammal responses to vessels may include avoidance and changes in dive pattern (NRC 2003).

An examination of all known ship strikes from all shipping sources (civilian and military) indicates vessel speed is a principal factor in whether a vessel strike results in death (Knowlton and Kraus 2001; Laist *et al.,* 2001; Jensen and Silber 2003; Vanderlaan and Taggart 2007). In assessing records with known vessel speeds, Laist *et al.* (2001) found a direct relationship between the occurrence of a whale strike and the speed of the vessel involved in the collision. The authors concluded that most deaths occurred when a vessel was traveling in excess of 24.1 km/h (14.9 mph; 13 kts). Given the slow vessel speeds and predictable course necessary for data acquisition, ship strike is unlikely to occur during the geophysical and geotechnical surveys. Marine mammals would be able to easily avoid the applicant's vessels due to the slow speeds and are likely already habituated to the presence of numerous vessels in the area. Further, DWW shall implement measures (*e.g.,* vessel speed restrictions and separation distances; see *Proposed Mitigation Measures*) set forth in the BOEM Lease to reduce the risk of a vessel strike to marine mammal species in the Lease Area.

There are no rookeries or mating grounds known to be biologically important to marine mammals within the proposed project area. However, this area is an important feeding area for fin whales and an important migratory route for North Atlantic right whales (Waring *et al.,* 2016). There is no designated critical habitat for any ESA-listed marine mammals. Critical habitat for North Atlantic right whales is a designated habitat that includes portions of Cape Cod Bay and Stellwagen Bank, the Great South Channel (each off the coast of Massachusetts), and waters adjacent to the coasts of Georgia and the east coast of Florida. This critical habitat was revised in 2006 to include two foraging areas in the North Pacific Ocean—one in the Bering Sea and one in the Gulf of Alaska (71 FR 38277, July 6, 2006); however, this is outside of the Project Area.

NMFS' regulations at 50 CFR part 224 designated the nearshore waters of the Mid-Atlantic Bight as the Mid-Atlantic U.S. Seasonal Management Area (SMA) for right whales in 2008. Mandatory vessel speed restrictions (less than 10 knots) are in place in that SMA from November 1 through April 30 to reduce the threat of collisions between ships and right whales around their migratory route and calving grounds.

Bottom disturbance associated with the proposed survey activities may include vibracores, CPTs, and grab sampling to validate the seabed classification obtained from the multibeam echosounder/sidescan sonar data. Approximately 10 vibracores per day or 8 CPTs per day is expected, either one or the other (not both). Impact on marine mammal habitat from these activities will be temporary, insignificant, and discountable.

Because of the temporary nature of the disturbance, the availability of similar habitat and resources (*e.g.,* prey species) in the surrounding area, and the lack of important or unique marine mammal habitat, the impacts to marine mammals and the food sources that they utilize are not expected to cause significant or long-term consequences for individual marine mammals or their populations.

Estimated Take by Incidental Harassment

This section provides an estimate of the number of incidental takes proposed for authorization through this IHA, which will inform both NMFS' consideration of whether the number of takes is ''small'' and the negligible impact determination.

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, the MMPA defines ''harassment'' as: Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) 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 (Level B harassment).

Authorized takes would be by Level A and Level B harassment, in the form of disruption of behavioral patterns or PTS for individual marine mammals resulting from exposure to HRG and geotechnical surveys. Level A harassment is only proposed to be authorized for harbor porpoise, harbor seal, and gray seal during the use of the sparker systems. Based on the small Level A isopleths (Table 7) for all other sources and hearing groups, Level A harassment is not anticipated. The death of a marine mammal is also a type of incidental take. However, as described previously, no mortality is anticipated or proposed to be authorized for this activity. Below we describe how the take is estimated for this project.

Project activities that have the potential to harass marine mammals, as defined by the MMPA, include underwater noise from operation of the HRG survey sub-bottom profilers and vibracores, and noise propagation associated with the use of DP thrusters during geotechnical survey activities that require the use of a DP drill ship. NMFS anticipates that impacts to marine mammals would be in the form of behavioral harassment potential PTS, and no take by serious injury or mortality is proposed.

The basis for the take estimate is the number of marine mammals that would be exposed to sound levels in excess of NMFS' Level B harassment criteria for impulsive noise (160 dB re 1 μPa (rms) and continuous noise (120 dB re 1 μPa (rms.)), which is generally determined by overlaying the area ensonified above NMFS acoustic thresholds for harassment within a day with the density of marine mammals, and multiplying by the number of days. NMFS' current acoustic thresholds for estimating take are shown in Table 4 below.

TABLE 4—NMFS'S ACOUSTIC EXPOSURE CRITERIA

Criterion	Definition	Threshold
Level B harassment (underwater)	Behavioral disruption	160 dB (impulsive source)/120 dB (continuous source) (rms).
Level B harassment (airborne)	Behavioral disruption	90 dB (harbor seals)/100 dB (other pinnipeds) (unweighted).

DWW took into consideration sound sources using the potential operational parameters, bathymetry, geoacoustic properties of the Project Area, time of year, and marine mammal hearing ranges. Results of a sound source verification study in a nearby location (xx) showed that estimated maximum distance to the 160 dB re 1 μPa (rms) MMPA threshold for all water depths for the HRG survey sub-bottom profilers (the HRG survey equipment with the greatest potential for effect on marine mammal) was approximately 447 m from the source, which equated to a propagation loss coefficient of 20logR (equivalent to spherical spreading). The estimated maximum critical distance to the 120 dB re 1 μPa (rms) MMPA threshold for all water depths for the vibracore was approximately 1,778 from the source using spherical spreading. For sparkers and vibracore, we doubled these distances to conservatively account for the uncertainty in predicting propagation loss in a similar but different location. The estimated maximum critical distance to the 120 dB re 1 μPa (rms) MMPA threshold for all water depths for the drill ship DP thruster was approximately 500 m from the source based on hydroacoustic modeling results (Subacoustech 2016). DWW and NMFS believe that these estimates represent the a conservative scenario and that the actual distances to the Level B harassment threshold may be shorter, as the calculated distance was doubled for the sparker system and vibracore, the SL for the sparker system was conservatively based on a source that was louder than the equipment proposed for use in this project, and there are some sound measurements taken in the Northeast that suggest a higher spreading coefficient (which would result in a shorter distance) may be applicable.

DWW estimated species densities within the proposed project area in order to estimate the number of marine mammal exposures to sound levels above the 120 dB Level B harassment threshold for continuous noise (*i.e.,* DP thrusters and vibracore) and the 160 dB Level B harassment threshold for intermittent, impulsive noise (*i.e.,* sparkers). Research indicates that marine mammals generally have extremely fine auditory temporal resolution and can detect each signal separately (*e.g.,* Au *et al.,* 1988; Dolphin *et al.,* 1995; Supin and Popov 1995; Mooney *et al.,* 2009b), especially for species with echolocation capabilities. Therefore, it is likely that marine mammals would perceive the acoustic signals associated with the HRG survey equipment as being intermittent rather than continuous, and we base our takes from these sources on exposures to the 160 dB threshold.

The data used as the basis for estimating cetacean density (''D'') for the Lease Area are sightings per unit effort (SPUE) derived by Duke University (Roberts *et al.,* 2016). For pinnipeds, the only available comprehensive data for seal abundance is the Northeast Navy Operations Area (OPAREA) Density Estimates (DoN 2007). SPUE (or, the relative abundance of species) is derived by using a measure of survey effort and number of individual cetaceans sighted. SPUE allows for comparison between discrete units of time (*i.e.* seasons) and space within a project area (Shoop and Kenney, 1992). The Duke University (Roberts *et al.,* 2016) cetacean density data represent models derived from aggregating line-transect surveys conducted over 23 years by 5 institutions (NMFS Northeast Fisheries Science Center (NEFSC), New Jersey Department of Environmental Protection (NJDEP), NMFS Southeast Fisheries Science Center (SEFSC), University of North Carolina Wilmington (UNCW), Virginia Aquarium & Marine Science Center (VAMSC)), the results of which are freely available online at the Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebrate Populations (OBIS–SEAMAP) repository. The datasets for each species were downloaded from OBIS–SEAMAP and were modeled as estimated mean year-round abundance (number of individual animals) per grid cell (100 km by 100 km) for most species. For certain species, the model predicted monthly mean abundance rather than mean year-round abundance, for which the annual mean abundance was calculated using Spatial Analyst tools in ArcGIS. Based on the annual mean abundance datasets, the mean density (animals/km^2) was calculated in ArcGIS by averaging the abundance of animals within the Project Area and dividing by 100 to get animals/km^2. The OPAREA Density Estimates (DoN 2007) used for pinniped densities were based on data collected through NMFS NWFSC aerial surveys conducted between 1998 and 2005.

