Application for Incidental Harassment Authorization for the Taking of Marine Mammals Incidental to Site Characterization of New Jersey Offshore Transmission Facilities

April 2022

Prepared For:

NEXTera™ ENERGY TRANSMISSION
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## List of Acronyms

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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMAPPS</td>
<td>Atlantic Marine Assessment Program for Protected Species</td>
</tr>
<tr>
<td>BOEM</td>
<td>Bureau of Ocean Energy Management</td>
</tr>
<tr>
<td>CeTAP</td>
<td>Cetacean and Turtle Assessment Program</td>
</tr>
<tr>
<td>CHIRPs</td>
<td>Compressed High-Intensity Radiated Pulses</td>
</tr>
<tr>
<td>CPT</td>
<td>cone penetration test</td>
</tr>
<tr>
<td>dB</td>
<td>decibel</td>
</tr>
<tr>
<td>DFO</td>
<td>Fisheries and Oceans Canada</td>
</tr>
<tr>
<td>DMA</td>
<td>dynamic management area</td>
</tr>
<tr>
<td>DMON</td>
<td>digital acoustic monitoring</td>
</tr>
<tr>
<td>DoN</td>
<td>Department of Navy</td>
</tr>
<tr>
<td>DPS</td>
<td>distinct population segment</td>
</tr>
<tr>
<td>EBS</td>
<td>Ecological Baseline Studies</td>
</tr>
<tr>
<td>EEZ</td>
<td>U.S. Exclusive Economic Zone</td>
</tr>
<tr>
<td>ESA</td>
<td>Endangered Species Act</td>
</tr>
<tr>
<td>GAPS</td>
<td>global acoustic positioning systems</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information Systems</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>HF</td>
<td>High Frequency</td>
</tr>
<tr>
<td>HRG</td>
<td>High-Resolution Geophysical</td>
</tr>
<tr>
<td>Hz</td>
<td>Hertz</td>
</tr>
<tr>
<td>IHA</td>
<td>Incidental Harassment Authorization</td>
</tr>
<tr>
<td>kHz</td>
<td>kilohertz</td>
</tr>
<tr>
<td>km</td>
<td>kilometers</td>
</tr>
<tr>
<td>km²</td>
<td>square kilometers</td>
</tr>
<tr>
<td>knots</td>
<td>nautical miles per hour</td>
</tr>
<tr>
<td>LF</td>
<td>Low-frequency</td>
</tr>
<tr>
<td>m</td>
<td>meters</td>
</tr>
<tr>
<td>MARCO</td>
<td>Mid-Atlantic Regional Council on the Ocean</td>
</tr>
<tr>
<td>MBES</td>
<td>multibeam echosounders</td>
</tr>
<tr>
<td>MF</td>
<td>Medium-frequency</td>
</tr>
<tr>
<td>MMPA</td>
<td>Marine Mammal Protection Act</td>
</tr>
<tr>
<td>NEETMA</td>
<td>NextEra Energy Transmission Mid-Atlantic</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>NEFSC</td>
<td>Northeast Fisheries Science Center</td>
</tr>
<tr>
<td>NJDEP</td>
<td>New Jersey Department of Environmental Protection</td>
</tr>
<tr>
<td>NJOTF</td>
<td>New Jersey Offshore Transmission Facilities Project</td>
</tr>
<tr>
<td>nm</td>
<td>nautical miles</td>
</tr>
<tr>
<td>nm²</td>
<td>square nautical miles</td>
</tr>
<tr>
<td>NMFS</td>
<td>National Marine Fisheries Service</td>
</tr>
<tr>
<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
</tr>
<tr>
<td>NRC</td>
<td>National Research Council</td>
</tr>
<tr>
<td>NROCC</td>
<td>Northeast Regional Ocean Council</td>
</tr>
<tr>
<td>NYDOS</td>
<td>New York Department of State</td>
</tr>
<tr>
<td>NYSERDA</td>
<td>New York State Energy Research and Development Authority</td>
</tr>
<tr>
<td>OCS</td>
<td>Outer Continental Shelf</td>
</tr>
<tr>
<td>OW</td>
<td>Otariid pinniped in water</td>
</tr>
<tr>
<td>PAM</td>
<td>Passive Acoustic Monitoring</td>
</tr>
<tr>
<td>PBR</td>
<td>potential biological removal</td>
</tr>
<tr>
<td>PSMMP</td>
<td>Protected Species Mitigation and Monitoring Plan</td>
</tr>
<tr>
<td>PSO</td>
<td>Protected Species Observer</td>
</tr>
<tr>
<td>PTS</td>
<td>permanent threshold shift</td>
</tr>
<tr>
<td>PW</td>
<td>Phocid pinnipeds in water</td>
</tr>
<tr>
<td>RMS</td>
<td>root mean squared sound pressure level</td>
</tr>
<tr>
<td>SBP</td>
<td>sub-bottom profiler</td>
</tr>
<tr>
<td>SEFSC</td>
<td>Southeast Fisheries Science Center</td>
</tr>
<tr>
<td>SELcum</td>
<td>cumulative sound exposure level</td>
</tr>
<tr>
<td>SMA</td>
<td>seasonal management area</td>
</tr>
<tr>
<td>SZ</td>
<td>shutdown zone</td>
</tr>
<tr>
<td>TTS</td>
<td>temporary threshold shift</td>
</tr>
<tr>
<td>UME</td>
<td>unusual mortality event</td>
</tr>
<tr>
<td>USBL</td>
<td>ultra-short baseline</td>
</tr>
<tr>
<td>WHOI</td>
<td>Woods Hole Oceanographic Institution</td>
</tr>
<tr>
<td>ZOI</td>
<td>Zone of Influence</td>
</tr>
<tr>
<td>μPa</td>
<td>micropascal</td>
</tr>
</tbody>
</table>
1. Description of Specified Activity

NextEra Energy Transmission MidAtlantic Holdings, LLC (NEETMA) is requesting an Incidental Harassment Authorization (IHA) for the site characterization surveys necessary to construct offshore and onshore facilities to collect energy generated at offshore wind farms, transmit the renewable energy onshore to the State of New Jersey, and interconnect to the existing bulk electrical grid operated by the regional transmission organization, PJM. NEETMA is requesting this IHA pursuant to Section 101(a)(5)(D) of the Marine Mammal Protection Act ([MMPA] 16 U.S.C. § 1371(a)(5)(D)) and 50 CFR § 216.104(a) to authorize the taking of small numbers of marine mammals by incidental harassment resulting from high-resolution geophysical (HRG) and geotechnical (G) survey investigations off the coast of New Jersey. The HRG&G surveys will occur in the survey area of the New Jersey Offshore Transmission Facilities Project (NJOTF or Project) along proposed submarine export cable routes and at offshore platform locations shown on Figure 1-1. The HRG&G surveys are proposed to be initiated June 1, 2022 and take place over a period of up to 12 months.

Geotechnical survey activities will include vibracores and/or cone penetration tests (CPTs) in order to ground-truth the HRG survey data; identify and characterize seabed conditions vertically to depth of potential impact for Project planning and design; and collect data to identify paleolandslides. Approximately one test will be performed per one km of cable route. It is expected that the same or a similar vessel will be used for the geotechnical activities as the HRG survey activities.

Geotechnical survey impacts on the seafloor are limited to minimal contact of the sampling equipment and inserted cores and are considered negligible (BOEM 2012). In addition, field studies offshore Virginia to determine the underwater noise produced by geotechnical survey activities (deep CPTs, borehole drilling, and vibracore sampling) have confirmed that these methods do not result in noise levels that exceed NOAA Level A and B harassment thresholds for marine mammals (Tetra Tech 2014; 85 FR 7926).

Geotechnical survey activities are therefore not discussed further in this application as they are not expected to cause Level A or B harassment to marine mammals.

The regulations set forth in Section 101(a)(5) of the MMPA and 50 C.F.R. § 216 Subpart I allow for the incidental taking of marine mammals by a specific activity if the take by such activity is found to have a negligible impact on the species or stock(s) of marine mammals and will not result in an unmitigable adverse impact on the availability of the marine mammal species or stock(s) for certain subsistence uses. For the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) to consider authorizing the taking by U.S. citizens of small numbers of marine mammals incidental to a specified activity (other than commercial fishing), or to make a finding that incidental take is unlikely to occur, a written request will be submitted to the NOAA Office of Protected Resources. Such a request is detailed in this IHA application.

1.1 Project Description

NEETMA proposes to conduct reconnaissance level HRG&G surveys within the Project area to support the proposed Project development (Figure 1-1). The survey area is divided in two and includes a southern survey area (1,278 square kilometers [km²]), and a northern survey area (6,254 km²) for a total area of approximately 7,532 km².

1.2 Survey Purpose and Need

The purpose of the HRG&G surveys is to support the siting and design of offshore Project facilities including offshore platforms for converter stations and offshore submarine transmission cables.
Figure 1-1. Proposed Survey Areas for the NJOTF Project HRG&G Surveys.
1.3 HRG Survey Activities

1.3.1 Regulatory Criteria

The MMPA defines two levels of marine mammal incidental harassment: Level A and Level B. Level A harassment is defined in the MMPA as having the potential to injure a marine mammal or marine mammal stock in the wild. Level B harassment is defined in the MMPA as having the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild. However, distinct noise levels are not defined in the MMPA as causing Level A or B takes.

1.3.2 Marine Mammal Functional Hearing Groups

Different species groups of marine mammals tend to hear with greater sensitivity at different ranges of frequencies. The functional hearing ranges of marine mammals are summarized in Table 1-1. NMFS and the Bureau of Ocean Energy Management (BOEM) have advised that HRG survey equipment that operates at frequencies below 180 kilohertz (kHz) have the potential to harass marine mammals. Frequencies above 180 kHz are generally outside of the hearing ranges of marine mammals. See Section 1.3.3 for details on proposed HRG survey equipment.

<table>
<thead>
<tr>
<th>Hearing Group</th>
<th>Functional Hearing Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-frequency (LF) cetaceans (baleen whales)</td>
<td>7 Hz to 35 kHz</td>
</tr>
<tr>
<td>Mid-frequency (MF) cetaceans (dolphins, toothed whales)</td>
<td>150 Hz to 160 kHz</td>
</tr>
<tr>
<td>High-frequency (HF) cetaceans (harbor porpoises)</td>
<td>275 Hz to 160 kHz</td>
</tr>
<tr>
<td>Phocid pinnipeds (PW) (underwater) (true seals)</td>
<td>50 Hz to 86 kHz</td>
</tr>
</tbody>
</table>

Source: NMFS 2018

The 2018 revised technical guidance from NMFS on assessing the effects of anthropogenic sound on marine mammals characterizes the acoustic criteria that may cause a Level A take or Level B take or cause a change in the acoustic hearing threshold of marine mammals. Acoustic thresholds refer to the levels of sound that, if exceeded, will likely result in temporary or permanent changes in marine mammal hearing sensitivity. NMFS categorizes these changes in hearing sensitivity into two categories, temporary threshold shifts (TTS) and permanent threshold shifts (PTS) (Table 1-3). NMFS (2018) characterizes Level A harassment as exposure to high noise levels and the onset of PTS. The threshold for Level B harassment has been defined by NMFS as 160 decibel root mean squared sound pressure level (dB_{rms}) for impulsive noise (e.g., impact pile driving, sparkers, boomers) and 120 dB_{rms} for continuous noise (e.g., vibratory pile driving, drilling).

The weighted criteria\(^1\) for acoustic exposure to cause PTS and TTS are presented in Table 1-2.

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\(^1\) As stated in NMFS (2018), auditory weighting functions best reflect an animal’s ability to hear a sound (and do not necessarily reflect how an animal will perceive and behaviorally react to that sound). To reflect higher hearing sensitivity at particular frequencies, sounds are often weighted. Auditory weighting functions have been proposed for marine mammals, specifically associated with PTS onset thresholds expressed in the weighted SEL_{cum} metric, which take into account what is known about marine mammal hearing (Southall et al. 2007; Erbe et al. 2016).
Table 1-2. Weighted PTS and TTS Onset Thresholds for Marine Mammals.

<table>
<thead>
<tr>
<th>Hearing Group</th>
<th>PTS Onset</th>
<th>TTS Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Impulsive</td>
<td>Non-Impulsive</td>
</tr>
<tr>
<td>LF cetaceans</td>
<td>219 dBpeak</td>
<td>199 dB SELcum</td>
</tr>
<tr>
<td></td>
<td>183 dB SELcum</td>
<td></td>
</tr>
<tr>
<td>MF cetaceans</td>
<td>230 dBpeak</td>
<td>198 dB SELcum</td>
</tr>
<tr>
<td></td>
<td>185 dB SELcum</td>
<td></td>
</tr>
<tr>
<td>HF cetaceans</td>
<td>202 dBpeak</td>
<td>173 dB SELcum</td>
</tr>
<tr>
<td></td>
<td>155 dB SELcum</td>
<td></td>
</tr>
<tr>
<td>PW</td>
<td>218 dBpeak</td>
<td>201 dB SELcum</td>
</tr>
<tr>
<td></td>
<td>188 dB SELcum</td>
<td></td>
</tr>
</tbody>
</table>

1 As dual metrics, NMFS considers onset of PTS to have occurred when either one of the two metrics presented (dBpeak or SELcum) is exceeded.

Source: NMFS 2018

Notes – decibel peak sound pressure level (dBpeak); cumulative sound exposure level (SELcum)

1.3.3 HRG Survey Equipment

HRG surveys will be conducted within the survey areas described in Section 1.1 above. The HRG survey equipment is anticipated to be identical or similar to that used for site characterization for offshore wind development projects in the western North Atlantic Outer Continental Shelf (OCS), as previously approved by NMFS and BOEM (87 FR 806; 86 FR 40469; 86 FR 33664; 86 FR 26465). NEETMA has evaluated the HRG survey equipment utilized for other NMFS-issued IHAs for similar projects performed in the same region and presents a list of representative HRG survey equipment in Table 1-3. It should be noted that the exact survey equipment has not yet been determined and will be determined through the survey contracting process. Actual survey equipment to be used will be determined by the survey contractor and availability of vessels and equipment, as well as the data collection requirements and final survey design. Proposed representative equipment that is used in the acoustic analysis of this application includes non-parametric shallow sub-bottom profilers (SBPs; non-impulsive, mobile, intermittent sound source types; CHIRP Sonar), medium SBPs (impulsive, mobile sound source types; sparkers and boomer), parametric SBPs, ultra-short baseline (USBL) positioning and global acoustic positioning systems (GAPS), multibeam echosounders (MBES), and sidescan sonar. Survey equipment will be deployed as mounted to or towed behind vessels of 15 to 80 m in length and traveling at survey speeds of approximately 4 nm per hour (knots, 7.4 km per hour).

Each type of HRG survey equipment has a designated purpose and used together they can provide a detailed characterization of the survey areas needed to inform Project development and regulatory requirements. Representative HRG survey equipment is briefly described below.

- Shallow Penetration Sub-bottom Profilers (SBPs; Compressed High-Intensity Radiated Pulses [CHIRPs]) to map the near-surface stratigraphy (top 0 to 5 m (0 to 16 ft) of sediment below seabed). A CHIRP system emits sonar pulses that increase in frequency over time. The pulse length frequency range can be adjusted to meet project variables. These are typically mounted on the hull of the vessel or from a side pole.
• Medium penetration SBPs (Boomers) to map deeper subsurface stratigraphy as needed. A boomer is a broad-band sound source operating in the 3.5 Hz to 10 kHz frequency range. This system is typically mounted on a sled and towed behind the vessel.

