

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°; 900kHz:0.2° vertical (50°)	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 System ³	Unknown	Unknown	Seabed to 20ft above seabed	omni directional 360	duration of core
Vibracore Operations: HPC or Rossfelder Corer ⁴	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

Equipment	Operating Frequencies	Source Level	Source Depth	Beam width (degrees)	Pulse Duration
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
<p>*BOEM, 2016, Table 10.</p> <p>-For the sparker (plus all other acoustic systems), it is planned to be operated 22-24 hours per day. Even if there is maintenance on a separate system, the sparker source firing would be kept. The primary reasons to shut down would be to perform maintenance on the sparker or take SVP velocity profiles. No DP thrusters are needed during the geophysical acquisition.</p> <p>-Vibracore and CPT operations would utilize DP thrusters for about 60% 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. About 10 vibracores per day or 8 CPTs per day is expected, either one or the other (not both). Therefore, for vibracores that would work out to about 10 per day at 0.5 hr per test or total of 5 hours per day. DP thrusters would be operating about 60% of the time or 3hours per day. DP thrusters during a day when in CPT mode would be less or 8 CPTs about 0.5hr = 4hrs; where 4hrs x 0.6 = 2.4hrs/day.</p> <p>-On average 22 hours per day for acoustic systems and 2.4 to 3 hours per day for DP thrusters.</p>					

The deployment of geophysical and geotechnical survey equipment, including the use of sound-producing equipment operating between 7 Hz and 160 kHz, has the potential to cause acoustic harassment to marine species, in particular marine mammals (NOAA-NMFS, 2016). When evaluating the effects of geophysical and geotechnical equipment, DWW compared the operating frequencies of the survey equipment (Table 1) with the hearing ranges of marine mammals potentially transiting the Project Area (Table 2). The following equipment were determined to be potential sources of disturbance to LF, MF, and HF cetaceans and phocid pinnipeds:

- Teledyne Benthos Chirp III Sub-bottom Profiler (2-7 kHz)
- EdgeTech Full-Spectrum (Chirp) Sub-bottom Profiler Equipped with a SB216 Tow Vehicle (2-16 kHz)
- Applied Acoustics Medium Penetration Sub-Bottom Profiling System (boomer) (0.1-10 kHz)
- 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 (0.250-8 kHz)
- 800 Joule GeoResources Sparker (0.75 - 2.75 kHz)/Applied Acoustics 100–1,000 joule Dura-Spark 240 System (0.03 to 1.2 kHz)
- HPC or Rossfelder Corer (10-20 kHz)
- DP Thruster/ Propeller System (0.1 to 10 kHz)

Based on the same comparison, the following equipment was eliminated as a source for disturbance, as the frequencies of the sound sources (e.g., 400 kHz) fell far outside of the lower or upper bounds of the hearing range of marine mammals which could occur in the project area as reported by NOAA (Table 2)::

- Reson SeaBat 7125 Multibeam Echosounder (200 kHz or 400 kHz)

- Reson Multibeam Echosounder (7125) (200 kHz or 400 kHz)
- RESON 70001 (200 and 400 kHz)
- R2SONIC (200 and 400 kHz)
- EdgeTech 4200 Dual Frequency Side Scan Sonar System (300 kHz and 900 kHz)
- EdgeTech 4000² (410 kHz)
- EdgeTech 4200 Dual Frequency Side Scan Sonar System (300 kHz and 600 kHz)
- G-882 Marine Magnetometer
- SeaSPY Magnetometer
- CPTs

Field studies conducted off the coast of Virginia by Tetra Tech on behalf of Dominion Energy to determine the underwater noise produced by borehole drilling and CPTs (e.g., Serafloor deployed 200kN CPT Rig and Seabed CPT) confirmed that these activities do not result in underwater noise levels that are harassing or harmful to marine mammals (Tetra Tech 2014; DONG 2016). 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).

The survey activities will be supported by a vessel approximately 100 to 200 feet long which will maintain a speed of between two to five knots while transiting survey lines. Geotechnical surveys are anticipated to be conducted from a 100-ft to 200-ft dynamically positioned (DP) vessel / jack up barge with support of a tug boat. For purposes of this application, 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*.