The Zone of influence (ZOI) is the extent of the ensonified zone in a given day. The ZOI was calculated using the following equations:

- Stationary source (*e.g.* DP thruster and vibracore): πr^2
- Mobile source (*e.g.* sparkers): (distance/day * 2r) + πr^2

Where distance is the maximum survey trackline per day (110 km) and r is the distance to the 160 dB (for impulsive sources) and 120 dB (for non-impulsive sources) isopleths. The isopleths for sparkers and vibracores were calculated using spherical spreading, and the resulting isopleths were doubled as a conservative measure. The isopleths for the DP thruster was calculated using a transmission loss coefficient of 11.12, which was based on field verification study results (Subacoustech 2016).

Estimated takes were calculated by multiplying the species density (animals per km^2) by the appropriate ZOI, multiplied by the number of appropriate days (*e.g.* 168 for HRG activities or 75 days for geotechnical activities) of the specified activity. A detailed description of the acoustic modeling used to calculate zones of influence is provided in DWW's IHA application (also see the discussion in the *Mitigation* section below).

DWW used a distance to the 160 dB Level B threshold of 447 m, which was doubled to be conservative, for a maximum distance of 894 m for the sparker system. The ZOI of 199.048 km^2 for the sparker system and the survey period of a conservative 168 days, which includes estimated weather downtime, was used to estimate take from use of the HRG survey equipment during geophysical survey activities. The ZOI is based on the worst case (since it assumes the higher powered Dura-Spark 240 System sparker will be operating all the time) and a maximum survey trackline of 110 km (68 mi) per day. The resulting take estimates (rounded to the nearest whole number) are presented in Table 5.

DWW used a maximum distance to the 120 dB Level B threshold of 499 m for DP thrusters. The ZOI of 0.782 km^2 and the maximum DP thruster use period of 75 days were used to estimate take from use of the DP thruster during geotechnical survey activities.

DWW used a distance to the 120 dB Level B zone of 1,778 m, which was doubled to be conservative, for a maximum distance of 3,556 m for vibracore. The ZOI of 39.738 km^2 and a maximum vibracore use period of 75 days were used to estimate take from use of the vibracore during geotechnical survey activities. The resulting take estimates (rounded to the nearest whole number) based upon these conservative assumptions are presented in Table 5.

TABLE 5—ESTIMATED LEVEL B HARASSMENT TAKES FOR HRG AND GEOPHYSICAL SURVEY ACTIVITIES

Equipment	Density	HPC or Rossfelder Corer	DP thruster	Applied acoustics 100–1,000 joule Dura-Spark 240 system	Total number of takes
Sound Source (dB)		185	150	213 dB_{rms}	
Number of Activity Days		75	75	168	
Threshold		RMS 120 dB	RMS 120 dB	RMS 160 dB	
Species Common Name		Level B Take Estimate (multiplied by number of days)			
Odontoceti (Toothed Whales and Dolphins)					
Sperm whale	0.00007657	0	0	3	3
Dwarf sperm whale	0.0	0	0	0	0
Pygmy sperm whale	0.0	0	0	0	0
Killer Whale	0	0	0	0	0
Pygmy killer whale	0.00000895	0	0	0	0
False killer whale	0	0	0	3	3
Northern bottlenose whale	0.00007786	0	0	0	0
Cuvier's beaked whale	0.00018441	1	0	6	7
Mesoplodon beaked whales (True's, Gervais', Blainville's, and Sowerby's beaked whales)	0	0	0	0	0
Melon-headed whale	0	0	0	0	0
	0				
Risso's dolphin	0.00000221	0	0	0	0
Long-finned pilot whale	0.00149747	4	0	50	54
Short-finned pilot whale	0	0	0	0	0
Atlantic white-sided dolphin	0.01444053	43	1	483	527
White-beaked dolphin	0.00008411	0	0	3	3
Short-beaked common dolphin	0.04027238	120	2	1,347	....
Atlantic spotted dolphin	0.00006577	0	0	2	2
Pantropical spotted dolphin	0	0	0	0	0
Striped dolphin	0.00003174	0	0	1	1
Fraser's dolphin	0	0	0	0	0
Rough toothed dolphin	0	0	0	0	0
Clymene dolphin	0	0	0	0	0
Spinner dolphin	0	0	0	0	0
Common bottlenose dolphin	0.0115608	34	1	387	42
Harbor Porpoise	0.03340904	100	2	1,117	1,219
Mysticeti (Baleen Whales)					
Fin whale	0.00207529	6	0	69	75
Sei whale	0.00008766	0	0	3	3
Minke whale	0.00046292	1	0	15	16
Blue whale	0.00000918	0	0	0	0
Humpback whale	0.0014806	4	0	50	54
North Atlantic right whale	0.00295075	9	0	99	108
Phocids (Seals)					
Harbor seal	0.313166136	933	18	10,472	11,423

TABLE 5—ESTIMATED LEVEL B HARASSMENT TAKES FOR HRG AND GEOPHYSICAL SURVEY ACTIVITIES—Continued

Equipment	Density	HPC or Rossfelder Corer	DP thruster	Applied acoustics 100–1,000 joule Dura-Spark 240 system	Total number of takes
Gray seal	0.036336364	108	2	1,215	1,325

DWW's requested take numbers are provided in Tables 7 and are also the number of takes NMFS is proposing to authorize. DWW's calculations do not take into account whether a single animal is harassed multiple times or whether each exposure is a different animal. Therefore, the numbers in Table 7 are the maximum number of animals that may be harassed during the HRG and geotechnical surveys (*i.e.,* DWW assumes that each exposure event is a different animal). These estimates do not account for prescribed mitigation measures that DWW would implement during the specified activities and the fact that shutdown/powerdown procedures shall be implemented if an animal enters within 200 m of the vessel during any activity, and within 400 m when the sparkers are operating, further reducing the potential for any takes to occur during these activities.

DWW used NMFS' Guidance (NMFS 2016) to determine sound exposure thresholds to determine when an activity that produces sound might result in impacts to a marine mammal such that a take by injury, in the form of PTS, might occur. The functional hearing groups and the associated PTS onset acoustic thresholds are indicated in Table 6 below.

TABLE 6—SUMMARY OF PTS ONSET ACOUSTIC THRESHOLDS [1]

Hearing group	PTS onset acoustic thresholds * (received level)	
	Impulsive	Non-impulsive
Low-frequency cetaceans	*Cell 1:* Lpk,flat: 219 dB; LE,LF,24h: 183 dB	*Cell 2:* LE,LF,24h: 199 dB.
Mid-frequency cetaceans	*Cell 3:* Lpk,flat: 230 dB; LE,MF,24h: 185 dB	*Cell 4:* LE,MF,24h: 198 dB.
High-frequency cetaceans	*Cell 5:* Lpk,flat: 202 dB; LE,HF,24h: 155 dB	*Cell 6:* LE,HF,24h: 173 dB.
Phocid Pinnipeds (underwaters)	*Cell 7:* Lpk,flat: 218 dB; LE,PW,24h: 185 dB	*Cell 8:* LE,PW,24h: 201 dB.
Otariid Pinnipeds (underwater)	*Cell 9:* Lpk,flat: 232 dB; LE,OW,24h: 203 dB	*Cell 10:* LE,OW,24h: 219 dB.

[1] NMFS 2016.

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

DWW used the user spreadsheet to calculate the isopleth for the loudest sources (sparker, vibracore, DP thruster). The sparker was calculated with the following conditions: Source level of 186 dB SEL, source velocity of 1.93 meters per second (m/s), repetition rate of 2.48, and a weighting factor adjustment of 1.2 and 2.75 based on the appropriate broadband source. Isopleths were less than 1 m for all hearing groups (Table 7) except high-frequency cetaceans, which was 5.12 m. Level A takes are only requested for harbor porpoise, harbor seal, and gray seal (Table 8). The vibracore used the following parameters: Source level of 185 rms, distance of source level measurement at 1 m, duration of 1 hour, propagation loss of 20, and weighting factor adjustment of 1.7, 6.2, and 20 based on the spectrograms for this equipment. Isopleths are summarized in Table 7 and no Level A takes are requested during the use of the vibracore (Table 8). The DP thruster was defined as non-impulsive static continuous source with a source level of 150 dB rms, Propagation loss of 11.12 based on the spectrograms for this equipment (Subacoustech 2016), an activity duration of 1 and 3 hours and weighting factor adjustment of 1.7 and 5. Isopleths were less than 3 m for all hearing groups (Table 7); therefore, no Level A takes were requested for this source (Table 8).