• Medium penetration SBPs (Sparkers) to map deeper subsurface stratigraphy as needed. A sparker creates acoustic pulses from 50 Hz to 4 kHz omni-directionally from the source that can penetrate several hundred meters into the seafloor. These are typically towed behind the vessel with adjacent hydrophone arrays to receive the return signals.

• Parametric SBPs, also called sediment echosounders, for providing high density data in sub-bottom profiles that are typically required for cable routes, very shallow water, and archaeological surveys. These are typically mounted on the hull of the vessel or from a side pole.

• Ultra-short Baseline (USBL) Positioning and Global Acoustic Positioning System (GAPS) to provide high accuracy ranges to track the positions of other HRG equipment by measuring the time between the acoustic pulses transmitted by the vessel transceiver and the equipment transponder necessary to produce the acoustic profile. It is a two-component system with a hull or pole mounted transceiver and one to several transponders either on the seabed or on the equipment.

• Multibeam echosounder (MBES) to determine water depths and general bottom topography. MBES sonar systems project sonar pulses in several angled beams from a transducer mounted to a ship's hull. The beams radiate out from the transducer in a fan-shaped pattern orthogonally to the ship's direction.

• Seafloor imaging (sidescan sonar) for seabed sediment classification purposes, to identify natural and man-made acoustic targets resting on the bottom as well as any anomalous features. The sonar device emits conical or fan-shaped pulses down toward the seafloor in multiple beams at a wide angle, perpendicular to the path of the sensor through the water. The acoustic return of the pulses is recorded in a series of cross-track slices, which can be joined to form an image of the sea bottom within the swath of the beam. They are typically towed beside or behind the vessel or from an autonomous vehicle.

Based on the representative equipment discussed above, the shallow and medium SBPs have the potential to harass marine mammals. Equipment operating outside of marine mammal hearing ranges above 180 kHz (MBES and sidescan sonar) are not discussed further in this application as they do not have the potential to affect marine mammals occurring in the survey areas. Additionally, parametric SBPs operate at high frequencies with narrow bandwidths, which may result in Level A and B harassment isopleth distances less than 4 meters (m). Harassment exposure is therefore not reasonably expected from this source. USBLs are also not expected to result in Level A or B harassment due to their functionality and source characteristics (86 FR 8490).

Table 1-3 provides a list of representative HRG survey equipment that has the potential to result in Level A or B take of marine mammals and is used to assess take in this application (Section 6).
Table 1-3. Representative HRG Survey Equipment.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>CF = Crocker and Fratantonio (2016)</th>
<th>MAN = manufacturer</th>
<th>Operating frequency (kHZ)</th>
<th>SL_{rms} (dB re 1 \mu Pa m)</th>
<th>SL_{0-pk} (dB re 1 \mu Pa m)</th>
<th>Pulse duration (width) (millisecond)</th>
<th>Repetition rate (Hz)</th>
<th>Beamwidth (degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-parametric shallow penetration SBPs (non-impulsive)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET 216 (2000DS or 3200 top unit)</td>
<td>MAN</td>
<td>2-16</td>
<td>195</td>
<td>-</td>
<td>20</td>
<td>6</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET 424</td>
<td>CF</td>
<td>4–24</td>
<td>176</td>
<td>-</td>
<td>3.4</td>
<td>2</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>ET 512</td>
<td>CF</td>
<td>0.7–12</td>
<td>179</td>
<td>-</td>
<td>9</td>
<td>8</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>GeoPulse 5430A</td>
<td>MAN</td>
<td>2–17</td>
<td>196</td>
<td>-</td>
<td>50</td>
<td>10</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Teledyne Benthos Chirp III - TTV 170</td>
<td>MAN</td>
<td>2–7</td>
<td>197</td>
<td>-</td>
<td>60</td>
<td>15</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Medium penetration SBPs (impulsive)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AA, Dura-spark UHD (400 tips, 500 J)</td>
<td>CF</td>
<td>0.3–1.2</td>
<td>203</td>
<td>211</td>
<td>1.1</td>
<td>4</td>
<td>Omni</td>
<td></td>
</tr>
<tr>
<td>GeoMarine Geo Spark 2000 (400 tip)</td>
<td>CF</td>
<td>0.05-3</td>
<td>203</td>
<td>213</td>
<td>3.4</td>
<td>1</td>
<td>Omni</td>
<td></td>
</tr>
<tr>
<td>AA, triple plate S-Boom (700–1,000 J)</td>
<td>CF</td>
<td>0.1–5</td>
<td>205</td>
<td>211</td>
<td>0.6</td>
<td>4</td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

- not applicable; \( \mu Pa = \) micropascal; AA = Applied Acoustics; dB = decibel; ET = EdgeTech; J = joule; Omni = omnidirectional source; re = referenced to; SL = source level; 0-PK = zero-to-peak; RMS = root mean squared; UHD = ultra-high definition.

1 The Dura-spark measurements and specifications provided in Crocker and Fratantonio (2016) were used for all sparker systems proposed for the survey. These include variants of the Dura-spark sparker system and various configurations of the GeoMarine Geo-Source sparker system. The data provided in Crocker and Fratantonio (2016) represent the most applicable data for similar sparker systems with comparable operating methods and settings when manufacturer or other reliable measurements are not available.

2 GeoMarine Geo Spark 2000 (400 tips) information provided in 86 FR 40469 (Vineyard Wind 1 Marine Site Characterization Survey, 2021)

3 Crocker and Fratantonio (2016) provide S-Boom measurements using two different power sources (CSP–D700 and CSP–N). The CSP–D700 power source was used in the 700 J measurements but not in the 1,000 J measurements. The CSP–N source was measured for both 700 J and 1,000 J operations but resulted in a lower SL; therefore, the single maximum SL value was used for both operational levels of the S-Boom.
Because the HRG survey equipment to be used is anticipated to be identical or similar to HRG survey equipment used for other offshore projects, the Level A and B isopleths (distances to the Level A and B thresholds) in Table 1-4 were obtained from both the South Fork Wind issued IHA (87 FR 806) and the Vineyard Wind 1 issued IHA (86 FR 40469).

Table 1-4. Level A and B Harassment Isopleths by Representative HRG Survey Equipment Type.

<table>
<thead>
<tr>
<th>HRG Survey Equipment Type</th>
<th>LF Cetaceans (SEL_{cum})</th>
<th>MF Cetaceans (SEL_{cum})</th>
<th>HF Cetaceans (SEL_{cum})</th>
<th>HF Cetaceans (SPL_{pk})</th>
<th>PW (SEL_{cum})</th>
<th>Level B Harassment Isopleths (m)</th>
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</thead>
<tbody>
<tr>
<td>Shallow SBPs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET 216 CHIRP</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>2.9</td>
<td>NA</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>ET 424 CHIRP</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NA</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>GeoPulse 5430</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>36.5</td>
<td>NA</td>
<td>&lt;1</td>
<td>21</td>
</tr>
<tr>
<td>TB CHIRP III</td>
<td>1.5</td>
<td>&lt;1</td>
<td>16.9</td>
<td>NA</td>
<td>&lt;1</td>
<td>48</td>
</tr>
<tr>
<td>Medium SBPs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AA Triple plate S-Boom</td>
<td>&lt;1</td>
<td>0</td>
<td>0</td>
<td>4.7</td>
<td>&lt;1</td>
<td>34</td>
</tr>
<tr>
<td>Boom (700/1,000J)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AA Dura-spark UHD 500J/400</td>
<td>&lt;1</td>
<td>0</td>
<td>0</td>
<td>2.8</td>
<td>&lt;1</td>
<td>141</td>
</tr>
<tr>
<td>400+400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GeoMarine Geo Spark 2000</td>
<td>&lt;1</td>
<td>0</td>
<td>0</td>
<td>2.8</td>
<td>&lt;1</td>
<td>141</td>
</tr>
</tbody>
</table>

Note: Table adapted from Table 12 in 87 FR 806

2. Survey Dates, Duration, and Specific Geographic Region

NEETMA is proposing to conduct HRG&G surveys in both New Jersey state waters and federal waters as described in Section 1 (Figure 1-1). HRG&G surveys will cover the proposed cable corridors, proposed platform locations, and landfall areas. The total survey area is approximately 7,532 km². Water depths in the survey area extend from the shoreline to approximately 40 m offshore. As stated in Section 1.1, the proposed survey area is divided into a northern and southern survey area.

The HRG&G surveys are projected to be initiated in June 2022 and take place over a period of up to 12 months. The HRG&G survey schedule is based on 24-hour operations and an estimated total of 320 vessel days. 248 vessel days are estimated for the northern survey area and 72 vessel days are estimated for the southern survey area. The number of vessel days is estimated as the number of days required to cover the length of the survey area, assuming that up to 62 km is surveyed by one vessel in a 24-hour period based on contractor-supplied information. The estimate of 62 km surveyed per day was calculated by dividing the total linear survey distance of 18,311 km by 320 total survey days. Up to three survey vessels may be operating within one or both of the survey areas at one time. In addition, day boats used to transport crews back and forth from shore to an offshore vessel are not anticipated.

3. Species and Number of Marine Mammals

Thirty-nine species of marine mammals inhabit the regional waters off New Jersey, in the New York-New Jersey Bight, and the western North Atlantic OCS and may occur in the survey area, including six mysticetes (baleen whales), 28 odontocetes (toothed whales, dolphins, and porpoise), four pinnipeds (earless or true seals), and one species of sirenian (manatee) (NMFS 2021b). All marine mammals are protected under the MMPA (16 U.S.C. §§ 1361 et seq.). Five species that may occur in the Project area are protected as
threatened or endangered under the Endangered Species Act (ESA) (Table 4-1). Additionally, the fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), blue whale (*Balaenoptera musculus*), North Atlantic right whale (*Eubalaena glacialis*), sperm whale (*Physeter macrocephalus*), and humpback whale (*Megaptera novaeangliae*) are listed as Endangered by the states of New York and New Jersey and the harbor porpoise (*Phocoena phocoena*) is considered a species of special concern as defined in Section 182.2(i) of 6NYCRR Part 182 by the state of New York (Table 3-1).

Table 3-1 summarizes the marine mammal species known to occur on the western North Atlantic OCS, including the relative and seasonal occurrences for each species within the survey area. The table also includes each species’ conservation status, including the designation as a strategic or non-strategic stock, as defined by the MMPA (NMFS 2021b). A strategic stock is defined by the MMPA as marine mammal stock that meets one or more of the following criteria: the population experiences a level of human-caused mortality that exceeds the potential biological removal (PBR) level; the population is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future, based on the best available information; or the population is listed as a threatened marine mammal species under the ESA or is designated as depleted under the MMPA. A non-strategic stock is defined as any marine mammal stock that does not meet the strategic stock criteria. The occurrence of the 39 species of marine mammals that may occur or are expected or likely to occur in or transit near the survey area is based on the following criteria and/or the Mid-Atlantic Regional Council on the Ocean (MARCO) and Northeast Regional Ocean Council (NROC) data portals habitat models (i.e., Cadmus and CBI Catalyzing Collaboration 2020; MARCO 2021; NROC 2021) for the survey area and for species available in the model analyses:

- **Common** – occurring consistently in moderate to large numbers.
- **Regular** – occurring regularly, inhabitants at least seasonally and have been documented within the survey area.
- **Uncommon** – occurring in low numbers or on an irregular basis.
- **Rare** – records for some years but limited.
- **Not expected** – range includes the survey area but due to habitat preferences and distribution information, species are not expected to occur in the survey area although records may exist for adjacent waters.
Table 3-1. Marine Mammals Known to Occur in the Western North Atlantic Outer Continental Shelf.