Given the size of the Project Area, the Applicant has proposed conducting survey operations 24 hours per day to lessen the duration of survey activities and, therefore, shorten the period of potential impact on marine species.

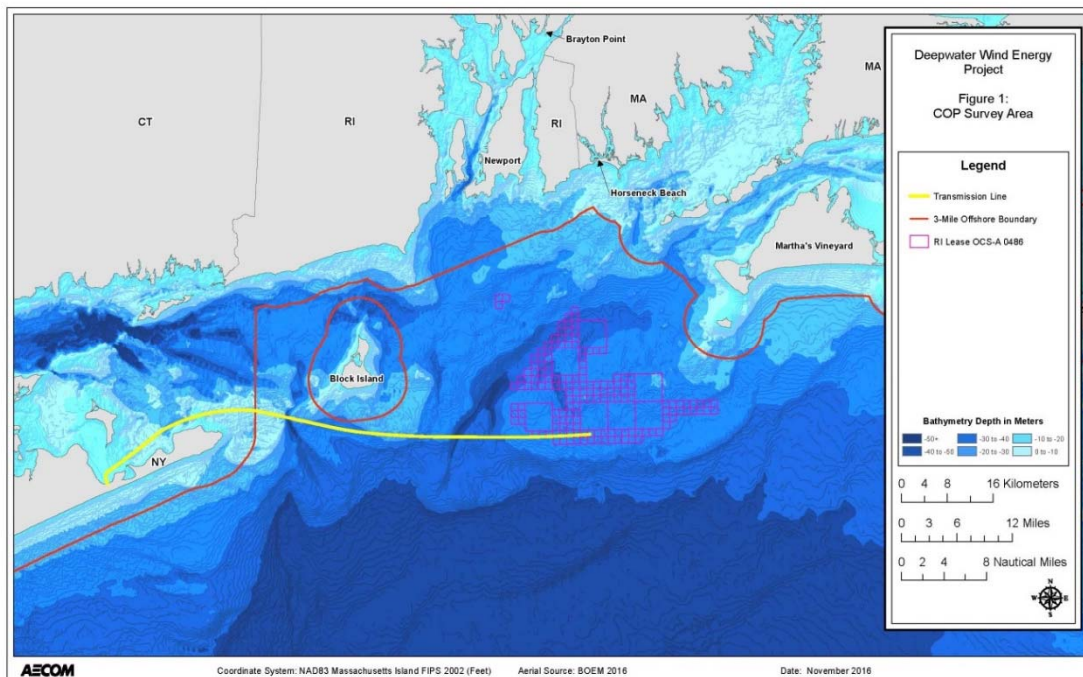


Figure 1. Project Area

1.1 Survey Activities Resulting in the Potential Incidental Taking of Marine Mammals

Marine mammals live in an environment in which vision is not the primary sense because light does not penetrate far beneath the surface of the ocean. As such, marine animals often rely upon sound, instead of sight, as their primary sense for communication and awareness of their environment. Marine mammal communication has a variety of functions such as mother/calf cohesion, group cohesion, individual recognition, and danger avoidance.

1.1.1 United States Regulatory Framework

The potential effects of underwater sound resulting in the 'take' of marine mammals are federally managed by NOAA-NMFS under the MMPA to minimize the potential for both harm and harassment. The term take, as defined in Section 3 (16 U.S. Code [U.S.C.] 1362 of the MMPA, means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal." Harassment was further defined in the 1994 amendments to the MMPA, which provided two levels of harassment, Level A (injury) and Level B (disturbance). Level A harassment is statutorily defined as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild. Level B harassment is defined as any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering, but does not have the potential to injure a marine mammal or marine mammal stock.

It is likely that any take, as defined above, during the proposed geophysical and geotechnical surveys will occur because of the introduction of sound to the marine environment. NOAA-NMFS will authorize incidental take of marine mammals under the MMPA if the taking of marine mammals is of a small number, will have no more than a "negligible impact" on those marine mammal species or stocks, and will not have an "immitigable adverse impact" on the availability of the species or stock for subsistence uses (50 CFR 216). An application for an Incidental Take Permit (ITP) and issuance of a letter of authorization (LOA) is required if the take of marine mammals is expected to cause harm (i.e., serious injury or mortality to any marine mammal species) or result in harassment (i.e., injury or disturbance) and is planned for multiple years. An IHA is required for activities that result in harassment of marine mammals (i.e., injury or disturbance), such as could be the case for the proposed geophysical and geotechnical surveys, where the taking of marine mammals is expected to result in harassment (Level B take) only and for a short duration (less than one year). For this survey, the maximum time frame is less than one year.