TABLE 7—MAXIMUM WORST-CASE DISTANCE (m) AND AREA (km^2) TO THE LEVEL A AND LEVEL B THRESHOLDS

Hearing group	SELcum threshold (dB)	Equipment	Vibracore operations: HP Cor Rossfelder Corer			DP thruster		800 Joule geo resources sparker	Sparker system
		Source PLS	185 dB $_{RMS}$			150 dB $_{RMS}$		186 dB $_{SEL}$	186 dB $_{SEL}$
Level A									
	Threshold	WFA* (kHz)	1.7	6.2	20	1.7	5	2.75	1.2
Low-Frequency Cetaceans.	199	PTS Isopleth to threshold (meters).	11.97 m, 0 km^2.	....	....	0.06 m, 0 km^2	....	1.29 m, 0.283 km^2.	1.30 m, 0.287 km^2.
Mid-Frequency Cetaceans.	198		....	....	12.96 m, 0.001 km^2.	....	0.03 m, 0 km^2	0.02 m, 0.005 km^2.	
High-Frequency Cetaceans.	173		....	....	207.58 m, 0.135 km^2.	....	2.17 m, 0 km^2	5.12 m, 1.127 km^2.	
Phocid Pinnipeds ...	201		....	9.51 m, 0 km^2	....	....	0.11 m, 0 km^2	0.65 m, 0.144 km^2.	
Level B									
	Threshold	Source PLS	185 dB $_{RMS}$			150 dB $_{RMS}$		213 dB $_{RMS}$	213 dB $_{RMS,}$
All Marine Mammals.	120	Level B Harassment Distance.	3,556 m, 39.74 km^2			499 m, 0.78 km^2			
	160							893 m, 199.0481 km^2.	893 m, 199.0481 km^2.

* Weighting Factor Adjustment.

Estimated Level A takes for all geophysical and geotechnical activities are summarized in Table 8 below.

TABLE 8—ESTIMATED LEVEL A HARASSMENT TAKES FOR HRG AND GEOPHYSICAL SURVEY ACTIVITIES

Equipment	Density (animal/km^2)	HPC or Rossfelder Corer			DP thruster		Applied acoustics 100–1,000 joule Dura-Spark 240 system
Sound Source (dB)		185			150		186 dB$_{SEL}$
Weighting Factor Adjustment (kHz)		1.7	6.2	20	1.7	5	2.75
Number of Activity Days		75			75		168
Species Common Name		Take Estimate (multiplied by number of days and rounded to a whole number)					
Harbor Porpoise	0.03340904	....	....	0	....	0	6
Harbor seal	0.313166136	....	0	....	....	0	8
Gray seal	0.036336364	....	0	....	....	0	1

Proposed Mitigation

Under section 101(a)(5)(D) of the MMPA, NMFS shall prescribe the permissible methods of taking by harassment pursuant to such activity, and other means of effecting the least practicable adverse impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for subsistence uses.

To ensure that the ''least practicable adverse impact'' will be achieved, NMFS evaluates mitigation measures in consideration of the following factors in relation to one another: The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, their habitat, and their availability for subsistence uses (latter where relevant); the proven or likely efficacy of the measures; and the practicability of the measures for applicant implementation.

Proposed Mitigation Measures

With NMFS' input during the application process, and as per the BOEM Lease, DWW is proposing the following mitigation measures during site characterization surveys utilizing HRG survey equipment and use of the DP thruster and vibracore. The mitigation measures outlined in this section are based on protocols and procedures that have been successfully implemented and resulted in no observed take of marine mammals for similar offshore projects and previously approved by NMFS (ESS 2013; Dominion 2013 and 2014).

Marine Mammal Exclusion Zones

Protected species observers (PSOs) will monitor the following exclusion/monitoring zones for the presence of marine mammals:

- A 200-m exclusion zone during all geophysical and geotechnical operations
- A 400-m exclusion zone during the use of sparkers.

These exclusion zones are exclusion zone specified in stipulations of the OCS–A 0486 Lease Agreement.

Visual Monitoring

Visual monitoring of the established exclusion zone(s) s will be performed by qualified and NMFS-approved PSOs, the resumes of whom will be provided to NMFS for review and approval prior to the start of survey activities. Observer qualifications will include direct field experience on a marine mammal observation vessel and/or aerial surveys in the Atlantic Ocean/Gulf of Mexico. An observer team comprising a minimum of four NMFS-approved PSOs and two certified Passive Acoustic Monitoring (PAM) operators (PAM operators will not function as PSOs), operating in shifts, will be stationed aboard the survey vessel. PSOs and PAM operators will work in shifts such that no one monitor will work more than 4 consecutive hours without a 2-hour break or longer than 12 hours during any 24-hour period. Each PSO will monitor 360 degrees of the field of vision.

PSOs will be responsible for visually monitoring and identifying marine mammals approaching or within the established exclusion zone(s) during survey activities. It will be the responsibility of the Lead PSO on duty to communicate the presence of marine mammals as well as to communicate and enforce the action(s) that are necessary to ensure mitigation and monitoring requirements are implemented as appropriate. PAM operators will communicate detected vocalizations to the Lead PSO on duty, who will then be responsible for implementing the necessary mitigation procedures.

PSOs will be equipped with binoculars and have the ability to estimate distances to marine mammals located in proximity to the vessel and/or exclusion zone using range finders. Reticulated binoculars will also be available to PSOs for use as appropriate based on conditions and visibility to support the siting and monitoring of marine species. During night operations, PAM (see *Passive Acoustic Monitoring* requirements below) and night-vision equipment in combination with infrared technology will be used. Position data will be recorded using hand-held or vessel global positioning system (GPS) units for each sighting.

The PSOs will begin observation of the exclusion zone(s) at least 60 minutes prior to ramp-up of HRG survey equipment. Use of noise-producing equipment will not begin until the exclusion zone is clear of all marine mammals for at least 60 minutes, as per the requirements of the BOEM Lease.

If a marine mammal is detected approaching or entering the 200-m or 400-m exclusion zones, the vessel operator would adhere to the shutdown (during HRG survey) or powerdown (during DP thruster use) procedures described below to minimize noise impacts on the animals.

At all times, the vessel operator will maintain a separation distance of 500 m from any sighted North Atlantic right whale as stipulated in the *Vessel Strike Avoidance* procedures described below. These stated requirements will be included in the site-specific training to be provided to the survey team.

Passive Acoustic Monitoring

As per the BOEM Lease, alternative monitoring technologies (*e.g.,* active or passive acoustic monitoring) are required if a Lessee intends to conduct geophysical surveys at night or when visual observation is otherwise impaired. To support 24-hour HRG survey operations, DWW will include PAM as part of the project monitoring during nighttime operations to provide for optimal acquisition of species detections at night.

Given the range of species that could occur in the Project Area, the PAM system will consist of an array of hydrophones with both broadband (sampling mid-range frequencies of 2 kHz to 200 kHz) and at least one low-frequency hydrophone (sampling range frequencies of 75 Hz to 30 kHz). The PAM operator(s) will monitor the hydrophone signals for detection of marine mammals in real time both aurally (using headphones) and visually (via the monitor screen displays). PAM operators will communicate detections to the Lead PSO on duty who will ensure the implementation of the appropriate mitigation measure.