<table>
<thead>
<tr>
<th>Common Name (Scientific Name)</th>
<th>Stock</th>
<th>ESA/ MMPA Status; Strategic (Y or N)</th>
<th>NJ Status</th>
<th>NY Status</th>
<th>Stock Abundance</th>
<th>Habitat Preference</th>
<th>Relative Occurrence in the Project Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mysticetes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Atlantic right whale</td>
<td>W. North Atlantic</td>
<td>ESA; E/D (Y)</td>
<td>E</td>
<td>E</td>
<td>368 Coastal to continental shelf</td>
<td>Regular</td>
<td></td>
</tr>
<tr>
<td>(Eubalaena glacialis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humpback whale</td>
<td>Gulf of Maine</td>
<td>MMPA; NL (N)</td>
<td>E</td>
<td>E</td>
<td>1,396 Coastal to continental shelf</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>(Megaptera novaeangliae)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fin whale (Balaenoptera</td>
<td>W. North Atlantic</td>
<td>ESA; E/D (Y)</td>
<td>E</td>
<td>E</td>
<td>6,802 Coastal to continental shelf</td>
<td>Regular</td>
<td></td>
</tr>
<tr>
<td>physalus physalus)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sei whale (Balaenoptera</td>
<td>Nova Scotia</td>
<td>ESA; E/D (Y)</td>
<td>E</td>
<td>E</td>
<td>6,292 Continental shelf</td>
<td>Uncommon</td>
<td></td>
</tr>
<tr>
<td>borealis borealis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minke whale (Balaenoptera</td>
<td>Canadian East Coast</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>21,968 Continental shelf</td>
<td>Regular</td>
<td></td>
</tr>
<tr>
<td>acutorostrata)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue whale (Balaenoptera</td>
<td>W. North Atlantic</td>
<td>ESA; E/D (Y)</td>
<td>E</td>
<td>E</td>
<td>Unknown (402 min) Deep water beyond the continental shelf</td>
<td>Rare</td>
<td></td>
</tr>
<tr>
<td>acutorostrata)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Odontocetes</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sperm whale (Physeter</td>
<td>North Atlantic</td>
<td>ESA; E</td>
<td>E</td>
<td>E</td>
<td>4,349 Continental shelf break and offshore</td>
<td>Uncommon</td>
<td></td>
</tr>
<tr>
<td>macrocephalus)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwarf and pygmy sperm whale</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>7,750 Offshore</td>
<td>Rare</td>
<td></td>
</tr>
<tr>
<td>(Kogia sima and Kogia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>breviceps)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risso’s dolphin (Grampus</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>35,215 Offshore</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>griseus)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-finned pilot whale</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>39,215 Continental shelf</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>(Globicephala melas)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Name (Scientific Name)</td>
<td>Stock</td>
<td>ESA/ MMPA Status; Strategic (Y or N)</td>
<td>NJ Status</td>
<td>NY Status</td>
<td>Stock Abundance</td>
<td>Habitat Preference</td>
<td>Relative Occurrence in the Project Area</td>
</tr>
<tr>
<td>-------------------------------</td>
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<td>----------------------------------------</td>
</tr>
<tr>
<td>Short-finned pilot whale (Globicephala macrorhynchus)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>28,924</td>
<td>Offshore</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Atlantic white-sided dolphin (Lagenorhynchus acutus)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>93,233</td>
<td>Continental shelf</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Common dolphin (Delphinus delphis delphis)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>172,974</td>
<td>Coastal and offshore</td>
<td>Common</td>
</tr>
<tr>
<td>Common bottlenose dolphin (Tursiops truncatus truncatus)</td>
<td>W. North Atlantic, Offshore</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>62,851</td>
<td>Offshore</td>
<td>Uncommon</td>
</tr>
<tr>
<td></td>
<td>W. North Atlantic, Northern Coastal Migratory</td>
<td>MMPA; NL/D; Y</td>
<td>N/A</td>
<td>N/A</td>
<td>6,639</td>
<td>Coastal, bays, inlets, and offshore</td>
<td>Common</td>
</tr>
<tr>
<td>Atlantic spotted dolphin (Stenella frontalis)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>39,921</td>
<td>Deep slope water and offshore</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Harbor porpoise (Phocoena phocoena phocoena)</td>
<td>Gulf of Maine/Bay of Fundy</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>SC</td>
<td>95,543</td>
<td>Coastal to continental shelf</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Cuvier's beaked whale (Ziphius cavirostris)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>5,744</td>
<td>DOW</td>
<td>Rare</td>
</tr>
<tr>
<td>Mesoplodont beaked whales (Blainville's, Gervais', True's, and Sowerby's) (Mesoplodon densirostris, M. europaeus, M. mirus, and M. bidens)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL/D (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>10,107</td>
<td>DOW</td>
<td>Rare</td>
</tr>
<tr>
<td>Common Name (Scientific Name)</td>
<td>Stock</td>
<td>ESA/ MMPA Status; Strategic (Y or N)</td>
<td>NJ Status</td>
<td>NY Status</td>
<td>Stock Abundance</td>
<td>Habitat Preference</td>
<td>Relative Occurrence in the Project Area</td>
</tr>
<tr>
<td>------------------------------</td>
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<td>----------------------------------------</td>
</tr>
<tr>
<td>Striped dolphin (<em>Stenella coeruleoalba</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>67,036</td>
<td>Offshore</td>
<td>Rare</td>
</tr>
<tr>
<td>Clymene dolphin (<em>Stenella clymene</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>4,237</td>
<td>DOW</td>
<td>Not Expected</td>
</tr>
<tr>
<td>Fraser's dolphin (<em>Lagenodelphis hosei</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>Unknown</td>
<td>DOW</td>
<td>Rare</td>
</tr>
<tr>
<td>Pantropical spotted dolphin (<em>Stenella attenuata</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>6,593</td>
<td>Deep slope water and offshore</td>
<td>Rare</td>
</tr>
<tr>
<td>Rough-toothed dolphin (<em>Steno bredanensis</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>136</td>
<td>DOW</td>
<td>Rare</td>
</tr>
<tr>
<td>Spinner dolphin (<em>Stenella longirostris</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>4,102</td>
<td>DOW</td>
<td>Rare</td>
</tr>
<tr>
<td>White-beaked dolphin (<em>Lagenorhynchus albirostris</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>536,016</td>
<td>Continental shelf</td>
<td>Rare</td>
</tr>
<tr>
<td>Killer whale (<em>Orcinus orca</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>Unknown</td>
<td>Continental shelf and rise; Open sea and offshore waters</td>
<td>Rare</td>
</tr>
<tr>
<td>Pygmy killer whale (<em>Feresa attenuata</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>Unknown</td>
<td>DOW</td>
<td>Not Expected</td>
</tr>
<tr>
<td>False killer whale (<em>Pseudorca crassidens</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>1,791</td>
<td>DOW</td>
<td>Rare</td>
</tr>
<tr>
<td>Northern bottlenose whale (<em>Hyperoodon ampullatus</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>Unknown</td>
<td>DOW</td>
<td>Not Expected</td>
</tr>
<tr>
<td>Melon-headed whale (<em>Peponocephala electra</em>)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>Unknown</td>
<td>DOW</td>
<td>Not Expected</td>
</tr>
<tr>
<td>Common Name (Scientific Name)</td>
<td>Stock</td>
<td>ESA/ MMPA Status; Strategic (Y or N)</td>
<td>NJ Status</td>
<td>NY Status</td>
<td>Stock Abundance</td>
<td>Habitat Preference</td>
<td>Relative Occurrence in the Project Area</td>
</tr>
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<tr>
<td><strong>Pinnipeds</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Harbor seal (Phoca vitulina vitulina)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>61,336</td>
<td>Coastal, bays, estuaries, inlets, Great Bay, Barnegat Inlet/Barnegat Lighthouse, Sandy Hook</td>
<td>Regular</td>
</tr>
<tr>
<td>Gray seal (Halichoerus grypus atlantica)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>27,300</td>
<td>Coastal and continental shelf waters, Muskeget Island</td>
<td>Regular</td>
</tr>
<tr>
<td>Harp seal (Pagophilus groenlandicus)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>7.6 million</td>
<td>Continental shelf with pack ice</td>
<td>Rare</td>
</tr>
<tr>
<td>Hooded seal (Phoca groenlandica)</td>
<td>W. North Atlantic</td>
<td>MMPA; NL (N)</td>
<td>N/A</td>
<td>N/A</td>
<td>Unknown</td>
<td>DOW at edge of continental shelf with pack ice</td>
<td>Rare</td>
</tr>
<tr>
<td><strong>Sirenians</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Florida manatee (Trichechus manatus latirostris)</td>
<td>-</td>
<td>ESA; T/D (Y)</td>
<td>N/A</td>
<td>N/A</td>
<td>~6,300</td>
<td>Nearshore: marine, brackish, and freshwater systems in coastal and riverine areas</td>
<td>Not Expected</td>
</tr>
</tbody>
</table>

Notes: D = depleted; DOW = deep ocean water; E = Endangered; ESA = Endangered Species Act; M / SI = Mortality / Serious Injury; min = minimum; MMPA = Marine Mammal Protection Act; N/A = Not applicable; NJ = New Jersey; NL = not listed; NY = New York; PBR = Potential Biological Removal; SC = Special Concern; T = Threatened; W. = Western.

4. Affected Species Status and Distribution

The species with likelihood of occurrence identified as not expected or rare in the survey area (Table 3-1) are not anticipated to be present in or near the survey area at densities that make them vulnerable to impact from project activities; therefore, they are not carried forward in the following sections. The following 16 potentially affected species are those that have a regular, common, or uncommon relative occurrence in the survey areas, or have a very wide distribution with limited distribution or abundance details, so it is possible they could occur within the survey area. Status, stock identification, distribution, and occurrence of these marine mammal species are listed in Table 3-1 and each species and stock is discussed in the following sections. The 16 species assessed for take estimates in this application include:

1. North Atlantic right whale,
2. Fin whale,
3. Sei whale,
4. Sperm whale,
5. Humpback whale,
6. Common minke whale,
7. Risso's dolphin,
8. Short-finned pilot whale
9. Long-finned pilot whale
10. Atlantic white-sided dolphin,
11. Common dolphin,
12. Common bottlenose dolphin,
13. Atlantic spotted dolphin,
14. Harbor porpoise,
15. Harbor seal, and

4.1 Threatened and Endangered Marine Mammals

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

The North Atlantic right whale was listed as a federally endangered species in 1970 and is considered one of the most critically endangered large whale species in the world (Clapham et al. 1999; Weinrich et al. 2000; Hayes et al. 2021; Quintana-Rizzo et al. 2021; 71 FR 77704; 73 FR 12024). The North Atlantic right whale has seen a nominal two percent recovery rate since it was listed as a protected species (Waring et al. 2015), which is much lower than the recovery rate of seven to eight percent documented for the Southern right whale distinct population segment (DPS) in the Southern Hemisphere (Knowlton and Kraus 2001). Right whales are considered grazers as they swim slowly with their mouths open. They are the slowest swimming whales and can only reach speeds up to 10 miles (mi) (16 km) per hour. They typically dive between 80 and 175 m and stay submerged for typically 10 to 15 minutes, following their prey below the surface (Baumgartner and Mate 2003). North Atlantic right whale hearing is in the low-frequency range (Southall et al. 2007, 2019).

The North Atlantic right whale is a migratory species that moves annually between high-latitude feeding grounds and low-latitude calving and breeding grounds. The present range of the western North Atlantic right whale population extends from the southeastern U.S., which is utilized for wintering and calving, to summer feeding and nursery grounds in New England, the Bay of Fundy, and the Gulf of St. Lawrence (Kenney 2017; Hayes et al. 2021). The winter distribution of North Atlantic right whales is largely unknown, although offshore surveys have reported one to 13 detections annually from 1996 to 2001 in northeastern Florida and southeastern Georgia (Hayes et al. 2021). A few events of North Atlantic right whale calving have been documented from shallow coastal areas and bays (Kenney 2017). Some evidence provided through acoustic
monitoring suggests that not all individuals of the population participate in annual migrations, with a continuous presence of North Atlantic right whales occupying their entire habitat range throughout the year, particularly north of Cape Hatteras (Davis et al. 2017). These data also recognize changes in population distribution throughout the right whale habitat range that could be due to environmental or anthropogenic effects, a response to short-term changes in the environment, or a longer-term shift in the right whale distribution cycle. For example, since 2010, there has been an apparent shift in North Atlantic right whale habitat use, with decreasing use of the Great South Channel and increasing use of Cape Cod Bay, the Mid-Atlantic Bight, and the Gulf of St. Lawrence (Whitt et al. 2013; Davis et al. 2017; Mayo et al. 2018; Quintana-Rizzo et al. 2021).

Three critical habitat areas were designated for this species in 1994: (1) the Cape Cod Bay/Stellwagen Bank, (2) the Great South Channel, and (3) waters adjacent to the coasts of Georgia and the east coast of Florida (59 FR 28805). In 2016, NMFS issued a final rule to replace the critical habitat for right whales in the North Atlantic with two new areas. The areas being designated as critical habitat contain approximately 29,763 square nm of marine habitat in the Gulf of Maine and Georges Bank region (Unit 1) and off the Southeast U.S. coast (Unit 2) (81 FR 4837). Unit 1 contains approximately 29,763 square nautical miles (nm²) of marine habitat in the Gulf of Maine and Georges Bank region. No critical habitat for the North Atlantic right whale occurs in the survey area; however, two Seasonal Management Areas (SMA) fall within the survey area.

Observations in December 2008 noted congregations of more than 40 individual North Atlantic right whales in the Jordan Basin area of the Gulf of Maine, leading researchers to believe this may be a wintering ground (NOAA Fisheries 2008). A North Atlantic right whale satellite tracking study within the northeast Atlantic (Baumgartner and Mate 2005) reported that this species often visited waters exhibiting low bottom water temperatures, high surface salinity, and high surface stratification, most likely for higher food densities. North Atlantic right whales may be found in feeding grounds within New England waters between February and May, with peak abundance in late March (NOAA 2005). While in New England, North Atlantic right whales feed mostly on copepods belonging to the Calanus and Pseudocalanus genera (Hayes et al. 2021).

The North Atlantic right whale was the first species targeted during commercial whaling operations and was the first species to be greatly depleted because of whaling operations (Kenney 2017). North Atlantic right whales were hunted in southern New England until the early twentieth century. Shore-based whaling in Long Island, New York, involved catches of North Atlantic right whale year-round, with peak catches in spring during the northbound migration from calving grounds off the southeastern U.S. to feeding grounds in the Gulf of Maine (Kenney and Vigness-Raposa 2010).

Abundance estimates for the North Atlantic right whale population vary. From the 2003 U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments, there were only 291 North Atlantic right whales in existence, which is fewer than what was reported in the Northern Right Whale Recovery Plan written in 1991 (NMFS 1991a; Waring et al. 2004). Pre-exploitation numbers are estimated at around 1,000 individuals. When the right whale was finally protected in the 1930s, the North Atlantic right whale population was roughly 100 individuals (Waring et al. 2004). In 2015, the Western North Atlantic population was estimated to be at least 476 individuals (Waring et al. 2016). That population size estimate decreased to 440 individuals in 2017 (Hayes et al. 2017), with a median estimate of abundance of 451 in 2018 (Hayes et al. 2019). Additional information provided by Pace et al. (2017) confirms that the probability that the North Atlantic right whale population has declined since 2010 is 99.99 percent. The 2020 population estimate for the North Atlantic right whale was 412 individuals identified using photo-identification techniques (Pace et al. 2017; Hayes et al. 2021). Based on the North Atlantic Right Whale Consortium 2020 Annual Report Card, the best estimate for the end of 2019 is 356 North Atlantic right whales (Pettis et al. 2021). As of October 2021, the North Atlantic Right Whale Consortium announced that the population had dropped to 336 individuals in 2020, the lowest estimate for the species in the last 20 years (New England Aquarium 2021; North Atlantic Right Whale Consortium 2021). However, using the Pace et al. (2017) state–space mark–recapture estimates, the most recent estimate is 368 individuals as of
January 2019 (Pace 2021; NMFS 2021b; Pettis et al. 2021). The current draft 2021 Stock Assessment Report estimates an abundance of 368 individuals, which is a decrease from 412 individuals as estimated for 2020 (NMFS 2021b; Hayes et al. 2021). This estimate is based on an updated published state-space model of the sighting histories of individual whales identified using photo-identification techniques (Pace et al. 2017, Pace 2021) and reflects the impacts of the ongoing Unusual Mortality Event (UME) declared in 2017 for the species (NOAA Fisheries 2021a). Data indicate that the number of adult females dropped from 200 in 2010 down to 186 in 2015, while males dropped from 283 to 272 in the same timeframe. Also cause for concern is the confirmed mortality of 14 individuals in 2017 alone (Pace et al. 2017).

The most recent stock assessment report (NMFS 2021b) noted that studies by van der Hoop et al. (2015) have concluded large whale vessel strike mortalities decreased inside active SMAs but have increased outside inactive SMAs. In 2017, there were 17 North Atlantic right whale mortalities (Daoust et al. 2017). This number exceeds the largest estimated mortality rate during the past 25 years. Further, despite high survey effort, only 5 and 0 calves were detected in 2017 and 2018, respectively. An UME for the species was declared in June 2017 and since then, 34 North Atlantic right whales have stranded dead (21 in Canada; 12 in the U.S.) and 15 live, free-swimming, non-stranded whales have been documented with serious injuries from entanglements or vessel strikes (NOAA Fisheries 2021a). The major cause of the UME is vessel strikes and gear entanglement.

North Atlantic right whales have been observed in or near waters south of New England during all four seasons (New Jersey Department of Environmental Protection [NJDEP] 2010); however, they are most common in the spring when they are migrating north and in the fall during their southbound migration (Kenney and Vigness-Raposa 2010; Roberts et al. 2016). North Atlantic right whales were reported off New Jersey in all seasons except summer during the 2008-2009 aerial- and vessel-based surveys (NJDEP 2010; Whitt et al. 2013, 2015). They were observed in the spring 2014 aerial, the winter/spring 2015 aerial, the spring 2019 aerial Atlantic Marine Assessment Program for Protected Species (AMAPPS) surveys (Northeast Fisheries Science Center [NEFSC] and Southeast Fisheries Science Center [SEFSC] 2014, 2015, 2020). A single North Atlantic right whale occurred in the project area during the Geotechnical 1A Survey in winter 2017-2018 (Smultea Environmental Sciences 2018). Three North Atlantic right whale sightings within the project area were reported between 13 and 14 December 2018 (NOAA Fisheries 2019). During the New York-New Jersey Bight Whale Monitoring Aerial Surveys March 2017 – February 2018, 13 individual North Atlantic right whales were observed during winter (two whales in January and one whale in February), spring (three whales in March and five whales in April) and two whales during fall (November) (Tetra Tech and LGL 2019).