1.1.2 Hearing Sensitivity in Marine Mammals in the Region

Current data (via direct behavioral and electrophysiological measurements) and predictions (based on inner ear morphology, modelling, behavior, vocalizations, or taxonomy) indicate that not all marine mammal species have the same hearing capabilities in terms of absolute hearing sensitivity and the frequency band of hearing (Richardson et al. 1995; Wartzok and Ketten 1999; Southall et al. 2007; Au and Hastings 2008; NOAA-NMFS 2016). In the July 2016, guidance for assessing the effects of anthropogenic sound on marine mammal hearing were assigned to functional hearing groups based on their hearing characteristics by Southall et al. (2007) and NOAA-NMFS (2016) estimates. Table 2 presents the estimated auditory bandwidth for each functional hearing group and examples of species relevant to this assessment (NOAA-NMFS 2016).

Table 2. Summary of the Four Functional Hearing Groups of Marine Mammals Commonly Found Within the Project Area

Functional Hearing Group	Estimated Auditory Bandwidth	Species or Taxonomic Groups (Examples in Project Area*)
Low-frequency (LF) cetaceans	7 Hz to 35 kHz	All baleen whales
Mid-frequency (MF) Cetaceans	150 Hz to 160 kHz	Dolphins, toothed whales and beaked whales
High frequency (HF) cetaceans	275 Hz to 160 kHz	True porpoises
Phocid pinnipeds (underwater)	50 Hz to 86 kHz	True seals

* 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). Source: NOAA-NMFS 2016
Note: Otariid pinnipeds do not occur in the North Atlantic and Project Area and so are not presented in this table or discussed further.

1.1.3 Acoustic Threshold Levels for Marine Mammals in the Region

The NOAA-NMFS criterion for Level A harassment for noise is that which results in a permanent threshold shift (PTS) (i.e., any level above that which is known to cause a temporary threshold shift [TTS]). NOAA-NMFS has compiled, interpreted, and synthesized the best available science, including a recent Navy Technical Report (Finneran, 2015), to produce updated acoustic threshold levels for the permanent threshold shifts (PTS) onset and replace those currently in use by NOAA-NMFS for determining PTS onset thresholds (NOAA-NMFS 2016). Updates include a protocol for estimating PTS onset threshold levels for impulsive sound sources (e.g., airguns, impact pile drivers) and non-impulsive sound sources (e.g., sonar, DP thrusters, vibratory pile drivers). Impulsive sources produce sounds that are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI 1986; NIOSH 1998; ANSI 2005). Non-impulsive sources produce sounds that can be broadband, narrowband or tonal, brief or prolonged, continuous or intermittent and typically do not have the high peak sound pressure with rapid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH 1998).

Table 3 provides the underwater acoustic threshold levels for the onset of PTS. Cumulative sound exposure level over a 24 hour period and peak sound pressure level have been recommended as the most appropriate parameters for establishing PTS onset acoustic threshold levels for marine mammals found in the North Atlantic (NOAA-NMFS 2016).

Table 3. Summary of NOAA-NMFS PTS Onset Acoustic Thresholds for Marine Mammals Possibly Transiting the Area

PTS Onset Thresholds* Levels (Received Level)

Hearing Group	Impulsive	Non-impulsive
LF Cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB
MF Cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB
HF Cetaceans	$L_{pk,flat}$: 202 dB	$L_{E,HF,24h}$: 173 dB

Hearing Group	Impulsive	Non-impulsive
	$L_{E, HF, 24h}$: 155 dB	
Phocid Pinnipeds (Underwater)	$L_{pk, flat}$: 218 dB $L_{E, PW, 24h}$: 185 dB	$L_{E, PW, 24h}$: 201 dB

Notes: > = greater than; dB = decibel; SEL = sound exposure level; SPL = sound pressure level.

* 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.