Vessel Strike Avoidance

DWW will ensure that vessel operators and crew maintain a vigilant watch for cetaceans and pinnipeds and slow down or stop their vessels to avoid striking these species. Survey vessel crew members responsible for navigation duties will receive site-specific training on marine mammal sighting/reporting and vessel strike avoidance measures. Vessel strike avoidance measures will include the following, except under extraordinary circumstances when complying with these requirements would put the safety of the vessel or crew at risk:

- All vessel operators will comply with 10 knot (<18.5 km per hour [km/h]) speed restrictions in any Dynamic Management Area (DMA).
- All survey vessels will maintain a separation distance of 500 m or greater from any sighted North Atlantic right whale.
- If underway, vessels must steer a course away from any sited North Atlantic right whale at 10 knots (<18.5 km/h) or less until the 500 m minimum separation distance has been established. If a North Atlantic right whale is sited in a vessel's path, or within 100 m to an underway vessel, the underway vessel must reduce speed and shift the engine to neutral. Engines will not be engaged until the North Atlantic right whale has moved outside of the vessel's path and beyond 100 m. If stationary, the vessel must not engage engines until the North Atlantic right whale has moved beyond 100 m.
- All vessels will maintain a separation distance of 100 m or greater from any sighted non-delphinoid (*i.e.,* mysticetes and sperm whales) cetaceans. If sighted, the vessel underway must reduce speed and shift the engine to neutral and must not engage the engines until the non-delphinoid cetacean has moved outside of the vessel's path and beyond 100 m. If a survey vessel is stationary, the vessel will not engage engines until the non-delphinoid cetacean has moved out of the vessel's path and beyond 100 m.
- All vessels will maintain a separation distance of 50 m or greater from any sighted delphinoid cetacean. Any vessel underway will remain parallel to a sighted delphinoid cetacean's course whenever possible and avoid excessive speed or abrupt changes in direction. Any vessel underway reduces vessel speed to 10 knots or less when pods (including mother/calf pairs) or large assemblages of delphinoid cetaceans are observed. Vessels may not adjust course and speed until the delphinoid cetaceans have moved beyond 50 m and/or abeam (*i.e.,* moving away and at a right angle to the centerline of the vessel) of the underway vessel.

- All vessels will maintain a separation distance of 50 m (164 ft) or greater from any sighted pinniped.

The training program will be provided to NMFS for review and approval prior to the start of surveys. Confirmation of the training and understanding of the requirements will be documented on a training course log sheet. Signing the log sheet will certify that the crew members understand and will comply with the necessary requirements throughout the survey event.

Seasonal Operating Requirements

Between watch shifts, members of the monitoring team will consult the NMFS North Atlantic right whale reporting systems for the presence of North Atlantic right whales throughout survey operations. The proposed survey activities will, however, occur outside of the seasonal management area (SMA) located off the coasts of Delaware and New Jersey. The proposed survey activities will also occur in June/July and September, which is outside of the seasonal mandatory speed restriction period for this SMA (November 1 through April 30).

Throughout all survey operations, DWW will monitor the NMFS North Atlantic right whale reporting systems for the establishment of a DMA. If NMFS should establish a DMA in the Lease Area under survey, within 24 hours of the establishment of the DMA, DWW will work with NMFS to shut down and/or alter the survey activities to avoid the DMA.

Ramp-Up

As per the BOEM Lease, a ramp-up procedure will be used for HRG survey equipment capable of adjusting energy levels at the start or re-start of HRG survey activities. A ramp-up procedure will be used at the beginning of HRG survey activities in order to provide additional protection to marine mammals near the Project Area by allowing them to vacate the area prior to the commencement of survey equipment use. The ramp-up procedure will not be initiated during daytime, nighttime, or periods of inclement weather if the exclusion zone cannot be adequately monitored by the PSOs using the appropriate visual technology (*e.g.,* reticulated binoculars, night vision equipment) and/or PAM for a 60-minute period. A ramp-up would begin with the power of the smallest acoustic HRG equipment at its lowest practical power output appropriate for the survey. The power would then be gradually turned up and other acoustic sources added such that the source level would increase in steps not exceeding 6 dB per 5-minute period. If marine mammals are detected within the HRG survey exclusion zone prior to or during the ramp-up, activities will be delayed until the animal(s) has moved outside the monitoring zone and no marine mammals are detected for a period of 60 minutes.

The DP vessel thrusters will be engaged from the time the vessel leaves the dock to support the safe operation of the vessel and crew while conducting geotechnical survey activities and require use as necessary. Therefore, there is no opportunity to engage in a ramp-up procedure.

Shutdown and Powerdown

HRG Survey—The exclusion zone(s) around the noise-producing activities (HRG and geotechnical survey equipment) will be monitored, as previously described, by PSOs and at night by PAM operators for the presence of marine mammals before, during, and after any noise-producing activity. The vessel operator must comply immediately with any call for shutdown by the Lead PSO. Any disagreement should be discussed only after shutdown.

As per the BOEM Lease, if a non-delphinoid (*i.e.,* mysticetes and sperm whales) cetacean is detected at or within the established exclusion zone (200-m exclusion zone during HRG surveys; 400-m exclusion zone during the operation of the sparker), an immediate shutdown of the survey equipment is required. Subsequent restart of the survey equipment must use the ramp-up procedures described above and may only occur following clearance of the exclusion zone for 60 minutes.

As per the BOEM Lease, if a delphinoid cetacean or pinniped is detected at or within the exclusion zone, the HRG survey equipment (including the sub-bottom profiler) must be powered down to the lowest power output that is technically feasible. Subsequent power up of the survey equipment must use the ramp-up procedures described above and may occur after (1) the exclusion zone is clear of a delphinoid cetacean and/or pinniped for 60 minutes or (2) a determination by the PSO after a minimum of 10 minutes of observation that the delphinoid cetacean or pinniped is approaching the vessel or towed equipment at a speed and vector that indicates voluntary approach to bow-ride or chase towed equipment.

If the HRG sound source (including the sub-bottom profiler) shuts down for reasons other than encroachment into the exclusion zone by a marine mammal including but not limited to a mechanical or electronic failure, resulting in in the cessation of sound source for a period greater than 20 minutes, a restart for the HRG survey equipment (including the sub-bottom profiler) is required using the full ramp-up procedures and clearance of the exclusion zone of all cetaceans and pinnipeds for 60 minutes. If the pause is less than 20 minutes, the equipment may be restarted as soon as practicable at its operational level as long as visual surveys were continued diligently throughout the silent period and the exclusion zone remained clear of cetaceans and pinnipeds. If the visual surveys were not continued diligently during the pause of 20 minutes or less, a restart of the HRG survey equipment (including the sub-bottom profiler) is required using the full ramp-up procedures and clearance of the exclusion zone for all cetaceans and pinnipeds for 60 minutes.

Geotechnical Survey (DP Thrusters)—During geotechnical survey activities, a constant position over the drill, coring, or CPT site must be maintained to ensure the integrity of the survey equipment. During DP vessel operations if marine mammals enter or approach the established exclusion zone, DWW proposes to reduce DP thruster to the maximum extent possible, except under circumstances when ceasing DP thruster use would compromise safety (both human health and environmental) and/or the integrity of the Project. Reducing thruster energy will effectively reduce the potential for exposure of marine mammals to sound energy. Normal use may resume when PSOs report that the monitoring zone has remained clear of marine mammals for a minimum of 60 minutes since last the sighting.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for incidental take authorizations (ITAs) must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring measures prescribed by NMFS should contribute to improved understanding of one or more of the following general goals:

• Occurrence of marine mammal species or stocks in the action area (*e.g.,* presence, abundance, distribution, density).

• Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) Action or environment (*e.g.,* source characterization, propagation, ambient noise); (2) affected species (*e.g.,* life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.,* age, calving or feeding areas).

• Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors.

• How anticipated responses to stressors impact either: (1) Long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks.

• Effects on marine mammal habitat (*e.g.,* marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat).

• Mitigation and monitoring effectiveness.

Proposed Monitoring Measures

DWW submitted marine mammal monitoring and reporting measures as part of the IHA application. These measures may be modified or supplemented based on comments or new information received from the public during the public comment period.

Visual Monitoring—Visual monitoring of the established Level B harassment zones (200-m radius during all HRG and geotechnical surveys (note that this is the same as the mitigation exclusion/shutdown zones established for HRG and geotechnical survey sound sources); 400-m radius during use of the sparker system (note that this is the same as the exclusion zone established for sparker use) will be performed by qualified and NMFS-approved PSOs (see discussion of PSO qualifications and requirements in *Marine Mammal Exclusion Zones* above).

The PSOs will begin observation of the monitoring zone during all HRG survey activities and all geotechnical operations where DP thrusters are employed. Observations of the monitoring zone will continue throughout the survey activity and/or while DP thrusters are in use. PSOs will be responsible for visually monitoring and identifying marine mammals approaching or entering the established monitoring zone during survey activities.