Passive Acoustic Monitoring (PAM) of North Atlantic right whales has been conducted in and near the survey area (Whitt et al. 2013; Davis et al. 2017; Woods Hole Oceanographic Institution [WHOI] 2021; WhaleMap 2021) and have demonstrated their year-round presence off New Jersey (Whitt et al. 2013, 2015). A digital acoustic monitoring (DMON) moored buoy was deployed 20 miles southeast of Atlantic City, New Jersey, on 30 July 2020, to monitor the presence of baleen whales in near real-time by automatically detecting and identifying their calls (WHOI 2021). North Atlantic right whales have been detected off New Jersey during the fall, winter, and spring with the last detection in early March (WHOI 2021). From November to December 2020, a Slocum G3 glider was deployed in the survey area off Atlantic City and North Atlantic right whales were detected during both months (WHOI 2021). During summer and fall 2020, Slocum G3 gliders were deployed in the survey area off Atlantic City and North Atlantic right whales were not detected during the months of July, August, or October (WHOI 2021).

4.1.2 Fin Whale (Balaenoptera physalus) – Endangered

The fin whale was listed as federally endangered in 1970 and is considered a strategic stock although no critical habitat is designated. The fin whale is MMPA depleted throughout its range. NMFS initiated a 5-year review of the fin whale in January 2018 to determine whether a reclassification or delisting may be warranted
In February 2019, the review indicated that, based on the most reliable available scientific and commercial information, the fin whale should be downlisted from endangered to threatened; however, this downlisting has not occurred and is recommended for future action (NMFS 2019). A final recovery plan was written for fin whales in 2010 (NMFS 2010).

Fin whales’ range in the North Atlantic extends from the Gulf of Mexico, Caribbean Sea, and Mediterranean Sea in the south to Greenland, Iceland, and Norway in the north (Jonsgård 1966; Gambell 1985). They are the most sighted large whales in continental shelf waters from the mid-Atlantic coast of the U.S. to Nova Scotia (Sergeant 1977; Sutcliffe and Brodie 1977; Cetacean and Turtle Assessment Program (CeTAP) 1982; Hain et al. 1992; Waring et al. 2008). Fin whales, much like humpback whales, seem to exhibit site fidelity (Kenney and Vigness-Raposa 2010). However, fin whales’ habitat use has shifted in the southern Gulf of Maine, most likely due to changes in the abundance of sand lance and herring, both of which are major prey species along with squid, krill, and copepods (Kenney and Vigness-Raposa 2010). While fin whales typically feed in the Gulf of Maine and the waters surrounding New England, mating and calving (and general wintering) areas are still largely unknown (Hayes et al. 2021).

The overall pattern of fin whale movement is complex, consisting of a less obvious north-south pattern of migration than that of right and humpback whales. Based on acoustic recordings from hydrophone arrays, Clark (1995) reported a general southward flow pattern of fin whales in the fall from the Labrador/Newfoundland region, past Bermuda, and into the West Indies. The overall distribution may be based on prey availability, as this species preys opportunistically on both invertebrates and fish (Watkins et al. 1987). Fin whale abundance off the coast of the northeastern U.S. is highest between spring and fall, with some individuals remaining during the winter (Hain et al. 1992). Past estimates of fin whale abundance conducted between Georges Bank and the Gulf of St. Lawrence during the feeding season in August 2006 place the western North Atlantic fin whale populations at 2,269 individuals (Waring et al. 2007). More recent estimates indicate the western North Atlantic fin whale population is 6,802 individuals (Hayes et al. 2021). Fin whales are the second largest living whale species on the planet (Kenney and Vigness-Raposa 2010). The gestation period for fin whales is approximately 11 months and calf births occur between late fall and winter. Females can give birth every two to three years. Their hearing is in the low-frequency range (Southall et al. 2007, 2019).

From 2008 to 2012, the minimum annual rate of mortality for the North Atlantic stock from anthropogenic causes was approximately 3.35 per year (Waring et al. 2015) while from 2010 to 2014, this number has increased to 3.8 (Hayes et al. 2017). The average annual observed and estimated mortality and injury for fin whales is 1.8 for the years 2015 to 2019 (NMFS 2021b). There have not been any UMEs documented for fin whales in the last three decades. Increase in ambient noise has also impacted fin whales, for whales in the Mediterranean have demonstrated at least two different avoidance strategies after being disturbed by tracking vessels (Jahoda et al. 2003). The most reliable abundance estimate available for the western North Atlantic fin whale stock is 6,802 based on the 2016 NOAA shipboard and aerial surveys and the 2016 NEFSC and Fisheries and Oceans Canada (DFO) surveys (Lawson and Gosselin 2018; NEFSC and SEFSC 2018; Garrison 2020; Palka 2020; Hayes et al. 2021).

Fin whales are present in waters south of New England waters and may occur in the survey area during all four seasons (NJDEP 2010). In spring, summer, and fall, the main center of their distribution is in the Great South Channel area to the east of Cape Cod, which is a well-known feeding ground (Kenney and Winn 1986). Winter is the season of lowest overall abundance, but they do not depart the area entirely. Fin whales are the most common large whale encountered in continental shelf waters (Muirhead et al. 2018). They are the whales most often encountered by local whale-watching operations in most years and are likely to occur in the vicinity of the survey area. Fin whales were reported off New Jersey in all seasons during the 2008-2009 aerial- and vessel-based surveys (NJDEP 2010; Whitt et al. 2015). Fin whales were observed in the survey area during the fall 2012 aerial, spring 2013 aerial, spring 2014 aerial, spring and summer 2017 aerial, winter 2018 aerial, spring
2019 aerial, and summer 2016 shipboard AMAPPS surveys (NEFSC and SEFSC 2012, 2013, 2014, 2016, 2018, 2019, 2020). Fin whales were recorded in the survey area during the summer 2017 HRG survey (Alpine 2017) and during the Geotechnical 1A Survey in winter 2017-2018 (Smultea Environmental Sciences 2018). During the New York-New Jersey Bight Whale Monitoring Aerial Surveys March 2017 – February 2018, fin whales were recorded in all four seasons and all months, except for April and June (Tetra Tech and LGL 2019). Fin whales were reported off New Jersey during the Atlantic Shores 2020 Offshore Windfarm HRG survey from April to August 2020 (RPS 2020). During Digital Aerial Baseline Surveys in the New York-New Jersey Bight, fin whales were recorded off New Jersey in the summer and fall (Normandeau and APEM 2020).

PAM of fin whales has been conducted in and near the survey area (WHOI 2021). A DMON moored buoy was deployed 20 miles southeast of Atlantic City, New Jersey, on 30 July 2020 to monitor the presence of baleen whales in near real-time by automatically detecting and identifying their calls (WHOI 2021). Fin whales have been detected almost daily during the months of October, November, January, February off New Jersey with the last detection in early March (WHOI 2021). From November to December 2020, a Slocum G3 glider was deployed in the survey area off Atlantic City and fin whales were detected during both months (WHOI 2021). During summer and fall 2020, Slocum G3 gliders were deployed in the survey area off Atlantic City and fin whales were not detected during the months of July or October but detected on one day in August (WHOI 2021).

4.1.3 Sei Whale (*Balaenoptera borealis*) – Endangered

The sei whale was listed as federally endangered in 1970 and a final recovery plan was published for the species in 2011 (NOAA Fisheries 2011). The stock that resides in the U.S. Exclusive Economic Zone (EEZ) is the Nova Scotian stock, which is highly migratory from the northeast U.S. to Newfoundland (Hayes et al. 2021). Sei whales typically inhabit deeper offshore waters of the OCS (Hain et al. 1985; BOEM 2014). However, they have been known to episodically enter shallow inshore waters (Payne et al. 1990; Flinn et al. 2002; Hayes et al. 2017). Of the other large whales, sei whales are the least abundant species in the survey area (Kraus et al. 2016). However, there is still a possibility that this species may be encountered during HRG surveys (Right Whale Consortium 2014). The major prey of sei whales are copepods, in addition to small schooling fish and squid (Flinn et al. 2002). Sei whales are generally sighted traveling in small groups (less than five individuals), but it is not unusual for larger congregations to be found in feeding grounds (NOAA Fisheries 2018a). Their hearing is in the low-frequency range (Southall et al. 2007, 2019).

The most recent estimate of abundance for the Nova Scotia stock of sei whales is 6,292 individuals based on spatially- and temporally explicit density models derived from abundance survey data collected between 2010 and 2013 (Palka et al. 2017; Hayes et al. 2021). This is considered a low estimate as sei whales inhabit deep offshore waters that have not been surveyed to a great extent. In addition, there is insufficient information to determine population trends for the species. Sei whales migrate from south of Cape Cod to the eastern Canadian coast in June and July and return in September and October (Waring et al. 2014, 2016). Sei whales are most abundant in deep southern New England waters in summer and absent in winter (Waring et al. 2014, 2016; Roberts et al. 2016). No sei whales were recorded during Ecological Baseline Studies (EBS) surveys, but a fin/sei whale (could not be identified to species) was documented in the waters off New Jersey during the summer 2016 and 2017 AMAPPS surveys (NJDEP 2010; NEFSC and SEFSC 2016, 2018). During the New York-New Jersey Bight Whale Monitoring Aerial Surveys March 2017 – February 2018, no sei whales were confirmed to species (Tetra Tech and LGL 2019). A sighting of one sei whale was reported off New Jersey during the Atlantic Shores 2020 Offshore Windfarm HRG survey from April to August 2020 (RPS 2020). During Digital Aerial Baseline Surveys in the New York-New Jersey Bight, sei whales were recorded off New Jersey in the spring (Normandeau and APEM 2020).
PAM of sei whales has been conducted in and near the survey area (WHOI 2021). A DMON moored buoy was deployed 20 miles southeast of Atlantic City, New Jersey, on 30 July 2020 to monitor the presence of baleen whales in near real-time by automatically detecting and identifying their calls (WHOI 2021). Sei whales were detected during the month of January off New Jersey on one occasion (WHOI 2021). From November to December 2020, a Slocum G3 glider was deployed in the survey area off Atlantic City and fin whales were detected during both months (WHOI 2021). During summer and fall 2020, Slocum G3 gliders were deployed in the survey area off Atlantic City and sei whales were not detected during the months of July, October, or November (WHOI 2021).

4.1.4 Sperm Whale (*Physeter macrocephalus*) – Endangered

Sperm whales are listed as endangered under the ESA and are considered a strategic stock by NMFS (Hayes et al. 2020). Data are insufficient to assess population trends, and the current abundance estimate was based on only a fraction of the known stock range (Hayes et al. 2020). For the North Atlantic, the most reliable estimate of abundance is 4,349 and the minimum population size estimate is 3,451 individuals (NEFSC and SEFSC 2018; Garrison 2020; Palka 2020; Hayes et al. 2020).

Sperm whales are highly social, with a basic social unit consisting of 20 to 40 adult females, calves, and some juveniles (Rice 1998; Whitehead 2017). During their prime breeding period and old age, male sperm whales are essentially solitary. Males rejoin or find nursery groups during prime breeding season. While foraging, sperm whales typically gather in small clusters. Between diving bouts, sperm whales are known to raft together at the surface. Adult males often forage alone. Groups of females may spread out over distances greater than 0.5 nm (0.9 km) when foraging. When socializing, they generally gather into larger surface-active groups (Whitehead 2003; Jefferson et al. 2015). In the Northern Hemisphere, the peak breeding season for sperm whales occurs between March and June, and in the Southern Hemisphere, between October and December (Best et al. 1984; NMFS 2015). Sperm whale hearing is in the mid-frequency range (Southall et al. 2007, 2019).

This species primarily preys on squid and octopus and is also known to prey on fish, such as lumpsuckers and redfish (Clarke 1980, 1996; Martin and Clarke 1986). Although sperm whales are generalists in terms of prey, specialization does appear to occur in a few places. The main sperm whale feeding grounds are correlated with increased primary productivity caused by upwelling.

The sperm whale is thought to have a more extensive distribution than any other marine mammal, except possibly the killer whale. Sperm whales are found in polar to tropical waters, from approximately 70° N to 70° S (Rice 1998; Whitehead 2003). This species has a range throughout global deep oceans, essentially from equatorial zones to the edges of the polar pack ice. In the Atlantic, sperm whales are found throughout the Gulf Stream and North Central Atlantic Gyre. Sperm whales show a strong preference for deep waters (Rice 1998; Whitehead 2003). Sperm whale concentrations near bathymetric drop-offs and areas with strong currents and steep topography are correlated with high prey productivity. These whales occur almost exclusively at the shelf break, regardless of season (New York Department of State [NYDOS] 2013). Their distribution is typically associated with waters over the continental shelf break and the continental slope and into deeper waters (Whitehead et al. 1992; Jefferson et al. 2015). Migrations of sperm whales are not as regular or as well understood as those of most baleen whales. Sperm whales are widely distributed and dependent on their food source. Their migrations are not as specifically tied to seasons as seen in large baleen whale species. In some mid-latitudes, there appears to be a general seasonal north-south migration, with whales moving poleward in summer, but in equatorial and some temperate areas, there is no clear seasonal migration. In the North Atlantic, specifically off New York and Nova Scotia, sperm whales are sighted regularly in waters less than 300 m deep (Rice 1998; Whitehead 2003).

Sperm whales could potentially occur in the project area. During the summer 2017 and spring 2019 AMAPPS aerial surveys, single sperm whales was documented in the waters off New Jersey, in the deeper portion of the
shelf edge (NEFSC and SEFSC 2018, 2020). During the New York-New Jersey Bight Whale Monitoring Aerial Surveys March 2017 – February 2018, sperm whales were observed during all four seasons and most frequently during summer and fall (Tetra Tech and LGL 2019).

4.2 Non-Endangered Marine Mammals

4.2.1 Cetaceans

4.2.1.1 Humpback Whale (Megaptera novaeangliae) – Non-Strategic

The humpback whale was listed as endangered in 1970 due to population decreases resulting from overharvesting. In September 2016, NMFS revised the ESA listing for the humpback whale to identify 14 DPSs based on breeding populations: West Indies, Cape Verde Islands/Northwest Africa, Hawaii, Mexico, Central America, Brazil, Gabon/Southwest Africa, Southeast Africa/Madagascar, West Australia; East Australia, Oceania, Southeastern Pacific, and Arabian Sea (81 FR 62259). Under this new final rule, humpback whales are considered endangered in the Cape Verde Islands/Northwest Africa, Western North Pacific, Central America, and Arabian Sea DPSs and are considered threatened in the Mexico DPS. For all the remaining DPSs, including the West Indies DPS, to which humpback whales along the east coast of the U.S. belong, humpback whales are no longer listed as endangered or threatened.