Peak sound pressure (L_{pk}) has a reference value of 1 μ Pa, and cumulative sound exposure level (LE) has a reference value of 1 μ Pa²s. In this table, thresholds are abbreviated to reflect American National Standards Institute (ANSI) standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript flat is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

Source: NOAA-NMFS 2016.

While NOAA-NMFS has published TTS Thresholds as part of their 2016 Guidance document, they are not yet being used to evaluate Level B take for marine mammals. Therefore, NOAA-NMFS has instructed that DWW use the previous guidance regarding Level B harassment, which is reflected in our analysis. The NOAA-NMFS criterion for Level B harassment is the acoustic threshold that causes behavioral disruption. NOAA-NMFS has defined the threshold level for Level B harassment as 120 dB_{RMS} re 1 μ Pa for non-impulsive sound sources (e.g., sonar, DP thrusters, vibratory pile drivers, and other continuous sounds) and 160 dB_{RMS} re 1 μ Pa for impulsive sound sources (e.g., airguns, impact pile drivers) (Table 4). At some distance from the sound source (meters) received sound levels could exceed Level B thresholds and Project activities may approach or exceed ambient sound levels (within the zone of influence); however, actual perceptibility of marine mammals to the sound source will depend on the actual hearing thresholds of the species under consideration and the inherent masking effects of ambient sound levels.

Table 4. Level B Harassment Acoustic Thresholds for Marine Mammals Possibly Transiting the Project Area

Criterion	Acoustic threshold (SEL _{cum})
Possible Behavioral Disruption (for impulsive sound pressure level)	160 dB
Possible Behavioral Disruption (for continuous sound pressure level)	120 dB

Source: NOAA-NMFS 2015

1.1.4 Zone of Influence (ZOI)

Geophysical devices operate across wide frequency ranges (Hz or kHz) as well as different source levels (dB) and beam widths depending on survey objectives. In general, the lowest frequency at which the equipment may operate and loudest source level, represents a worst-case scenario. However, most geophysical equipment is highly directional and beamwidth can have a significant impact on sound propagation. Equipment that focuses its energy in vertical direction does not see as

much horizontal propagation. While equipment that transmits its energy over a wider beamwidth, such as a towed sparker, is more likely to see greater horizontal propagation.

To better understand both the level and extent of underwater sound generated by Project activities, equipment was evaluated over the range of expected operating conditions. This hydroacoustic modelling exercise of the representative survey equipment was used to predict the potential acoustic zones of influence (ZOI) associated with the proposed survey equipment. The acoustic modelling took into consideration the following factors: equipment type, operating frequencies, source level, and pulse duration for Level A harassment thresholds. For level B harassment thresholds the source level and the reference distance were used.

In accordance with the BOEM #OCS-A-0486 Lease stipulation 4.3.6.2 of Addendum C, the Applicant will verify in the field distances calculated by the hydroacoustic modeling and within the protected species exclusion zone. To satisfy this requirement, the Applicant will conduct underwater acoustic measurements of noise-producing activities at the start of the geophysical and geotechnical survey programs. Acoustic measurements will be taken at a minimum of two reference locations and at two depths (i.e. midwater, and 1 meter above the seafloor). Field verification of actual sound propagation will enable adjustment of the critical MMPA threshold level distances to fit actual survey conditions, if necessary. See Section 11 for additional details on mitigation, monitoring, and reporting.

2.0 Survey Dates, Duration, and Specific Geographic Region

2.1 Survey Activity Dates and Duration

As stated above, the geophysical survey is expected to take up to 168 days between May 15, 2017 and December 31, 2017. The geotechnical surveys are expected to take up to 75 days between June 15, 2017 and December 31, 2017.

2.2 Specific Geographic Region

The Applicant's survey activities will occur in the approximately 97,498-acre (394 km²) Lease Area. The Lease Area falls within the RI-MA WEA and along a transmission line route to Long Island as shown in Figure 1. An evaluation of site assessment activities within the RI-MA WEA was fully assessed in the BOEM Environmental Assessment (EA) for site assessment activities on the OCS (BOEM 2014) and associated Finding of No Significant Impact, revised in June 2014.