Observations will take place from the highest available vantage point on the survey vessel. General 360-degree scanning will occur during the monitoring periods, and target scanning by the PSO will occur when alerted of a marine mammal presence.

Data on all PSO observations will be recorded based on standard PSO collection requirements. This will include dates and locations of construction operations; time of observation, location and weather; details of the sightings (*e.g.,* species, age classification (if known), numbers, behavior); and details of any observed ''taking'' (behavioral disturbances or injury/mortality). The data sheet will be provided to both NMFS and BOEM for review and approval prior to the start of survey activities. In addition, prior to initiation of survey work, all crew members will undergo environmental training, a component of which will focus on the procedures for sighting and protection of marine mammals. A briefing will also be conducted between the survey supervisors and crews, the PSOs, and DWW. 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.

Acoustic Field Verification—As per the requirements of the BOEM Lease, field verification of the exclusion/monitoring zones will be conducted to determine whether the proposed zones correspond accurately to the relevant isopleths and are adequate to minimize impacts to marine mammals. The details of the field verification strategy will be provided in a Field Verification Plan no later than 45 days prior to the commencement of field verification activities.

DWW must conduct field verification of the exclusion zone (the 160 dB isopleth) for HRG survey equipment and the exclusion zone (the 120 dB isopleth) for DP thruster use for all equipment operating below 200 kHz. DWW must take acoustic measurements at a minimum of two reference locations and in a manner that is sufficient to establish source level (peak at 1 meter) and distance to the 160 dB isopleths (the B harassment zones for HRG surveys) and 120 dB isopleth (the Level B harassment zone) for DP thruster use. Sound measurements must be taken at the reference locations at two depths (*i.e.,* a depth at mid-water and a depth at approximately 1 meter (3.28 ft) above the seafloor).

DWW may use the results from its field-verification efforts to request modification of the exclusion/monitoring zones for the HRG or geotechnical surveys. Any new exclusion/monitoring zone radius proposed by DWW must be based on the most conservative measurements (*i.e.,* the largest safety zone configuration) of the target Level A or Level B harassment acoustic threshold zones. The modified zone must be used for all subsequent use of field-verified equipment. DWW must obtain approval from NMFS and BOEM of any new exclusion/monitoring zone before it may be implemented, and the IHA shall be modified accordingly.

Proposed Reporting Measures

DWW will provide the following reports as necessary during survey activities:

• The Applicant will contact NMFS and BOEM within 24 hours of the commencement of survey activities and again within 24 hours of the completion of the activity.

• As per the BOEM Lease: Any observed significant behavioral reactions (*e.g.,* animals departing the area) or injury or mortality to any marine mammals must be reported to NMFS and BOEM within 24 hours of observation. Dead or injured protected species are reported to the NMFS Greater Atlantic Regional Fisheries Office (GARFO) Stranding Hotline (800–900–3622) within 24 hours of sighting, regardless of whether the injury is caused by a vessel. In addition, if the injury of death was caused by a collision with a project related vessel, DWW must ensure that NMFS and BOEM are notified of the strike within 24 hours. DWW must use the form included as Appendix A to Addendum C of the Lease to report the sighting or incident. Additional reporting requirements for injured or dead animals are described below (*Notification of Injured or Dead Marine Mammals*).

• *Notification of Injured or Dead Marine Mammals*—In the unanticipated event that the specified HRG and geotechnical activities lead to an injury of a marine mammal (Level A harassment) or mortality (*e.g.,* ship-strike, gear interaction, and/or entanglement), DWW would immediately cease the specified activities and report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources and the NOAA GARFO Stranding Coordinator. The report would include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;
- Water depth;
- Environmental conditions (*e.g.,* wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities would not resume until NMFS is able to review the circumstances of the event. NMFS would work with DWW to minimize reoccurrence of such an event in the future. DWW would not resume activities until notified by NMFS.

In the event that DWW discovers an injured or dead marine mammal and determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.,* in less than a moderate state of decomposition), DWW would immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources and the GARFO Stranding Coordinator. The report would include the same information identified in the paragraph above. Activities would be able to continue while NMFS reviews the circumstances of the incident. NMFS would work with DWW to determine if modifications in the activities are appropriate.

In the event that DWW discovers an injured or dead marine mammal and determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.,* previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), DWW would report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, and the GARFO Regional Stranding Coordinator, within 24 hours of the discovery. DWW would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS. DWW can continue its operations under such a case.

- Within 90 days after completion of the marine site characterization survey activities, a technical report will be provided to NMFS and BOEM that fully documents the methods and monitoring protocols, summarizes the data recorded during monitoring, estimates the number of marine mammals that may have been taken during survey activities, and provides an interpretation of the results and effectiveness of all monitoring tasks. Any recommendations made by NMFS must be addressed in the final report prior to acceptance by NMFS.
- In addition to the Applicant's reporting requirements outlined above, DWW will provide an assessment report of the effectiveness of the various mitigation techniques, *i.e.* visual observations during day and night, compared to the PAM detections/operations. This will be submitted as a draft to NMFS and BOEM 30 days after the completion of the HRG and geotechnical surveys and as a final version 60 days after completion of the surveys.

Negligible Impact Analysis and Determinations

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival. A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.,* population-level effects). An estimate of the number of takes, alone, is not enough information on which to base an impact determination. In addition to considering the authorized number of marine mammals that might be ''taken'' through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.,* intensity, duration), the context of any responses (*e.g.,* critical reproductive time or location, migration, etc.), as well as effects on habitat, the status of the affected stocks, and the likely effectiveness of the mitigation. Consistent with the 1989 preamble for the NMFS implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into these analyses via their impacts on the environmental baseline (*e.g.,* as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

As discussed in the *Potential Effects* section, PTS, masking, non-auditory physical effects, and vessel strike are not expected to occur. Further, once an area has been surveyed, it is not likely that it will be surveyed again, thereby reducing the likelihood of repeated impacts within the project area.

Potential impacts to marine mammal habitat were discussed previously in this document (see the *Potential Effects of the Specified Activity on Marine Mammals and their Habitat* section). Marine mammal habitat may be impacted by elevated sound levels and some sediment disturbance, but these impacts would be temporary. Feeding behavior is less likely to be significantly impacted, as marine mammals appear to be less likely to exhibit behavioral reactions or avoidance responses while engaged in feeding activities (Richardson *et al.,* 1995). Additionally, prey species are mobile and are broadly distributed throughout the Project Area; therefore, marine mammals that may be temporarily displaced during survey activities are expected to be able to resume foraging once they have moved away from areas with disturbing levels of underwater noise. Because of the temporary nature of the disturbance, and the availability of similar habitat and resources in the surrounding area, the impacts to marine mammals and the food sources that they utilize are not expected to cause significant or long-term consequences for individual marine mammals or their populations. Furthermore, there are no rookeries or mating grounds known to be biologically important to marine mammals within the proposed project area. A biologically important feeding area for fin whales East of Montauk Point (from March to October) and a biologically important migratory route effective March–April and November–December for North Atlantic right whale, occur near the Project Area (LaBrecque, *et al.,* 2015). However, there is only a small temporal overlap between the migratory biologically important area (BIA) and the proposed survey activities in November and December.

ESA-listed species for which takes are proposed are North Atlantic right, sperm, sei and fin whales. Recent estimates of abundance indicate a potential declining right whale population; however, this may also be due to low sighting rates in areas where right whales were present in previous years, due to a shift in habitat use patterns (Waring *et al.,* 2016). There are currently insufficient data to determine population trends for fin whale, sei whale, and sperm whale (Waring *et al.,* 2015). There is no designated critical habitat for any ESA-listed marine mammals within the Project Area, and most of the stocks for non-listed species proposed to be taken are not considered depleted or strategic by NMFS under the MMPA. Of the two non-listed species that are considered strategic for which take is requested (false killer whale and long-finned pilot whale), take is less than one percent of the entire populations; therefore, the proposed site characterization surveys will not have population-level effects, and we do not expect them to impact annual rates of recruitment or survival.

The proposed mitigation measures are expected to reduce the number and/or severity of takes by (1) giving animals the opportunity to move away from the sound source before HRG survey equipment reaches full energy; (2) reducing the intensity of exposure within a certain distance by reducing the DP thruster power; and (3) preventing animals from being exposed to sound levels that may cause injury. Additional vessel strike avoidance requirements will further mitigate potential impacts to marine mammals during vessel transit to and within the Study Area.