Humpback whales feed on small prey that is often found in large concentrations, including krill and fish such as herring and sand lance (Kenney and Vigness-Raposa 2010; Hayes et al. 2020). Humpback whales are thought to feed mainly while migrating and in summer feeding areas; little feeding is known to occur in their wintering grounds. Humpback whales feed over the continental shelf in the North Atlantic between along the east coast of the U.S, the Gulf of St. Lawrence, Newfoundland/Labrador, and western Greenland (Katona and Beard 1990), consuming roughly 95 percent small schooling fish and five percent zooplankton (i.e., krill), and they will migrate throughout their summer habitat to locate prey (Kenney and Winn 1986). They swim below the thermocline to pursue their prey, so even though the surface temperatures may be warm, they are frequently swimming in cold water (NMFS 1991b). Humpback whales from the North Atlantic migrate to the breeding grounds in the West Indies during winter (Clapham and Mayo 1987; Robbins et al. 2001; MacKay et al. 2016; Hayes et al. 2020), where calves are born between January and March (Baraff and Weinrich 1993; Robbins 2007). Their hearing is in the low-frequency range (Southall et al. 2007, 2019).

Humpback whales occur off southern New England in all four seasons, with peak abundance in spring and summer. The whales exhibit consistent fidelity to feeding areas within the northern hemisphere (Stevick et al. 2006). In winter, whales from waters in the Gulf of Maine, Gulf of St. Lawrence, western Greenland, Iceland, and Norway migrate to mate and calve primarily in the West Indies (including the Bahamas, Turks and Caicos Islands, Silver Bank, Samaná Bay, Puerto Rico, and the Lesser Antilles), where spatial and genetic mixing among these groups occurs (Katona and Beard 1990; Mattila et al. 1989; MacKay et al. 2016; Stevick et al. 2018). While migrating, humpback whales utilize the mid-Atlantic as a migration pathway between calving/mating grounds and feeding grounds in the north (Waring et al. 2007). Since 1989, observations of juvenile humpback whales in the mid-Atlantic have been increasing during the winter months, peaking January through March (Swingle et al. 1993). Biologists theorize that non-reproductive animals may be establishing a winter-feeding range in the mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. Swingle et al. (1993) identified a shift in distribution of juvenile humpback whales in the nearshore waters of Virginia, primarily in winter months (Aschettino et al. 2015, 2016, 2017, 2018, 2019, 2020a, b, 2021) (Virginia had the greatest number of strandings from 2016 to 2019; NOAA Fisheries 2021b). This is exemplified from 2016 to May 2019, where Virginia had the highest number of strandings along the western Atlantic coast from Maine to Florida (NOAA Fisheries 2021b).
Humpback whales were hunted as early as the seventeenth century, with most whaling operations having occurred in the nineteenth century (Kenney and Vigness-Raposa 2010). Before whaling activities, it was thought that the abundance of whales in the North Atlantic stock was in excess of 15,000 (Nowak 2002). By 1932, commercial hunting within the North Atlantic may have reduced the humpback whale population to as few as 700 individuals (Breiwick et al. 1983). Humpback whales were commercially exploited by whalers throughout their range until they were protected in the North Atlantic in 1955 by the International Whaling Commission ban. Humpback whaling ended worldwide in 1973 (Jefferson et al. 2015).

An UME for humpback whales was declared in January 2016, and since then, 151 humpback whales have stranded between Maine and Florida, with approximately 50% due to ship strike or entanglement (NOAA Fisheries 2021b). The humpback whale population within the North Atlantic has been estimated to include approximately 11,570 individuals (Waring et al. 2015, 2016). Through photographic population estimates, humpback whales within the Gulf of Maine have been estimated to consist of 600 individuals in 1979 (NMFS 1991b). According to the latest species stock assessment report, the most reliable estimate of abundance for the Gulf of Maine stock of humpback whales is 1,393 individuals based on a state-space model of the sighting histories of individual whales identified using photo-identification techniques (Pace et al. 2017; Hayes et al. 2020).

Humpback whales have been observed in or near waters south of New England and in the survey area during all four seasons (NJDEP 2010); however, they are most common in the spring and summer when they are migrating north (Roberts et al. 2016; Stone et al. 2017; Brown et al. 2018, 2019; King et al. 2021). Humpback whales were reported off New Jersey in all seasons during the 2008-2009 aerial- and vessel-based surveys; most sightings were recorded during winter (NJDEP 2010; Whitt et al. 2015). Humpback whales were also observed during the spring and fall AMAPPS aerial surveys (NEFSC and SEFSC 2013, 2016, 2018, 2019, 2020). During the New York-New Jersey Bight Whale Monitoring Aerial Surveys March 2017 – February 2018, humpback whales were recorded during all four seasons and most frequently during spring and winter (Tetra Tech and LGL 2019). Humpback whales were present in the survey area during the Geotechnical 1A Survey in winter 2017-2018 (Smultea Environmental Sciences 2018) and during the summer 2017 HRG survey (Alpine 2017). During the Equinor Wind HRG Survey Campaign from April to July 2019 off New York and New Jersey, humpback whales occurred in the survey area (Milne 2019). During Digital Aerial Baseline Surveys in the New York-New Jersey Bight, humpback whales were recorded off New Jersey in the spring (Normandeau and APEM 2020). During vessel-based surveys between 2017 and 2019, humpback whales were observed in the New York Bight nearshore and mid-shelf areas (10-60 km offshore), but more common in the mid-shelf areas (King et al. 2021). The relatively recent increase in humpback whale sightings in the New York Bight suggests that this is an important supplementary foraging area for migrating whales (Brown et al. 2018; King et al. 2021).

PAM of humpback whales has been conducted in and near the survey area (WHOI 2021). A DMON moored buoy was deployed 20 miles southeast of Atlantic City, New Jersey, on 30 July 2020 to monitor the presence of baleen whales in near real-time by automatically detecting and identifying their calls (WHOI 2021). Humpback whales have been detected from October through March off New Jersey with the last detection in early March (WHOI 2021). From November to December 2020, a Slocum G3 glider was deployed in the survey area off Atlantic City and humpback whales were detected during both months (WHOI 2021). In July 2020, a Slocum G3 glider was deployed in the survey area off Atlantic City and humpback whales were not detected (WHOI 2021).

**4.2.1.2 Common Minke Whale (Balaenoptera acutorostrata) – Non-Strategic**

Common minke whales (referred to as minke whales) are among the most widely distributed of all the baleen whales. They occur in the North Atlantic and North Pacific, from tropical to polar waters. Minke whales’ range between 6 and 9 m (20 and 30 ft) with maximum lengths of 9 to 10 m (30 to 33 ft) and are the smallest of the
North Atlantic baleen whales (Jefferson et al. 1993; Wynne and Schwartz 1999; Kenney and Vigness-Raposa 2010). The primary prey species for minke whales are most likely sand lance, clupeids, gadoids, and mackerel (Kenney and Vigness-Raposa 2010). These whales generally feed below the surface of the water, and calves are usually not seen in adult feeding areas. Minke whales are almost absent from OCS waters off the western Atlantic in winter; however, they are common in the fall and abundant in spring and summer (CTAP 1982; Kenney and Vigness-Raposa 2010). In the 2015 stock assessment, the estimate for minke whales in the Canadian East Coast stock was 20,741 (Waring et al. 2016). The most reliable available current abundance estimate is 5,036 individuals (Palka 2020); however, this estimate only covers U.S. waters and slightly beyond into Canadian waters, and thus does not cover the habitat of the entire Canadian East Coast stock. The most recent abundance estimate for the entire Canadian East Coast stock is 21,968 individuals, which covers a larger portion of this stock including Nova Scotian and Newfoundland Canadian waters (Lawson and Gosselin 2018; NEFSC and SEFSC 2018; Palka 2020; Hayes et al. 2021). Their hearing is in the low-frequency range (Southall et al. 2007, 2019).

Minke whales are usually seen either alone or in small groups, although large aggregations sometimes occur in feeding areas (Reeves et al. 2002). Minke whale populations are often segregated by sex, age, or reproductive condition. Known for their curiosity, minke whales often approach boats. Minke whales have been observed south of New England during all four seasons (NJDEP 2010); however, widespread abundance is highest in spring through fall (Waring et al. 2016). Minke whales were reported off New Jersey in the winter and spring during the 2008-2009 aerial- and vessel-based surveys (NJDEP 2010; Whitt et al. 2015) and during winter, spring, and summer AMAPPS surveys (NEFSC and SEFSC 2013, 2015, 2018, 2020). Minke whales occurred in the survey area during the Geotechnical 1A Survey in winter 2017-2018 (Smultea Environmental Sciences 2018). During Digital Aerial Baseline Surveys in the New York-New Jersey Bight, minke whales were recorded off New Jersey in the spring, summer, and fall (Normandeau and APEM 2020).

An UME was declared for minke whales in January 2017, with 112 total strandings since then from Maine to South Carolina due to entanglement and infectious disease (NOAA Fisheries 2021c). In addition, hunting for minke whales continues today, by Norway in the northeastern North Atlantic, and by Japan in the North Pacific and Antarctic (Reeves et al. 2002). International trade in the species is currently banned. Average annual fishery-related mortality and serious injury does not exceed the PBR for this species; therefore, NMFS considers this species as “non-strategic” (Hayes et al. 2021).

4.2.1.3 Risso’s Dolphin (Grampus griseus) – Non-Strategic

Risso’s dolphins have a worldwide distribution (CTAP 1982; Jefferson et al. 2014, 2015), and are common to the U.S. east coast OCS and shelf edge (BOEM 2014) and are found in the northwest Atlantic from Florida to Newfoundland (Leatherwood et al. 1976; Baird and Stacey 1991; Hayes et al. 2020). Risso’s dolphins tend to feed primarily on squid, but also prey on anchovies, krill, or other cephalopods (NOAA Fisheries 2018b). There is currently not enough information to distinguish between separate stocks in the northwest Atlantic, but the Gulf of Mexico and Atlantic are treated as two separate stocks (Hayes et al. 2020).

Risso’s dolphins are common on the continental northwest Atlantic shelf in summer and fall, with low abundance in winter and spring (Payne et al. 1984; Roberts et al. 2016). The most reliable abundance estimate for Risso’s dolphin is 35,215, as derived from 2016 NEFSC and DFO surveys (Lawson and Gosselin 2018; NEFSC and SEFSC 2018; Garrison 2020; Palka 2020; Hayes et al. 2020; NMFS 2021b). Risso’s dolphins could potentially occur in the survey area. During the winter/spring 2015, summer 2016, and spring 2017 AMAPPS aerial surveys, Risso’s dolphins were documented in the waters off New Jersey in the deeper portion of the shelf edge (NEFSC and SEFSC 2015, 2016, 2018). During Digital Aerial Baseline Surveys in the New York-New Jersey Bight, Risso’s dolphins were recorded off New Jersey year-round; however, the sightings were over the continental shelf (Normandeau and APEM 2020).
4.2.1.4 Pilot Whale (Globicephala spp.) – Strategic

There are two species of pilot whales that occur in the western North Atlantic. These two species, the long-finned pilot whale (Globicephala melas) and short-finned pilot whale (Globicephala macrorhynchus), are difficult to identify to species level at sea (Rone et al. 2012; Hayes et al. 2017). Pilot whales are social animals that tend to be found in large, stable aggregations (Olson 2017). They feed on squid, but also prey on small and medium-sized fish (NOAA Fisheries 2018c, d). While long-finned and short-finned pilot whales are likely to overlap between New Jersey and Georges Bank (Payne and Heinemann 1993; Hayes et al. 2017), long-finned pilot whales have the more northerly distribution and are more likely to be found in the survey area than short-finned pilot whales. Long-finned pilot whales have been found stranded as far south as South Carolina while short-finned pilot whales have been found stranded as far north as Massachusetts (Pugliares et al. 2016; Hayes et al. 2017). However, the latitudinal distributions of these two species are uncertain (Hayes et al. 2020).

Both species are present in deep offshore waters of the U.S. east coast in winter and spring (CeTAP 1982; Payne and Heinemann 1993; Abend and Smith 1999; Hamazaki 2002). Pilot whales also tend to follow migrations of their prey and move inshore in summer and fall (Reeves et al. 2002). During the fall 2017 and spring 2019 AMAPPS aerial surveys, pilot whales were documented in the waters off New Jersey, in the deeper portion of the shelf edge (NEFSC and SEFSC 2018, 2020). Recent surveys undertaken for offshore wind projects in New York and New Jersey found pilot whales near the continental shelf break (NYDOS 2013; New York State Energy Research and Development Authority [NYSERDA] 2017), but not in nearshore waters (Whitt et al. 2015). A sighting of Risso’s dolphins was reported off New Jersey during the Atlantic Shores 2020 Offshore Windfarm HRG survey from April to August 2020 (RPS 2020). During Digital Aerial Baseline Surveys in the New York-New Jersey Bight, pilot whales were recorded off New Jersey spring, summer, and fall; however, the sightings were over the continental shelf (Normandeau and APEM 2020).

For both species of pilot whale, habitat-based density models provide an abundance estimate of 18,977 animals in the U.S. EEZ (Roberts et al. 2016a). The most reliable estimate of abundance for western North Atlantic long-finned pilot whales is 39,215 individuals and for short-finned pilot whales is 28,924 individuals (Lawson and Gosselin 2018; Garrison 2020; Palka 2020; Hayes et al. 2020).

4.2.1.5 Atlantic White-Sided Dolphin (Lagenorhynchus acutus) – Non-Strategic

The Atlantic white-sided dolphin is typically found at a depth of 100 m (330 ft) in the cool temperate and subpolar waters of the North Atlantic, generally along the continental shelf between the Gulf Stream and the Labrador current to as far south as North Carolina (Bulloch 1993; Reeves et al. 2002; Jefferson et al. 2015). They are the most abundant dolphin in the Gulf of Maine and the Gulf of St. Lawrence but seem relatively rare along the North Atlantic coast of Nova Scotia (Kenney and Vigness-Raposa 2010).

Atlantic white-sided dolphins range between 2.5 m and 2.8 m (8.2 ft and 9.2 ft) in length, with females being approximately 20 centimeters shorter than males (Kenney and Vigness-Raposa 2010). Their hearing is in the mid-frequency range (Southall et al. 2007, 2019). This species is highly social and is commonly seen feeding with fin whales (NOAA 1993). Atlantic white-sided dolphins feed on a variety of small species, such as herring, hake, smelt, capelin, cod, and squid, with regional and seasonal changes in the species consumed (Kenney and Vigness-Raposa 2010). Sand lance is an important prey species for these dolphins in the Gulf of Maine during the spring. Other fish prey include mackerel, silver hake, herring, smelt, and several other varieties of gadoids (Kenney and Vigness-Raposa 2010). There are seasonal shifts in the distribution of Atlantic white-sided dolphins off the northeastern U.S. coast, with low abundance in winter between Georges Basin and Jeffreys Ledge and high abundance in the Gulf of Maine during spring. During the summer, Atlantic white-sided dolphins are most abundant between Cape Cod and the lower Bay of Fundy. During the fall, the distribution of Atlantic white-sided dolphins is similar to that in the summer, although they are less abundant (Department of the Navy [DoN] 2005). Recent population estimates for Atlantic white-sided dolphins in the western North
Atlantic Ocean place this species at 93,233 individuals (Lawson and Gosselin 2018; Palka 2020; Hayes et al. 2020).