3.0 Species and Numbers of Marine Mammals

There are 36 species of marine mammals in the Northwest Atlantic Outer Continental Shelf (OCS) region that are protected by the MMPA (Table 5) (BOEM 2014). Thirty-one (31) of these species are cetaceans, including twenty-five (25) which belong to the suborder Odontoceti (toothed whales) and six (6) which belong to the suborder Mysticeti (baleen whales). There are five whale species listed under the Endangered Species Act (ESA) as endangered that could, in theory, transit the Project Area, including the following species that are listed as threatened or endangered: sperm whale (*Physeter macrocephalus*), fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), blue whale (*Balaenoptera musculus*), and North Atlantic right whale (*Eubalaena glacialis*). In addition to these listed species, several dolphin species protected under the MMPA have been sighted near the Project Area.

There are four species of *phocids* (true seals) that could transit the Project Area, all of which are protected under the MMPA, including: harbor seals, gray seals, harp seals, and hooded seals (USFWS 1997). Harbor seals (*Phoca vitulina*) are the most common seals along the U.S. east coast (Waring et al. 2008). Finally, while very rare, one species of *Sirenian*, the West Indian manatee, *Trichechus manatus*, has been sighted in the region.

The status and distribution of the species listed in Table 5 are discussed in more detail in Section 4.0.

Table 5. Marine Mammals Thought to Occur in the Region

Common Name	Scientific Name	Federal ESA/ MMPA Status ¹	Relative Occurrence in the Region ²	Estimated Minimum Number (Nmin) ³	Best Estimate ³
Toothed Whales (<i>Odontoceti</i>)					
Sperm whale	<i>Physeter macrocephalus</i>	ESA Endangered/ Depleted and Strategic	Common	1,815	2,288
Dwarf sperm whale	<i>Kogia sima</i>	Protected	Rare ⁴	2,598 ⁵	3,785 ⁵
Pygmy sperm whale	<i>Kogia breviceps</i>	Protected	Rare ⁴	2,598 ⁵	3,785 ⁵
Killer Whale	<i>Orcinus orca</i>	Protected	Rare	unknown	unknown
Pygmy killer whale	<i>Feresa attenuata</i>	Protected	Hypothetical	unknown	unknown
False killer whale	<i>Pseudorca crassidens</i>	Strategic	Rare	212	442
Northern bottlenose whale	<i>Hyperoodon ampullatus</i>	Protected	Hypothetical	unknown	unknown
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	Protected	Rare	5,021	6,532
Mesoplodon beaked whales	<i>Mesoplodon spp.</i>	Depleted ⁶	Rare	4,632 ⁷	7,092 ⁷
Melon-headed whale	<i>Peponocephala electra</i>	Protected	Hypothetical	unknown	unknown
Risso's dolphin	<i>Grampus griseus</i>	Protected	Common	12,619	18,250
Long-finned pilot whale	<i>Globicephala melas melas</i>	Protected	Common	3,464	5,636
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	Protected	Rare	15,913	21,515
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	Protected	Common	30,403	48,819

Common Name	Scientific Name	Federal ESA/ MMPA Status ¹	Relative Occurrence in the Region ²	Estimated Minimum Number (Nmin) ³	Best Estimate ³
White-beaked dolphin	<i>Lagenorhynchus albirostris</i>	Protected	Regular	1,023	2,003
Short-beaked common dolphin	<i>Delphinus delphis delphinis</i>	Protected	Common	112,531	173,486
Atlantic spotted dolphin	<i>Stenella frontalis</i>	Protected	Regular ⁴	31,610	44,715
Pantropical spotted dolphin	<i>Stenella attenuata</i>	Protected	Rare	1,733	3,333
Striped dolphin	<i>Stenella coeruleoalba</i>	Protected	Rare/Regular ⁸	42,804	54,807
Fraser's dolphin	<i>Lagenodelphis hosei</i>	Protected	Data deficient	unknown	unknown
Rough toothed dolphin	<i>Steno bredanensis</i>	Protected	Rare ⁸	134	271
Clymene dolphin	<i>Stenella clymene</i>	Protected	Hypothetical	unknown	unknown
Spinner dolphin	<i>Stenella longirostris</i>	Protected	Hypothetical	unknown	unknown
Common bottlenose dolphin ⁹	<i>Tursiops truncatus truncatus</i>	Protected	Common	85,945	118,974
Harbor Porpoise	<i>Phocoena phocoena</i>	Protected	Common	61,415	79,833
Baleen Whales (<i>Mysticeti</i>)					
Fin whale	<i>Balaenoptera physalus</i>	ESA Endangered/ Depleted and Strategic	Common	1,234	1,618
Sei whale	<i>Balaenoptera borealis</i>	ESA Endangered/ Depleted and Strategic	Regular	236	357
Minke whale	<i>Balaenoptera acutorostrata acutorostrata</i>	Protected	Common	16,199	20,741
Blue whale	<i>Balaenoptera musculus</i>	ESA Endangered/ Depleted and Strategic	Rare	440	unknown
Humpback whale	<i>Megaptera novaeangliae</i>	Strategic ¹⁰	Common	823	823
North Atlantic right whale	<i>Eubalaena glacialis</i>	ESA Endangered/ Depleted and Strategic	Common	476	476
True Seals (<i>Phocidae</i>)					
Harbor Seal	<i>Phoca vitulina concolor</i>	Protected	Common	66,884	75,834
Gray Seal	<i>Halichoerus grypus</i>	Protected	Common	unknown	unknown
Harp Seal	<i>Pagophilus groenlandica</i>	Protected	Common	unknown	unknown
Hooded Seal	<i>Cystophora cristata</i>	Protected	Regular	unknown	unknown