DWW did not request, and NMFS is not proposing, take of marine mammals by serious injury or mortality. NMFS expects that most takes would be in the form of a very small number of potential PTS takes, which would be expected to be of a small degree, and short-term Level B behavioral harassment in the form of brief startling reaction and/or temporary avoidance of the area or decreased foraging (if such activity were occurring)—reactions that are considered to be of low severity and with no lasting biological consequences (*e.g.,* Southall *et al.,* 2007). This is largely due to the short time scale of the proposed activities, the low source levels and intermittent nature of many of the technologies proposed to be used, as well as the required mitigation.

NMFS concludes that exposures to marine mammal species and stocks due to DWW's HRG and geotechnical survey activities would result in only short-term and relatively infrequent effects to individuals exposed and not of the type or severity that would be expected to be additive for the small portion of the stocks and species likely to be exposed. NMFS does not anticipate the proposed take estimates to impact annual rates of recruitment or survival, because although animals may temporarily avoid the immediate area, they are not expected to permanently abandon the area. Additionally, major shifts in habitat use, distribution, or foraging success, are not expected.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total marine mammal take from the proposed activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under Section 101(a)(5)(D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, NMFS compares the number of individuals taken to the most appropriate estimation of the relevant species or stock size in our determination of whether an authorization is limited to small numbers of marine mammals.

TABLE 9—SUMMARY OF POTENTIAL MARINE MAMMAL TAKES AND PERCENTAGE OF STOCKS AFFECTED

Species	Requested Level B take authorization (no.)	Requested Level A take authorization (no.)	Stock abundance estimate	Percentage of stock potentially affected
North Atlantic right whale (Eubalaena glacialis)	108	0	440	24.55
Fin Whale (*Balaenoptera physalus*)	75	0	1,618	4.64
Sei whale (*Balaenoptera borealis*)	3	0	357	0.84
Humpback whale (*Megaptera novaeangliae*)	54	0	823	6.56
Minke whale (*Balaenoptera acutorostrata*)	16	0	2,591	0.62
Sperm whale (Physeter macrocephalus)	3	0	2,288	0.13
False killer whale (*Pseudorca crassidens*)	3	0	442	0.68
Cuvier's beaked whale (*Ziphius cavirostris*)	7	0	6,532	0.11
Long-finned pilot whale (*Globicephala melas*)	54	0	5,636	0.96
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	527	0	48,819	1.08
White-beaked dolphin (*Lagenorhynhcus albirostris*)	3	0	2,003	0.15
Short beaked common Dolphin (*Delphinus delphis*)	1,469	0	70,184	2.09
Atlantic spotted dolphin (*Stenella frontalis*)	2	0	44,715	0.0045
Striped dolphin (*Stenella coruleoalba*)	1	0	54,807	0.0018
Bottlenose Dolphin (*Tursiops truncatus*)	422	0	77,532	0.54
Harbor Porpoise (*Phocoena phocoena*)	1219	6	79,883	1.53
Harbor Seal[1] *(Phoca vitulina)*	11,423	8	75,834	15.07
Gray seal (*Halichoerus grypus*)	1325	1	505,000	0.26

The requested takes proposed to be authorized for the HRG and geotechnical surveys represent less than one percent for 11 stocks (sei whale, minke whale, sperm whale, false killer whale, Cuvier's beaked whale, long-finned pilot whale, white-beaked dolphin, Atlantic spotted dolphin, striped dolphin, bottlenose dolphin, and gray seal); 1.08 percent for Atlantic white-sided dolphin; 1.53 percent for harbor porpoise; 2.09 percent for short-beaked common dolphin; 4.64 percent for fin whale; 6.56 percent for humpback whale; and 15.07 percent for harbor seal (Table 9). Just under 25 percent of the North Atlantic right whale stock has calculated take proposed; however, this is for the entire duration of the project activities (mid-June through December), and while this stock of right whales may be present in very low numbers in the winter months (November and December) in this area, most animals have moved off the feeding grounds and have moved to the breeding grounds during this time. We do not expect a large number of right whales to be in the area for nearly one third of the project duration. Only repeated takes of some individuals are likely and this is an overestimate of the number of individual right whales that may actually be impacted by project activities. However, we analyzed the potential for take of 25% of the individual right whales in the context of the anticipated effects described previously.

These take estimates represent the percentage of each species or stock that could be taken by Level B behavioral harassment and are small numbers relative to the affected species or stock sizes. Further, the proposed take numbers represent the instances of take and are the maximum numbers of individual animals that are expected to be harassed during the project; it is possible that some exposures may occur to the same individual.

Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act

Issuance of an MMPA authorization requires compliance with the ESA. Within the project area, fin, humpback, and North Atlantic right whale are listed as endangered under the ESA. Under section 7 of the ESA, BOEM consulted with NMFS on commercial wind lease issuance and site assessment activities on the Atlantic Outer Continental Shelf in Massachusetts, Rhode Island, New York and New Jersey Wind Energy Areas. NOAA's GARFO issued a Biological Opinion concluding that these activities may adversely affect but are not likely to jeopardize the continued existence of fin whale, humpback whale, or North Atlantic right whale. The Biological Opinion can be found online at *http://www.nmfs.noaa.gov/pr/permits/incidental/energy_other.htm.* NMFS is also consulting internally on the issuance of an IHA under section 101(a)(5)(D) of the MMPA for this activity. Following issuance of the DWW's IHA, the Biological Opinion may be amended to include an incidental take exemption for these marine mammal species, as appropriate.

National Environmental Policy Act (NEPA)

NMFS is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) and will consider comments submitted in response to this notice as part of that process. The EA will be posted at *http://www.nmfs.noaa.gov/pr/permits/incidental/energy_other.htm* once it is finalized.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to DWW for conducting HRG survey activities and use of a vibracore system and DP vessel thrusters during geotechnical survey activities from June 2017 through May 2018, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. This section contains a draft of the IHA itself. The wording contained in this section is proposed for inclusion in the IHA (if issued).

Deepwater Wind, LLC (DWW) is hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1371(a)(5)(D)) and 50 CFR 216.107, to harass marine mammals incidental to high-resolution geophysical (HRG) and geotechnical survey investigations associated with marine site characterization activities off the coast of New York in the area of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS–A 0486) (the Lease Area) and along potential submarine cable routes to a landfall location in Easthampton, New York (Submarine Cable Corridor) (collectively, the Lease Area and Submarine Cable Corridor are the Project Area).

1. This Authorization is valid from June 15, 2017, through June 14, 2018.

2. This Authorization is valid only for HRG and geotechnical survey investigations associated with marine site characterization activities as described in the Incidental Harassment Authorization (IHA) application.

3. The holder of this authorization (Holder) is hereby authorized to take the species listed in Table 1 incidental to HRG and geotechnical survey activities using sub-bottom profilers, vibracores, and dynamic positioning (DP) vessel thruster use during geotechnical activities.

4. The taking of any marine mammal in a manner prohibited under this IHA must be reported immediately to NMFS Greater Atlantic Regional Fisheries Office (GARFO), and NMFS Office of Protected Resources.

5. The Holder or designees must notify NMFS' GARFO and Office of Protected Resources at least 24 hours prior to the seasonal commencement of the specified activity.

6. The holder of this Authorization must notify the Chief of the Permits and Conservation Division, Office of Protected Resources, or her designee at least 24 hours prior to the start of survey activities (unless constrained by the date of issuance of this Authorization in which case notification shall be made as soon as possible) at 301–427–8401 or to *laura.mccue@noaa.gov.*

7. Mitigation Requirements: The Holder is required to abide by the following mitigation conditions listed in 7(a)–(f). Failure to comply with these conditions may result in the modification, suspension, or revocation of this IHA.

(a) *Marine Mammal Exclusion Zones:* Protected species observers (PSOs) shall monitor the following zones for the presence of marine mammals:

• A 200-m exclusion zone during HRG surveys is in operation.

• A 400-m monitoring zone during the use of sparker systems.

• At all times, the vessel operator shall maintain a separation distance of 500 m from any sighted North Atlantic right whale as stipulated in the *Vessel Strike Avoidance* procedures described below.