This species may be found off the coast of southern New England during all seasons of the year but is usually most numerous in areas farther offshore at depth of 100 m (330 ft) (Bulloch 1993; Reeves et al. 2002; Kenney and Vigness-Raposa 2010). A sighting of Atlantic white-sided dolphins was reported off New Jersey during the Atlantic Shores 2020 Offshore Windfarm HRG survey from April to August 2020 (RPS 2020). During Digital Aerial Baseline Surveys in the New York-New Jersey Bight, Atlantic white-sided dolphins were recorded off New Jersey in the summer, fall, and winter; however, the sightings were north of the survey area (Normandeau and APEM 2020).

4.2.1.6 Common Dolphin (Delphinus delphis) – Non-Strategic

The common dolphin is one of the most widely distributed cetaceans and occurs in temperate, tropical, and subtropical regions (Jefferson et al. 2015; Hayes et al. 2021). Common dolphins feed on squids and small fish, including species that school in proximity to surface waters as well as mesopelagic species found near the surface at night (Jefferson et al. 2015; Perrin 2017). They have been known to feed on fish escaping from fishermen’s nets or fish that are discarded from boats (NOAA 1993). This species is found between Cape Hatteras and Georges Bank from mid-January to May, although they migrate onto Georges Bank and the Scotian Shelf between mid-summer and fall, when large aggregations occur on Georges Bank (Hayes et al. 2021). These dolphins can gather in schools of hundreds or thousands, although the schools generally consist of smaller groups of 30 or fewer. They are eager bow riders and are active at the surface (Reeves et al. 2002). The common dolphin feeds on small schooling fish and squid. While this dolphin species can occupy a variety of habitats, common dolphins occur in greatest abundance within a broad band of the northeast edge of Georges Bank in the fall (Kenney and Vigness-Raposa 2010). According to the species stock report, the most reliable population estimate for the western North Atlantic common dolphin is approximately 172,947 individuals (Lawson and Gosselin 2018; NEFSC and SEFSC 2018; Garrison 2020; Palka 2020; Hayes et al. 2021). Its hearing is in the mid-frequency range (Southall et al. 2007, 2019).

Common dolphins can be found either along the 100- to 2,000-m (650- to 6,500-ft) isobaths over the continental shelf and in pelagic waters of the Atlantic and Pacific Oceans (Hayes et al. 2021). They are present in the western Atlantic from Newfoundland to Florida (Perrin 2017; Hayes et al. 2021). The common dolphin is especially common along shelf edges and in areas with sharp bottom relief such as seamounts and escarpments (Reeves et al. 2002). They show a strong affinity for areas with warm, saline surface waters. Off the coast of the eastern U.S., they are particularly abundant in continental slope waters from Georges Bank southward to about 35 degrees north (Reeves et al. 2002) and usually inhabit tropical, subtropical, and warm-temperate waters (Hayes et al. 2021).

Common dolphins are more likely to occur in the survey area during the fall and winter, but they may occur at any time of year (NJDEP 2010). Common dolphins were reported off New Jersey in all seasons except the spring during the 2008-2009 aerial- and vessel-based surveys (NJDEP 2010; Whitt et al. 2015). During the spring 2012, spring 2014, winter/spring 2015, summer 2016, fall 2017, spring 2017, winter 2018, and spring 2019 AMAPPS aerial surveys, common dolphins were documented in the waters off New Jersey (NEFSC and SEFSC 2012, 2014, 2015, 2016, 2018, 2019, 2020). Common dolphins occurred in the survey area during the Geotechnical 1A Survey in winter 2017-2018 (Smultea Environmental Sciences 2018); however, common dolphins were not present during the summer 2017 survey (Alpine 2017). Common dolphins were reported off New Jersey during the Atlantic Shores 2020 Offshore Windfarm HRG survey from April to August 2020 (RPS 2020).
4.2.1.7 Common Bottlenose Dolphin (*Tursiops truncatus*) – Non-Strategic and Strategic

The common bottlenose dolphin (referred to as bottlenose dolphin) is a light- to slate-gray dolphin, roughly 2.4 to 3.7 m (8 to 12 ft) long with a short, stubby beak. Because this species occupies a wide variety of habitats, it is regarded as possibly the most adaptable cetacean (Reeves et al. 2002). It occurs in oceans and peripheral seas at both tropical and temperate latitudes. In North America, bottlenose dolphins are found in surface waters with temperatures ranging from 10 to 32°C (50 to 90°F). Its hearing is in the mid-frequency range (Southall et al. 2007, 2019).

There are two distinct bottlenose dolphin morphotypes: coastal and migratory. The coastal morphotype resides along the inner continental shelf (within 7.5 km [4.5 mi] of shore) and around islands and is subdivided into seven stocks based largely upon spatial distribution (Hayes et al. 2021). These animals often move into or reside in bays, estuaries, and the lower reaches of rivers (Reeves et al. 2002). Generally, the offshore migratory morphotype is found exclusively seaward of 34 km (21 mi) and in waters deeper than 34 m (112 ft) (Hayes et al. 2017). This offshore population extends along the entire continental shelf break from Georges Bank to Florida during the spring and summer months and has been observed in the Gulf of Maine during the late summer and fall. However, south of Cape Hatteras, these morphotype ranges overlap to some degree.


Bottlenose dolphins feed on a large variety of organisms depending on their habitat. The coastal, shallow population tends to feed on benthic fish and invertebrates, while deep-water populations consume pelagic or mesopelagic fish such as croakers, sea trout, mackerel, mullet, and squid (Reeves et al. 2002). Bottlenose dolphins appear to be active both during the day and night. Their activities are influenced by the seasons, time of day, tidal state, and physiological factors such as reproductive seasonality (Wells and Scott 2017).

Bottlenose dolphins may occur in the survey area during any time of year. Bottlenose dolphins were reported off New Jersey in all seasons during the 2008-2009 aerial- and vessel-based surveys (NJDEP 2010; Whitt et al. 2015). Bottlenose dolphins were observed off New Jersey during the summer 2016 and spring 2017 fall AMAPPS aerial surveys (NEFSC and SEFSC 2016, 2018). Bottlenose dolphins were recorded in the survey area during the summer 2017 HRG survey (Alpine 2017). During the Equinor Wind HRG Survey Campaign from April to July 2019 off New York and New Jersey, bottlenose dolphins occurred in the survey area (Milne 2019). Bottlenose dolphins were reported off New Jersey during the Atlantic Shores 2020 Offshore Windfarm HRG survey from April to August 2020 (RPS 2020).

4.2.1.8 Atlantic Spotted Dolphin (*Stenella frontalis*) – Non-Strategic

The Atlantic spotted dolphin inhabits tropical, warm waters of the western North Atlantic typically along the continental shelf (Leatherwood et al. 1976). They have a wide range of distribution in the western North Atlantic from southern New England through the Gulf of Mexico, extending south to the Caribbean and Venezuela (Leatherwood et al. 1976; Perrin et al. 1994). The diet of the Atlantic spotted dolphin consists of a wide variety of prey, such as fish, squid, and benthic invertebrates (Herzing 1997). The seasonal distribution of the Atlantic spotted dolphin is not well known, but it has been suggested that they travel more inshore in spring (Caldwell and Caldwell 1966; Fritts et al. 1983). The Atlantic spotted dolphin is hard to distinguish from the pantropical spotted dolphin (*S. attenuata*) at sea, and their range is likely to overlap in tropical waters (Perrin et al. 1987; Fulling et al. 2003; Mullin and Fulling 2003; Waring et al. 2016). Additionally, there are two ecotypes of Atlantic spotted dolphin, but one the smaller, less-spotted ecotype is not likely to occur in the Gulf of Mexico (Fulling et al. 2003; Mullin and Fulling 2003; Viricel and Rosel 2014).
It is likely that the Atlantic spotted dolphin is relatively rare in the survey area, as these dolphins typically spend their time along the continental shelf and southern New England is the northernmost area of their range, but they may still be affected by surveying activities (BOEM 2014). Atlantic spotted dolphins were observed in the fall 2017 aerial AMAPPS survey (NEFSC and SEFSC 2018). During Digital Aerial Baseline Surveys in the New York-New Jersey Bight, Atlantic dolphins were recorded off New Jersey in the fall; however, the sightings were over the continental shelf (Normandeau and APEM 2020).

Their hearing is in the mid-frequency range (Southall et al. 2007, 2019). The most reliable abundance estimate for Atlantic spotted dolphins, from 2016 surveys, is 39,921 individuals (NEFSC and SEFSC 2018; Garrison 2020; Palka 2020; Hayes et al. 2020). There have been no recent UMEs declared for the Atlantic spotted dolphin.

4.2.1.9 Harbor Porpoise (Phocoena phocoena) – Non-Strategic

The harbor porpoise inhabits shallow, coastal waters, often found in bays, estuaries, and harbors. In the western Atlantic, they are found from Cape Hatteras north to Greenland (Hayes et al. 2021). They are likely to occur frequently in southern New England waters year-round but are most likely to be present in spring when migration brings them toward the Gulf of Maine feeding grounds from their wintering areas offshore and in the mid-Atlantic (Kenney and Vigness-Raposa 2010). After April, they migrate north towards the Gulf of Maine and Bay of Fundy. Harbor porpoises are the smallest North Atlantic cetacean, measuring only 1.4 to 1.9 m (4.6 to 6.2 ft), and feed primarily on fish, but also prey on squid and crustaceans (Reeves and Reed 2003; Kenney and Vigness-Raposa 2010).

In 2001, the harbor porpoise was removed from the candidate species list for the ESA; a review of the biological status of the stock indicated that a classification of "Threatened" was not warranted (Waring et al. 2009). This species has been listed as “non-strategic” because average annual human-related mortality and injury does not exceed the potential biological removal (Hayes et al. 2021). The current population estimate for harbor porpoise for the Gulf of Maine/Bay of Fundy stock is 95,543 (Lawson and Gosselin 2018; Palka 2020; Hayes et al. 2021). Harbor porpoise hearing is in the high-frequency range (Southall et al. 2007, 2019).

Sighting records from the 1978 to 1981 CeTAP surveys showed porpoises in spring exhibited highest densities in the southwestern Gulf of Maine in proximity to the Nantucket Shoals and western Georges Bank, with presence throughout the southern New England shelf and Gulf of Maine (CeTAP 1982). While strandings have occurred throughout the south shore of Long Island and coastal Rhode Island, many sightings have occurred offshore in the OCS area (Kenney and Vigness-Raposa 2010). Harbor porpoises occur in the nearshore waters of New Jersey, including the survey area, primarily during the winter; however, they may also occur in this region throughout the year (NJDEP 2010). Harbor porpoise were reported off New Jersey in all seasons except the fall during the 2008-2009 aerial- and vessel-based surveys (NJDEP 2010; Whitt et al. 2015). Harbor porpoises were observed in the spring 2013 and 2014, and summer 2017 and 2019 aerial AMAPPS surveys (NEFSC and SEFSC 2013, 2014, 2018, 2020). During Digital Aerial Baseline Surveys in the New York-New Jersey Bight, harbor porpoises were recorded off New Jersey year-round (Normandeau and APEM 2020).

4.2.2 Pinnipeds

4.2.2.1 Harbor Seal (Phoca vitulina) – Non-Strategic

Harbor seals are the most abundant seals in eastern U.S. waters and are commonly found in all nearshore waters of the Atlantic Ocean and adjoining seas above northern Florida; however, their "normal" range is probably only south to New Jersey. While harbor seals occur year-round north of Cape Cod, they only occur during winter migration, typically September through May, south of Cape Cod (Southern New England to New Jersey) (Kenney and Vigness-Raposa 2010; Hayes et al. 2021). During the summer, most harbor seals can be found north of New York, within the coastal waters of central and northern Maine, as well as the Bay of Fundy.
Distribution along the U.S. Atlantic coast has shifted in recent years (Johnston et al. 2015; DiGiovianni et al. 2018; Jones and Rees 2021), with an increased number of harbor seals reported in southern New England and the mid-Atlantic region (Hayes et al. 2021). Harbor seals migrate to northern areas for mating and pupping in the spring and summer and return to more southerly areas in the fall and winter (Ampela et al. 2021). Harbor seals are relatively small pinnipeds, with adults ranging between 1.7 and 1.9 m (5.6 and 6.2 ft) in length, with females being slightly smaller than males (Jefferson et al. 1993; Wynne and Schwartz 1999; Kenney and Vigness-Raposa 2010). Their hearing ranges from 100 Hertz (Hz) to 12 kilohertz (kHz) (Southall et al. 2007).

Harbor seals prey upon small to medium-sized fish, followed by octopus and squid, and lastly by shrimp and crabs (Kenney and Vigness-Raposa 2010). Fish eaten by harbor seals include commercially important species such as mackerel, herring, cod, hake, smelt, shad, sardines, anchovy, capelin, salmon, rockfish, sculpins, sand lance, trout, and flounders. They spend about 85 percent of the day diving, and much of the diving is presumed to be active foraging in the water column or on the seabed. They dive to depths of about 10 to 150 m (30 to 500 ft), depending on location. Harbor seals forage in a variety of marine habitats, including deep fjords, coastal lagoons and estuaries, and high-energy, rocky coastal areas. They may also forage at the mouths of freshwater rivers and streams, occasionally traveling several hundred miles upstream (Reeves et al. 2002). They haul out on sandy and pebble beaches, intertidal rocks and ledges, and sandbars, and occasionally on ice floes in bays near calving glaciers.

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

Since July 2018, increased numbers of gray seal and harbor seal mortalities have occurred across Maine, New Hampshire, and Massachusetts (NOAA Fisheries 2021d). This event has been declared a 2018-2020 Pinniped UME along the northeast coast which encompasses all seal strandings from Maine to Virginia (NOAA Fisheries 2021d). Average annual fishery-related mortality and serious injury does not exceed the potential biological removal for this species; therefore, NMFS considers this species as “non-strategic” (Hayes et al. 2021).

Currently, the most reliable abundance estimate for harbor seals is approximately 61,336 for the Western North Atlantic stock (NMFS 2021b; Sigourney et al. accepted). Average annual fishery-related mortality and serious injury does not exceed the potential biological removal for this species; therefore, NMFS considers this species as “non-strategic” (Hayes et al. 2021).

Harbor seals are the dominant pinniped species in the survey area and could occur throughout the year (NJDEP 2010). A single sighting of a harbor seal occurred in the summer during the 2008-2009 aerial- and vessel-based surveys (NJDEP 2010; Whitt et al. 2015). Other unidentified pinnipeds recorded near Ocean City in April were likely also harbor seals, but species could not be confirmed (NJDEP 2010; Whitt et al. 2015). An unidentified seal was observed in the spring 2013 aerial AMAPPS survey (NEFSC and SEFSC 2013).

The three major haul out sites in New Jersey are: 1) Great Bay (the largest haul out south of Long Island, New York), 2) Barnegat Inlet/Barnegat Lighthouse, and 3) Sandy Hook (Slocum et al. 2005; Slocum and Davenport 2009; NJDEP 2010). In March 2019, aerial surveys were conducted to identify seal haul-out locations from Sandy Hook to Great Bay harbor and count the numbers of seals at each haul-out site (Normandeau and Aperm 2019). Surveys were timed to occur when the maximum numbers of seals were expected to be hauled-out in
these areas. In total, 45 seals were detected: six in the Sandy Hook area, five in the Barnegat Light area, and 34 in the Fish Island-Great Bay area. In addition to these aerial survey data, results from a ground-based haul-out count survey conducted by the Rutgers University Marine Field Station at the Great Bay site in March 2019 indicated a maximum of 145 harbor seals at this site.