Common Name	Scientific Name	Federal ESA/ MMPA Status ¹	Relative Occurrence in the Region ²	Estimated Minimum Number (Nmin) ³	Best Estimate ³
Sirenians					
West Indian manatee ¹¹	<i>Trichechus manatus</i>	ESA Endangered/ Depleted and Strategic	Rare	unknown	unknown
<p>Notes: Common = greater than 100 records, Regular = 10–100 records, Rare = less than 10 records, Hypothetical = the remote possibility to occur in the region at some time (Kenney and Vigness-Raposa 2010).</p> <p>¹ Denotes ESA listing as either endangered or threatened, or MMPA listing as depleted and/or strategic. All marine mammal stocks are considered protected under the MMPA.</p> <p>² BOEM 2014</p> <p>³ Waring et al 2007, 2010, 2013, 2014, and 2016.</p> <p>⁴ Based on Waring et al. 2012 and 2013</p> <p>⁵ Estimate includes both the dwarf and pygmy sperm whales.</p> <p>⁶ Of the <i>Mesoplodon</i> species in the Atlantic, only the Gervais' beaked whale is depleted.</p> <p>⁷ This estimate includes all <i>Mesoplodon</i> species in the Atlantic (Blainville's, Gervais', Sowerby's, and True's beaked whales)</p> <p>⁸ AMAPPS 2011</p> <p>⁹ Numerous stocks for this species have been identified; please refer to Table 6</p> <p>¹⁰ NOAA-NMFS 2016a</p> <p>¹¹ NOAA-NMFS 2016b</p>					

4.0 Northwest Atlantic OCS Species Status and Distribution

Of the 36 marine mammal species transiting the Northwest Atlantic OCS region, four marine mammal species are listed under the ESA and are thought to be present, at least seasonally, in the waters of Southern New England: sperm whale, fin whale, sei whale, and North Atlantic right whale. However, these species are highly migratory and do not spend extended periods of time in a localized area. Other species protected under the MMPA that are more common in the Northwest Atlantic OCS, and so could transit the Project Area include the following species: humpback whale, minke whale, Risso's dolphin, long-finned pilot whale, Atlantic white-sided dolphin, White-beaked dolphin, short-beaked common dolphin, Atlantic spotted dolphin, striped dolphin, common bottlenose dolphin, harbor porpoise, harbor seal, gray seal and harp seal.

The following information summarizes data on the status and trends, distribution and habitat preferences, behavior and life history, and auditory capabilities of marine mammals found in the Northwest Atlantic OCS region as available in published literature and reports, including NOAA-NMFS marine mammal stock assessment reports.

4.1 Regular or Common Odontocetes in the Northeast Atlantic Region

4.1.1 Sperm Whale (*Physeter macrocephalus*)

Abundance, Density, and Stock Status: Sperm whales are listed as endangered under the ESA. Data are insufficient to assess population trends, and the current abundance estimate was based on only a fraction of the known stock range (Waring et al. 2007). A Draft Recovery Plan for sperm whales was written and is available for review (NOAA-NMFS 2006c).

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