Visual monitoring of the established exclusion zone(s) shall be performed by qualified and NMFS-approved protected species observers (PSOs). An observer team comprising a minimum of four NMFS-approved PSOs and two certified Passive Acoustic Monitoring (PAM) operators, operating in shifts, shall be stationed aboard either the survey vessel or a dedicated PSO-vessel. PSOs shall be equipped with binoculars and have the ability to estimate distances to marine mammals located in proximity to the vessel and/or exclusion zone using range finders. Reticulated binoculars will also be available to PSOs for use as appropriate based on conditions and visibility to support the siting and monitoring of marine species. During night operations, PAM (see *Passive Acoustic Monitoring* requirements below) and night-vision equipment in combination with infrared video monitoring shall be used. The PSOs shall begin observation of the exclusion zone(s) at least 60 minutes prior to ramp-up of HRG survey equipment. Use of noise-producing equipment shall not begin until the exclusion zone is clear of all marine mammals for at least 60 minutes. If a marine mammal is seen approaching or entering the 200-m or 400-m exclusion zones, the vessel operator shall adhere to the shutdown/powerdown procedures described below to minimize noise impacts on the animals.

(b) *Ramp-Up:* A ramp-up procedure shall be used for HRG survey equipment capable of adjusting energy levels at the start or re-start of HRG survey activities. The ramp-up procedure shall not be initiated during daytime, nighttime, or periods of inclement weather if the exclusion zone cannot be adequately monitored by the PSOs using the appropriate visual technology (*e.g.,* reticulated binoculars, night vision equipment) and/or PAM for a 60-minute period. A ramp-up shall begin with the power of the smallest acoustic HRG equipment at its lowest practical power output appropriate for the survey. The power shall then be gradually turned up and other acoustic sources added such that the source level would increase in steps not exceeding 6 dB per 5-minute period. If a marine mammal is sighted within the HRG survey exclusion zone prior to or during the ramp-up, activities shall be delayed until the animal(s) has moved outside the monitoring zone and no marine mammals are sighted for a period of 60 minutes.

(c) *Shutdown and Powerdown*

HRG Survey—The exclusion zone(s) around the noise-producing activities HRG survey equipment will be monitored, as previously described, by PSOs and at night by PAM operators for the presence of marine mammals before, during, and after any noise-producing activity. The vessel operator must comply immediately with any call for shutdown by the Lead PSO. If a non-delphinoid cetacean (*i.e.,* mysticetes and sperm whales) is detected at or within the established exclusion zone (200-m exclusion zone during HRG surveys; 400-m exclusion zone during use of the sparker system), an immediate shutdown of the HRG survey equipment is required. Subsequent restart of the electromechanical survey equipment must use the ramp-up procedures described above and may only occur following clearance of the exclusion zone for 60 minutes. If a delphinoid cetacean or pinniped is detected at or within the exclusion zone, the HRG survey equipment must be powered down to the lowest power output that is technically feasible. Subsequent power up of the survey equipment must use the ramp-up procedures described above and may occur after (1) the exclusion zone is clear of a delphinoid cetacean and/or pinniped for 60 minutes or (2) a determination by the PSO after a minimum of 10 minutes of observation that the delphinoid cetacean or pinniped is approaching the vessel or towed equipment at a speed and vector that indicates voluntary approach to bow-ride or chase towed equipment. If the HRG sound source shuts down for reasons other than encroachment into the exclusion zone by a marine mammal including but not limited to a mechanical or electronic failure, resulting in in the cessation of sound source for a period greater than 20 minutes, a restart for the HRG survey equipment is required using the full ramp-up procedures and clearance of the exclusion zone of all cetaceans and pinnipeds for 60 minutes. If the pause is less than 20 minutes, the equipment may be restarted as soon as practicable at its operational level as long as visual surveys were continued diligently throughout the silent period and the exclusion zone remained clear of cetaceans and pinnipeds. If the visual surveys were not continued diligently during the pause of 20 minutes or less, a restart of the HRG survey equipment is required using the full ramp-up procedures and clearance of the exclusion zone for all cetaceans and pinnipeds for 60 minutes.

Geotechnical Survey (DP Thrusters)—During geotechnical survey activities if marine mammals enter or approach the established 120 dB isopleth monitoring zone, DWW shall reduce DP thruster to the maximum extent possible, except under circumstances when reducing DP thruster use would compromise safety (both human health and environmental) and/or the integrity of the equipment. After decreasing thruster energy, PSOs shall continue to monitor marine mammal behavior and determine if the animal(s) is moving towards or away from the established monitoring zone. If the animal(s) continues to move towards the sound source then DP thruster use shall remain at the reduced level. Normal use shall resume when PSOs report that the marine mammals have moved away from and remained clear of the monitoring zone for a minimum of 60 minutes since the last sighting.

(d) *Vessel Strike Avoidance:* The Holder shall ensure that vessel operators and crew maintain a vigilant watch for cetaceans and pinnipeds and slow down or stop their vessels to avoid striking these protected species. Survey vessel crew members responsible for navigation duties shall receive site-specific training on marine mammal sighting/reporting and vessel strike avoidance measures. Vessel strike avoidance measures shall include the following, except under extraordinary circumstances when complying with these requirements would put the safety of the vessel or crew at risk:

- All vessel operators shall comply with 10 knot (<18.5 km per hour (km/h)) speed restrictions in any Dynamic Management Area (DMA). In addition, all vessels operating from November 1 through July 31 shall operate at speeds of 10 knots (<18.5 km/h) or less.
- All survey vessels shall maintain a separation distance of 500 m or greater from any sighted North Atlantic right whale.
- If underway, vessels must steer a course away from any sited North Atlantic right whale at 10 knots (<18.5 km/h) or less until the 500 m minimum separation distance has been established. If a North Atlantic right whale is sited in a vessel's path, or within 100 m to an underway vessel, the underway vessel must reduce speed and shift the engine to neutral. Engines shall not be engaged until the North Atlantic right whale has moved outside of the vessel's path and beyond 100 m. If stationary, the vessel must not engage engines until the North Atlantic right whale has moved beyond 100 m.
- All vessels shall maintain a separation distance of 100 m or greater from any sighted non-delphinoid cetacean (*i.e.,* mysticetes and sperm whales). If sighted, the vessel underway must reduce speed and shift the engine to neutral, and must not engage the engines until the non-delphinoid cetacean has moved outside of the vessel's path and beyond 100 m. If a survey vessel is stationary, the vessel shall not engage engines until the non-delphinoid cetacean has moved out of the vessel's path and beyond 100 m.
- All vessels shall maintain a separation distance of 50 m or greater from any sighted delphinoid cetacean. Any vessel underway shall remain parallel to a sighted delphinoid cetacean's course whenever possible, and avoid excessive speed or abrupt changes in direction. Any vessel underway shall reduce vessel speed to 10 knots or less when pods (including mother/calf pairs) or large assemblages of delphinoid cetaceans are observed. Vessels may not adjust course and speed until the delphinoid cetaceans have moved beyond 50 m and/or abeam of the underway vessel.

• All vessels shall maintain a separation distance of 50 m (164 ft) or greater from any sighted pinniped.

(e) *Seasonal Operating Requirements:* Between watch shifts members of the monitoring team shall consult the NMFS North Atlantic right whale reporting systems for the presence of North Atlantic right whales throughout survey operations. The proposed survey activities shall occur outside of the seasonal management area (SMA) located off the coast of New Jersey and Delaware and outside of the seasonal mandatory speed restriction period for this SMA (November 1 through April 30). Throughout all survey operations, the Holder shall monitor the NMFS North Atlantic right whale reporting systems for the establishment of a DMA. If NMFS should establish a DMA in the Lease Area under survey, within 24 hours of the establishment of the DMA the Holder shall work with NMFS to shut down and/or alter the survey activities to avoid the DMA.

(f) *Passive Acoustic Monitoring:* To support 24-hour survey operations, the Holder shall include PAM as part of the project monitoring during the geophysical survey during nighttime operations, or as needed during periods when visual observations may be impaired.

The PAM system shall consist of an array of hydrophones with both broadband (sampling mid-range frequencies of 2 kHz to 200 kHz) and at least one low-frequency hydrophone (sampling range frequencies of 75 Hz to 30 kHz). The PAM operator(s) shall monitor the hydrophone signals in real time both aurally (using headphones) and visually (via the monitor screen displays). PAM operators shall communicate detections/vocalizations to the Lead PSO on duty who shall ensure the implementation of the appropriate mitigation measure.

8. Monitoring Requirements: The Holder is required to abide by the following monitoring conditions listed in 8(a)–(b). Failure to comply with these conditions may result in the modification, suspension, or revocation of this IHA.