4.2.2.2 Gray Seal (Halichoerus grypus) – Non-Strategic

The gray seal occurs in cold temperate to sub-arctic waters in the North Atlantic and is partitioned into three major populations occurring in eastern Canada, northwestern Europe, and the Baltic Sea (Kenney and Vigness-Raposa 2010; Jefferson et al. 2015). The western North Atlantic stock is considered to be the same population as the one found in eastern Canada, and ranges between New England and Labrador (Waring et al. 2007). As exhibited in harbor seal populations, gray seals occur most often in the waters off Maine during winter and spring and spend summer and fall off northern Maine and in Canadian waters (DoN 2005). Gray seals exhibit sexual dimorphism, with adult males reaching 7.5 ft (2.3 m) long and females reaching 6.6 ft (2.0 m) (Jefferson et al. 1993; Wynne and Schwartz 1999; Kenney and Vigness-Raposa 2010). The gray seal is primarily found in coastal waters and forages in OCS regions (Lesage and Hammill 2001).

Gray seals are gregarious, gathering to breed, molt, and rest in groups of several hundred or more at island coasts and beaches or on land-fast ice and pack-ice floes. They are thought to be solitary when feeding and telemetry data indicates that some seals may forage seasonally in waters close to colonies, while others may migrate long distances from their breeding areas to feed in pelagic waters between the breeding and molting seasons (Reeves et al. 2002). Gray seals molt in late spring or early summer and may spend several weeks ashore during this time. When feeding, most seals remain within 45 mi (72 km) of their haul-out sites. Gray seals feed on numerous fish species and cephalopods (Kenney and Vigness-Raposa 2010). Gray seal scat samples from Muskeget Island, Massachusetts, included species such as sand lance, skates, flounder, silver hake (Merluccius bilinearis), and gadids (Kenney and Vigness-Raposa 2010).

Gray seals form colonies on rocky island or mainland beaches, though some seals give birth in sea caves or on sea ice, especially in the Baltic Sea. Gray seals prefer haul-out and breeding sites that are surrounded by rough seas and riptides where boating is hazardous. Pupping colonies have been identified at Muskeget Island (Nantucket Sound), Monomoy National Wildlife Refuge, and in eastern Maine (Rough 1995). Total western Atlantic gray seal population estimates in U.S. waters are 27,300 individuals derived from total population size to pup ratios in Canada, applied to U.S. pup counts (NMFS 2021b). However, the gray seal colony off Massachusetts has more than 5,600 seals total and there are more than 1,700 individuals in Maine (Waring et al. 2007).

This species has been reported with greater frequency in waters south of Cape Cod in recent years, likely due to a population rebound in southern New England and the mid-Atlantic (Kenney and Vigness-Raposa 2010); however, most gray seals present are juveniles dispersing in the spring. The only consistent haul-out locations within the vicinity of the survey area are along the sandy shoals around Monomoy and Nantucket in Massachusetts. WEA surveys from Massachusetts, Rhode Island and New Jersey have not reported any gray seal sightings; however, there were vertical camera detections of this species (Kraus et al. 2016; Milne 2019; RPS 2020).

See Section 4.2.2.1 above regarding the 2018-2020 Pinniped UME along the Northeast Coast.

5. Type of Incidental Take Authorization Requested

Under Section 101(a)(5)(D) of the MMPA, NEETMA is seeking authorization for the potential take by Level B harassment of small numbers of marine mammals in the specified geographic region where the HRG&G surveys are proposed to occur (Figure 1-1).
The ranges to isopleths corresponding to the Level A harassment threshold are generally very small (1.5 m or less) for all marine mammal species except for the harbor porpoise (high frequency cetaceans) (Table 1-4). Based on the extremely small Level A harassment zones for the low- and mid-frequency cetaceans and phocid pinnipeds, the potential for these species to be taken by Level A harassment during HRG surveys has been determined to be discountable by NMFS (87 FR 806). However, harbor porpoise may be impacted by HRG survey activities, with a larger isopleth to the Level A harassment threshold (Table 1-4). Level A harassment would only be expected if the animal approaches the sound source at a close range or remains exposed to the sound source for a longer duration. The proposed mitigation measures of the Project include a 100-m pre-clearance and/or shutdown zone for all marine mammals (except North Atlantic right whales, 500-m shutdown zone; Table 11-1). The likelihood of take by Level A harassment of harbor porpoises is therefore also discountable and only take by Level B harassment is requested by NEETMA.

The applicant requests the IHA be valid for one year, from June 1, 2022 to May 31, 2023, with the option to renew for an additional year if the surveys are not completed according to the anticipated schedule. The applicant’s request is based on the proposed activities and schedule as discussed in Section 1 and Section 2, which have the potential to impact marine mammals through noise associated with HRG survey equipment.

6. Take Estimates for Marine Mammals

As noted in Section 5, NEETMA is seeking authorization for the potential take by Level B harassment of small numbers of marine mammals in the specified geographic region where the HRG&G surveys are proposed to occur (Figure 1-1). The proposed use of HRG survey equipment has the potential to impact marine mammals via the propagation of underwater sounds. The following sections provide the basis for estimating the numbers of marine mammals that may be taken by harassment over the course of the proposed surveys.

NEETMA is seeking authorization for take by harassment of the following 16 species that regularly, commonly, or uncommonly occur in the survey area (Section 4):

- North Atlantic right whale
- Fin whale
- Sei whale
- Sperm whale
- Humpback whale
- Common minke whale
- Risso’s dolphin
- Short-finned pilot whale
- Long-finned pilot whale
- Atlantic white-sided dolphin
- Common dolphin
- Common bottlenose dolphin
- Atlantic spotted dolphin
- Harbor porpoise
- Harbor seal
- Gray seal

6.1 Basis for Estimating Numbers of Marine Mammals That Might Be Taken by Harassment

As described in Sections 1 and 2, NEETMA proposes the use of HRG&G surveys to support the siting and design of offshore Project facilities including offshore platforms for converter stations and offshore submarine
transmission cables. These surveys are planned to take place over the course of a year, from June 1, 2022 to May 31, 2023.

The projected number of exposures of marine mammals is expected to be an overestimate based on the assumptions used in the calculations, as follows:

- The mean annual density of each species in the survey area was used;
- All potentially exposed animals are assumed to be harassed;
- All survey days are assumed to be continuous 24-hour periods of the acoustic source being used;
- The acoustic equipment with the largest harassment isopleth is assumed to be used on all survey days; and
- The maximum distance a vessel can travel in a 24-hour period in the survey area was used.

### 6.2 Calculation of Maximum Zone of Influence

The zone of influence (ZOI) is a representation of the extent of the ensonified area around an acoustic source over a 24-hour period. The maximum possible ZOI is calculated using the largest harassment isopleth and the maximum distance a survey vessel could travel in a day.

The calculation for ZOI is as follows:

\[
ZOI = (\text{Distance/day} \times 2r) + \pi r^2
\]

Such that:

\[
\text{Distance/day} = \text{the longest distance a vessel could travel in a 24-hour period}
\]

\[
r = \text{the largest harassment isopleth for a given sound source}
\]

Table 6-1 uses the largest harassment isopleth from each type of survey equipment (Table 1-3) to calculate the maximum ZOI.

<table>
<thead>
<tr>
<th>HRG Survey Equipment Type</th>
<th>r, Largest Harassment Isopleth (km)</th>
<th>Distance/day (km)</th>
<th>ZOI (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shallow SBP</td>
<td>0.048</td>
<td>62</td>
<td>5.98</td>
</tr>
<tr>
<td>Medium SBP (sparker)</td>
<td>0.141</td>
<td></td>
<td>17.61</td>
</tr>
</tbody>
</table>

### 6.3 Marine Mammal Take Estimates

Marine mammal take estimates are calculated using the ZOI, the density, and the number of days of HRG surveys, as follows:

\[
\text{Estimated take} = D \times ZOI \times d
\]

Such that:

\[
D = \text{average annual marine mammal density (number of animals per km}^2)\text{)}
\]

\[
ZOI = \text{maximum ensonified area (km}^2)\text{ (Table 6-1)}
\]

\[
d = \text{number of days of HRG surveys}
\]

Marine mammal densities were determined by using data from the Duke University Geospatial Ecology Lab (Roberts et.al. 2016a; 2016b; 2017; 2018; 2020; 2021a; 2021b) and mapping it onto the survey area using geographic information systems (GIS). There are five data layers for most species and species groups; the 95 percent confidence interval densities for each species and species group were used to get the most conservative take estimates possible. Densities included in calculations were averaged for each of the two
individual survey areas, which included all 10 x 10 km (6.2 x 6.2 mile) grid cells (5 x 5 km [3.1 x 3.1 mile] for North Atlantic right whale) whose centroid was within each survey area. The average annual density for each species and each survey area is presented in Table 6-2. For some species, like short- and long-finned pilot whales, Roberts et al. present a single annual density, however for most species, density is available by month.

Take requests in Table 6-2 were modified to account for several situations in which the take calculations based on density yield numbers that may not accurately reflect the authorized take that could occur. One scenario is for species with near-zero densities in the project area, such as blue whale, sei whale, sperm whale, and Risso’s dolphin, the calculated take is subsequently very low due to the near-zero density. However, if those species did occur in the survey area, a typical group size is larger than the zero or near-zero estimated take. In these instances, take requests are adjusted to account for the potential taking of an entire group, even though it is unlikely these animals will be present in the survey area. This reduces risk to the Project due to a potential unauthorized take.

Due to the nature of the survey data used for density modeling, Roberts et al. (2016a, 2016b) pool certain species and stocks for the purposes of density estimation. Three of these species groups occur in the Project area: phocid (i.e., harbor and gray) seals, short- and long-finned pilot whales, and bottlenose dolphins (offshore and coastal migratory stocks). Because both harbor and gray seals may occur in the project area, predicted density values were split evenly between the two species. The same approach was used for short- and long-finned pilot whales, whose distributions overlap in the project area.

Based on methods in previously permitted site characterization surveys (86 FR 26465), the densities of the two stocks of bottlenose dolphins have been apportioned based on the 20 m isobath. For grid cells in the Roberts et al. data that were entirely within the 20 m isobath, those bottlenose dolphin densities were assigned to the coastal migratory stock. For grid cells entirely outside of the 20 m isobath, those bottlenose dolphin densities were assigned to the offshore stock. Based on inshore and offshore survey activity, in which potential contractors have anticipated survey distances of both inshore and offshore areas, the estimated take was split between the two stocks of bottlenose dolphin.

Roberts et al. (2021a) present density estimates for the North Atlantic right whale for three “eras”: 2003-2009, 2010-2018, and 2003-2018. Based on visual and acoustic survey data, it is likely that right whale density between Hatteras Island and Nantucket Shoals, which includes the mid-Atlantic and Project area, was higher in 2010-2018 than in 2003-2009 (Roberts et al. 2021a). North Atlantic right whale use of waters south and east of Rhode Island, Martha’s Vineyard, and Nantucket Shoals appears to be increasing rapidly (Quintana-Rizzo et al. 2021). Therefore, for conservatism, this application only considers the 2010-2018 era of right whale density to estimate potential take for this species.
Table 6-2. Summary of Marine Mammal Densities and Requested Takes for the Project.

<table>
<thead>
<tr>
<th>Species</th>
<th>Stock</th>
<th>Northern Survey Area</th>
<th>Southern Survey Area</th>
<th>Total Calculated Level B Take</th>
<th>Requested Level B Take</th>
<th>Stock Abundanceb</th>
<th>Percent of Stock (Take / Abundance * 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Atlantic Right Whale</td>
<td>W. North Atlantic</td>
<td>0.169</td>
<td>7.40</td>
<td>0.102</td>
<td>0.83</td>
<td>8.23</td>
<td>8</td>
</tr>
<tr>
<td>Fin whale</td>
<td>W. North Atlantic</td>
<td>0.154</td>
<td>6.73</td>
<td>0.058</td>
<td>0.47</td>
<td>7.21</td>
<td>7</td>
</tr>
<tr>
<td>Sei whale</td>
<td>Nova Scotia</td>
<td>0.004</td>
<td>0.17</td>
<td>0.001</td>
<td>&lt;0.01</td>
<td>0.17</td>
<td>0</td>
</tr>
<tr>
<td>Sperm whale</td>
<td>North Atlantic</td>
<td>0.017</td>
<td>0.73</td>
<td>0.002</td>
<td>0.02</td>
<td>0.74</td>
<td>3f</td>
</tr>
<tr>
<td>Humpback whale</td>
<td>Gulf of Maine</td>
<td>0.042</td>
<td>1.83</td>
<td>0.040</td>
<td>0.33</td>
<td>2.16</td>
<td>6f</td>
</tr>
<tr>
<td>Common minke whale</td>
<td>Canadian East Coast</td>
<td>0.044</td>
<td>1.92</td>
<td>0.010</td>
<td>0.08</td>
<td>2.01</td>
<td>2</td>
</tr>
<tr>
<td>Risso's dolphin</td>
<td>W. North Atlantic</td>
<td>0.014</td>
<td>0.62</td>
<td>0.001</td>
<td>0.01</td>
<td>0.62</td>
<td>30f</td>
</tr>
<tr>
<td>Pilot whale, long-finned</td>
<td>W. North Atlantic</td>
<td>0.108</td>
<td>4.72</td>
<td>0.005</td>
<td>0.04</td>
<td>4.75</td>
<td>20f</td>
</tr>
<tr>
<td>Pilot whale, short-finned</td>
<td>W. North Atlantic</td>
<td>0.108</td>
<td>4.72</td>
<td>0.005</td>
<td>0.04</td>
<td>4.75</td>
<td>20f</td>
</tr>
<tr>
<td>Atlantic white-sided dolphin</td>
<td>W. North Atlantic</td>
<td>0.836</td>
<td>36.52</td>
<td>0.092</td>
<td>0.76</td>
<td>37.28</td>
<td>37</td>
</tr>
<tr>
<td>Common dolphin</td>
<td>W. North Atlantic</td>
<td>5.692</td>
<td>248.52</td>
<td>0.739</td>
<td>6.04</td>
<td>254.56</td>
<td>255</td>
</tr>
<tr>
<td>Common bottlenose dolphin</td>
<td>W. North Atlantic, Offshore</td>
<td>2.616</td>
<td>53.88</td>
<td>8.158</td>
<td>9.27</td>
<td>63.15</td>
<td>64</td>
</tr>
<tr>
<td>Common bottlenose dolphin</td>
<td>W. North Atlantic, Offshore</td>
<td>14.203</td>
<td>325.25</td>
<td>33.409</td>
<td>235.27</td>
<td>560.52</td>
<td>561</td>
</tr>
<tr>
<td>Atlantic spotted dolphin</td>
<td>W. North Atlantic</td>
<td>0.129</td>
<td>5.61</td>
<td>0.004</td>
<td>0.03</td>
<td>5.65</td>
<td>100f</td>
</tr>
<tr>
<td>Harbor porpoise</td>
<td>Gulf of Maine/Bay of Fundy</td>
<td>3.012</td>
<td>131.51</td>
<td>0.874</td>
<td>7.15</td>
<td>138.66</td>
<td>139</td>
</tr>
<tr>
<td>Harbor seal</td>
<td>W. North Atlantic</td>
<td>1.690</td>
<td>73.77</td>
<td>1.226</td>
<td>10.02</td>
<td>83.79</td>
<td>84</td>
</tr>
<tr>
<td>Gray seal</td>
<td>W. North Atlantic</td>
<td>1.690</td>
<td>73.77</td>
<td>1.226</td>
<td>10.02</td>
<td>83.79</td>
<td>84</td>
</tr>
</tbody>
</table>

b NMFS 2021b

c Because both long-finned and short-finned pilot whales may occur in the project area and have overlapping distributions, predicted density values were divided evenly between species.
d Common bottlenose dolphin stock densities were delineated using the 20-m isobath. The anticipated survey days were divided based on anticipated inshore and offshore survey activity and applied to the take estimation between the two stocks of bottlenose dolphin.

e Because both harbor and gray seals are expected in the project area, predicted density values were divided evenly between species.

f For species with zero estimated take or estimated take lower than the predicted group size, requested take was adjusted to account for potential take of one group of the expected group size:

- Sperm whale: Barkaszi and Kelly 2019
- Humpback whale: King et al. 2021
- Risso’s dolphin: Baird et al. 1991; Barkaszi and Kelly 2019
- Pilot whales: CETAP 1982
- Atlantic spotted dolphin: Jefferson et al. 2008

g Sei whale take was adjusted to zero per direction from NMFS based on near zero density in the Project area.
7. Anticipated Impacts of the Activity

NMFS authorizes the incidental taking of marine mammals under the MMPA under a determination that the taking is of small numbers and has no more than a negligible impact on marine mammal species or stocks. A negligible impact is defined 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, adversely affect the species or stock through effects on annual rates of recruitment or survival.”