(a) *Visual Monitoring*—Protected species observers (refer to the PSO qualifications and requirements for *Marine Mammal Exclusion Zones* above) shall visually monitor the established Level B harassment zones (400-m radius during sparker use and 200-m radius during all other HRG and geotechnical surveys). The observers shall be stationed on the highest available vantage point on the associated operating platform. PSOs shall estimate distance to marine mammals visually, using laser range finders or by using reticulated binoculars during daylight hours. During night operations, PSOs shall use night-vision binoculars and infrared technology. Data on all PSO observations will be recorded based on standard PSO collection requirements. This will include dates and locations of survey operations; time of observation, location and weather; details of the sightings (*e.g.,* species, age classification (if known), numbers, behavior); and details of any observed ''taking'' (behavioral disturbances or injury/mortality). In addition, prior to initiation of survey work, all crew members will undergo environmental training, a component of which will focus on the procedures for sighting and protection of marine mammals

(b) *Acoustic Field Verification*—Field verification of the exclusion/monitoring zones shall be conducted to determine whether the proposed zones correspond accurately to the relevant isopleths and are adequate to minimize impacts to marine mammals. The Holder shall conduct field verification of the exclusion/monitoring zone (the 160 dB isolpleth) for HRG survey equipment and the monitoring/powerdown zone (the 120 dB isopleth) for DP thruster use for all equipment operating below 200 kHz. The Holder shall take acoustic measurements at a minimum of two reference locations and in a manner that is sufficient to establish source level (peak at 1 meter) and distance to the 160 dB isopleths (the B harassment zones for HRG surveys) and 120 dB isopleth (the Level B harassment zone) for DP thruster use. Sound measurements shall be taken at the reference locations at two depths (*i.e.,* a depth at mid-water and a depth at approximately 1 meter (3.28 ft) above the seafloor). The Holder may use the results from its field-verification efforts to request modification of the exclusion/monitoring zones for the HRG or geotechnical surveys. Any new exclusion/monitoring zone radius proposed by the Holder shall be based on the most conservative measurements (*i.e.,* the largest safety zone configuration) of the target Level A or Level B harassment acoustic threshold zones. The modified zone shall be used for all subsequent use of field-verified equipment. The Holder shall obtain approval from NMFS and BOEM of any new exclusion/monitoring zone before it may be implemented and the IHA shall be modified accordingly.

9. Reporting Requirements: The Holder shall provide the following reports as necessary during survey activities:

(a) The Holder shall contact NMFS (301–427–8401) and BOEM (703–787–1300) within 24 hours of the commencement of survey activities and again within 24 hours of the completion of the activity.

(b) Any observed significant behavioral reactions (*e.g.,* animals departing the area) or injury or mortality to any marine mammals shall be reported to NMFS and BOEM within 24 hours of observation. Dead or injured protected species shall be reported to the NMFS GARFO Stranding Hotline (800–900–3622) within 24 hours of sighting, regardless of whether the injury is caused by a vessel. In addition, if the injury of death was caused by a collision with a project related vessel, the Holder shall ensure that NMFS and BOEM are notified of the strike within 24 hours. The Holder shall use the form included as Appendix A to Addendum C of the Lease to report the sighting or incident. If the Holder is responsible for the injury or death, the vessel must assist with any salvage effort as requested by NMFS.

Additional reporting requirements for injured or dead animals are described below (*Notification of Injured or Dead Marine Mammals*).

(c) *Notification of Injured or Dead Marine Mammals*

(i) In the unanticipated event that the specified HRG and geotechnical survey activities lead to an injury of a marine mammal (Level A harassment) or mortality (*e.g.,* ship-strike, gear interaction, and/or entanglement), the Holder shall immediately cease the specified activities and report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, 301–427–8401, and the NOAA GARFO Stranding Coordinator, 978–281–9300. The report shall include the following information:

• Time, date, and location (latitude/longitude) of the incident;
• Name and type of vessel involved;
• Vessel's speed during and leading up to the incident;
• Description of the incident;
• Status of all sound source use in the 24 hours preceding the incident;
• Water depth;
• Environmental conditions (*e.g.,* wind speed and direction, Beaufort sea state, cloud cover, and visibility);
• Description of all marine mammal observations in the 24 hours preceding the incident;
• Species identification or description of the animal(s) involved;
• Fate of the animal(s); and
• Photographs or video footage of the animal(s) (if equipment is available).

Activities shall not resume until NMFS is able to review the circumstances of the event. NMFS would work with the Holder to minimize reoccurrence of such an event in the future. The Holder shall not resume activities until notified by NMFS.

(ii) In the event that the Holder discovers an injured or dead marine mammal and determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.,* in less than a moderate state of decomposition), the Holder shall immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, 301–427–8401, and the GARFO Stranding Coordinator, 978–281–9300. The report shall include the same information identified in the paragraph above. Activities would be able to continue while NMFS reviews the circumstances of the incident. NMFS would work with the Holder to determine if modifications in the activities are appropriate.

(iii) In the event that the Holder discovers an injured or dead marine mammal and determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.,* previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the Holder shall report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, 301–427–8401, and the NMFS GARFO Regional Stranding Coordinator, 978–281–9300, within 24 hours of the discovery. The Holder shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting.

(d) Within 90 days after completion of the marine site characterization survey activities, a technical report shall be provided to NMFS and BOEM that fully documents the methods and monitoring protocols, summarizes the data recorded during monitoring, estimates the number of marine mammals that may have been taken during survey activities, and provides an interpretation of the results and effectiveness of all monitoring tasks. Any recommendations made by NMFS shall be addressed in the final report prior to acceptance by NMFS.

(e) In addition to the Holder's reporting requirements outlined above, the Holder shall provide an assessment report of the effectiveness of the various mitigation techniques, *i.e.* visual observations during day and night, compared to the PAM detections/operations. This shall be submitted as a draft to NMFS and BOEM 30 days after the completion of the HRG and geotechnical surveys and as a final version 60 days after completion of the surveys.

10. This Authorization may be modified, suspended, or withdrawn if the Holder fails to abide by the conditions prescribed herein or if NMFS determines the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals.

11. A copy of this Authorization and the Incidental Take Statement must be in the possession of each vessel operator taking marine mammals under the authority of this Incidental Harassment Authorization.

12. The Holder is required to comply with the Terms and Conditions of the Incidental Take Statement corresponding to NMFS' Biological Opinion.

TABLE 1—SPECIES FOR WHICH TAKE IS PROPOSED TO BE AUTHORIZED

Species	Requested Level B take authorization (no.)	Requested Level A take authorization (no.)	Percentage of stock potentially affected
North Atlantic right whale (Eubalaena glacialis)	108	0	24.55
Fin Whale (*Balaenoptera physalus*)	75	0	4.64
Sei whale	3	0	0.84
Humpback whale (*Megaptera novaeangliae*)	54	0	6.56
Minke whale	16	0	0.62
Sperm whale (Physeter macrocephalus)	3	0	0.13
False killer whale (Pseudorca crassidens)	3	0	0.68
Cuvier's beaked whale	7	0	0.11
Long-finned pilot whale (Globicephala melas)	54	0	0.96
Atlantic white-sided dolphin	527	0	1.08
White-beaked dolphin	3	0	0.15
Short beaked common Dolphin (*Delphinus delphis*)	1,469	0	2.09
Atlantic spotted dolphin (Stenella frontalis)	2	0	0.0045
Striped dolphin (Stenella coruleoalba)	1	0	0.0018
Bottlenose Dolphin (*Tursiops truncatus*)	422	0	0.54
Harbor Porpoise (*Phocoena phocoena*)	1219	6	1.53
Harbor Seal [1] *(Phoca vitulina)*	11,423	8	15.07
Gray seal (*Halichoerus grypus*)	1325	1	0.27

Request for Public Comments

NMFS requests comment on our analysis, the draft authorization, and any other aspect of the Notice of Proposed IHA for DWW's proposed HRG and geotechnical survey investigations associated with marine site characterization activities off the coast of New York in the area of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS–A 0486) and along potential submarine cable routes to a landfall location in Easthampton, New York. Please include with your comments any supporting data or literature citations to help inform our final decision on DWW's request for an MMPA authorization.

Dated: May 9, 2017.

Donna S. Wieting,

Director, Office of Protected Resources, National Marine Fisheries Service.

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