Site characterization surveys for the proposed Project would temporarily increase existing underwater noise levels of the New York-New Jersey Bight, which is offshore of a high-use industrial area with frequent marine vessel traffic and associated activities. Potential for vessel strikes also exists, although it is not discussed in detail as a Project potential impact due to the mitigation measures discussed in Section 11.

Noise propagated from HRG site characterization surveys has the potential to impact marine mammals. Marine mammals are highly mobile and are generally able to avoid areas of disturbance or elevated noise levels. However, marine mammals may still be exposed to underwater sound associated with HRG surveys. Although marine mammals experience anthropogenic sounds (e.g., vessel traffic) on a routine basis, noise exposure, depending on the level of severity, may cause auditory or non-auditory impacts such as hearing injury or a behavioral response (Southall et al. 2007; Wood et al. 2012; NMFS 2018; Southall et al. 2019).

Many investigators have studied the potential effects of human-generated sounds in marine environments on marine mammals and extensive reviews can be found in numerous documents (e.g., Reeves 1992; Bowles et al. 1994; Norris 1994; Richardson et al. 1995; Croll et al. 1999, 2001; Frankel and Clark 1998; Gisiner 1998; McCauley and Cato 2001; National Research Council (NRC) 1994, 1996, 2000, 2003, 2005; Tyack 2000, 2007; Wright et al. 2007; Abgrail et al. 2008; Erbe et al. 2018; Southall et al. 2007, 2019; Kraus et al. 2019; Denes et al. 2020).

The ability to hear and transmit sound (echolocation/vocalization) is vital for marine mammals to perform several life functions. Marine mammals use sound to gather and understand information about their current environment, including detecting prey, predators, and conspecifics. The distance a sound travels through the water is highly dependent on existing environmental conditions (e.g., sea floor topography, water temperature, and salinity) and characteristics of the sound (source levels and frequency; Richardson et al. 1995). Impacts on marine mammals can vary among species based on their sensitivity to sound and their ability to hear different frequencies. Certain equipment proposed for use during HRG surveys may impact marine mammals behaviorally and/or physiologically via temporary increases in underwater noise. The level of impact on marine mammals from HRG surveys will vary depending on the equipment used, species of marine mammal, the distance between the marine mammal and the sound source or HRG equipment, the intensity and duration of the noise, and the environmental conditions.

Behavioral and physiological changes that may result from increased noise levels include changes in tolerance levels; masking of natural sounds; behavioral disturbances; and temporary or permanent hearing impairment, or non-auditory physical effects (Richardson et al. 1995).

As discussed in Section 6, the acoustic exposure to marine mammals anticipated as a result of HRG surveys is not likely to result in Level A take. An estimated 1,424 total Level B takes are requested for marine mammals as a result of the proposed HRG surveys. However, this is a conservative estimate as described in Section 6.1 and these take calculations also do not take into account the mitigation and monitoring measures as described in Section 11. In addition, take estimates may include the same individuals within the same 24-hour period or across multiple days, so take estimates may be considered instances of exposure rather than a count of individuals that may be taken. This causes an increase in the calculation for estimation of total take, resulting in a conservative estimation of take.
Based on the best available marine mammal density, status, and distribution data, anticipated impacts of the activity are short-term and minimal for individual marine mammals. The most likely impacts on marine mammals as a result of the HRG surveys is a temporary behavioral response such as a shift in spatial use of habitat where perceived noise levels are lower. Impacts on marine mammal species or populations are negligible as species are not likely to be adversely affected at a stock level by the HRG surveys.

The anticipated impacts on habitat and effects of habitat impacts on marine mammals are discussed in Sections 9 and 10, respectively.

8. **Anticipated Impacts on Subsistence Uses**

There are no traditional subsistence hunting areas in the survey area.

9. **Anticipated Impacts on Habitat**

Geotechnical survey impacts on the seafloor are limited to minimal contact of the sampling equipment and inserted cores and are considered negligible (BOEM 2012). This section therefore focuses on the acoustic environment. The importance of the acoustic environment and hearing and transmitting sound for marine mammals is discussed in Section 7.

Potential impacts on marine mammal habitat are expected to be localized and short-term as the HRG survey equipment will be transiently charting the survey area. In comparison with the surrounding area in the survey vicinity, the largest ZOI (approximately 18 km², Table 6-1) is a relatively small area in terms of the total available open water habitat. Vessel usage during the Project will not be increased substantially above baseline levels and survey vessels will follow best management practices to prevent any air or water pollution that may affect marine mammal habitat.

Marine mammal prey may temporarily avoid the areas of direct survey where noise levels are elevated, although the noise environment will return to baseline levels once the HRG survey activity has ceased and mobile prey species are expected to return to the vicinity. Similar to marine mammals, fish also experience a varied response to noise, which depends on frequency and duration. However, sonar such as that used for site characterization surveying is typically operated at frequencies outside of the hearing ranges of most fish except clupeids (Dunning et al. 1992; Nestler et al. 1992; Ross et al. 1995; Mann et al. 1997, Normandeau 2012). In addition, evaluation of fish behavior as exposed to noise from seismic airguns (175 dB re 1 µPa²·s to over 200 dB re 1 µPa, similar to sound pressure levels emitted from HRG equipment) elicited no noticeable responses in fish observed in the Mackenzie River, Canada (Jorgenson and Gyselman 2009; Cott et al. 2012). Prey are consequently not expected to be impacted at a population level as to reduce availability of food sources for marine mammals.

Marine mammals may experience minimal temporary modification of habitat due to impacts on the acoustic environment and potential short-term impacts on prey sources. No long-term impacts on marine mammal habitat or loss of habitat will result following proposed HRG surveys. Impacts on marine mammal habitat from HRG survey activities will be negligible.

10. **Anticipated Effects of Habitat Impacts on Marine Mammals**

As stated in Section 9, the effects of habitat impacts on marine mammals are expected to be minimal and short-term. No long-term effects of habitat impacts on marine mammals are anticipated.
11. Mitigation and Monitoring Measures to Protect Marine Mammals and Their Habitat

The mitigation measures described in the following sections have been approved by NMFS and implemented in similar offshore projects involving HRG surveys (85 FR 21198; 86 FR 26465). They are intended to protect marine mammals from disruptive and injurious levels of sound produced over the course of these surveys. In addition, NEETMA will adhere to all mitigation and monitoring requirements for ESA-listed species outlined in the Offshore Wind Site Assessment and Site Characterization Activities Programmatic Consultation (NMFS 2021d).

NEETMA is committed to minimizing the impacts of its offshore activities as well as maintaining open communications with NMFS throughout the course of the surveys in order to effectively protect marine mammals in the project area. In addition to the mitigation measures outlined below, NEETMA will be conducting a project-specific training for all vessel crews and offshore personnel prior to the start of the surveys and for any new employees that join the project after it has commenced. This training will outline all the mitigation measures to be implemented during the survey, and the roles of various personnel in effecting those measures.

11.1 Visual Monitoring Program

NEETMA will implement a visual monitoring program on all Project vessels. Visual monitoring will be conducted by NMFS-approved Protected Species Observers (PSO) (Section 13.2) during all survey operations requiring the use of acoustic equipment. The following conditions will be met by the visual monitoring program:

- All underway vessels (e.g., transiting, surveying) will have a dedicated visual observer on duty at all times to monitor for marine mammals. Visual observers may be third-party observers (i.e., NMFS-approved PSOs) or trained crew members.
- At least one PSO per survey vessel will be on visual watch during all daylight hours on days when HRG survey equipment is planned to be used, from 30 minutes prior to sunrise to 30 minutes after sunset.
- Visual monitoring by PSOs will begin at least 30 minutes prior to ramp-up of the specified HRG survey equipment (sources <180 kHz, CHIRPs, sparkers, and boomers) (Sections 11.6 and 11.7) and visual monitoring will continue during operation and at least 30 minutes after HRG survey equipment is deactivated or shut down.
- PSOs will visually monitor 360 degrees around the vessel during their watch.
- There will be a clearly defined communication protocol between vessel crew and PSOs such that the presence of marine mammals, the status of pre-clearance monitoring, and the implementation of mitigation measures can be easily and quickly shared with the appropriate parties.
- One PSO will be designated as lead observer. The lead observer will have prior experience working as a PSO in offshore environments.
- If the clearance zone is obscured and not fully visible because of darkness, rain, fog, etc., then specified HRG survey equipment and survey activities will not be initiated until the clearance zone is fully visible and able to be properly monitored (and clear of marine mammals) for a minimum of 30 consecutive minutes.
- In cases when the clearance process has begun in conditions with good visibility, including via the use of night vision equipment (infrared/thermal camera), and the lead PSO has determined that the clearance zones are clear of marine mammals, the use of specified HRG acoustic sources will commence (i.e., no delay is required) despite brief periods of inclement weather and/or loss of
daylight. In cases when shutdown zones become obscured for brief periods due to inclement weather, the use of HRG acoustic sources will continue (i.e., no shutdown is required)

- Two PSOs will be required for periods of reduced visibility, whether due to darkness or inclement weather conditions.
- PSOs will be on visual watch for 30 minutes prior to and during any nighttime ramp-ups of acoustic equipment (Section 11.2 and 11.7).
- When visual watch is occurring during hours of darkness, PSOs will be equipped with night vision devices.
- PSOs will not work more than 12 hours per 24-hour period, and no more than four consecutive hours without a two-hour (minimum) consecutive break from visual watch.
- PSO duties are limited to maintaining visual watch for protected species, collecting data on protected species observations, communicating with vessel crew about sightings, implementing any necessary mitigation measures, ramp-up and pre-clearance, and alerting vessel crew of navigational hazards. No additional duties may be assigned to PSOs during watch shifts.
- Prior to the commencement of any in-water activities or vessel operations, PSOs and operators of all vessels associated with the Project will use all available sources of information on North Atlantic right whale presence, including daily monitoring of the Right Whale Sightings Advisory System, WhaleAlert app, and Coast Guard VHF Channel 16 throughout the day to receive notifications of any sightings and/or information associated with any Slow Zones (i.e., dynamic management areas (DMAs) or acoustically-triggered slow zones) to plan vessel routes, if practicable, to minimize the potential for co-occurrence with any North Atlantic right whales.

11.2 Nighttime Monitoring

Due to reduced visibility during nighttime hours, two PSOs will be on visual watch during hours of darkness, from 30 minutes after sunset to 30 minutes prior to sunrise. PSOs working at night will be equipped with night vision devices and a thermal camera to improve their ability to detect marine mammals in the dark. Specifications of night vision equipment will be provided to NMFS for approval prior to commencement of the project in the form of an Alternative Monitoring Plan (AMP). To maximize visibility with two PSOs working simultaneously, they will maintain a 360-degree view around the vessel by working on opposite sides to the extent practicable, e.g., port and starboard or bow and stern.

11.3 Vessel Strike Avoidance Procedures

Vessel strikes of marine mammals will be avoided through the implementation of the following mitigation measures:

- NEETMA will submit a North Atlantic right whale vessel strike avoidance plan 90 days prior to commencement of surveys;
- All underway vessels (e.g., transiting, surveying) will have a dedicated visual observer on duty at all times to monitor for marine mammals. Visual observers may be third-party observers (i.e., NMFS-approved PSOs) or crew members.
- All vessel operators and PSOs (Section 11.1) will maintain a vigilant watch for marine mammals;
- Vessel operators will slow or halt vessel or alter course to avoid collision with marine mammals;
- All vessels will observe a 10-knot speed limit when operating in SMAs and DMAs designated by NMFS;
- All vessels will reduce speed to 10 knots or less when any large whale, cow/calf pairs, or groups of non-delphinoid cetaceans are observed within 100 m of the vessel;
• PSOs will monitor a minimum separation distance to prevent vessel strike and all vessels will stay at least 500 m away from any ESA-listed species. In the event a whale cannot be identified to species, it will be assumed to be a North Atlantic right whale or other ESA-listed species;
• If a large whale is identified within 500 m of the forward path of any vessel, the vessel operator will steer a course away from the whale at 10 knots (18.5 km/hr) or less until the 500 m minimum separation distance has been established. Vessels may also shift to idle if feasible.
• PSOs will monitor a minimum separation distance to prevent vessel strike and all vessels will stay at least 100 m away from sperm whales and all baleen whales, with the exception of right whales or other ESA-listed species (above);
• If a large whale is sighted within 200 m of the forward path of a vessel, the vessel operator will reduce speed and shift the engine to neutral. Engines will not be engaged until the whale has moved outside of the vessel’s path and beyond 500 m. If stationary, the vessel will not engage engines until the large whale has moved beyond 500 m.
• PSOs will monitor a minimum separation distance to prevent vessel strike and all vessels will stay at least 50 m away from all other marine mammals to the extent possible;
• When marine mammals are sighted, vessels will act to maintain the minimum separation distances above. If non-delphinoid cetaceans are observed already within the separation distance, underway vessels will reduce speed and/or shift engine into neutral until the animals are outside the minimum separation distance, with exceptions for the safety of personnel on board or vessels that are constrained by towing equipment. If delphinoid cetaceans are observed already within the separation distance, underway vessels will remain parallel to the to a sighted delphinoid cetacean’s course whenever possible and avoid excessive speed or abrupt changes in direction. Vessels may not adjust course or speed until the delphinoid cetaceans have moved beyond 50-m and/or the abeam of the underway vessel;
• Vessels will not purposely approach any marine mammals and in the event marine mammals are observed, vessels will avoid sudden changes to direction or increases in speed;
• Year-round, operators of all vessels associated with the Project will use all available sources of information on North Atlantic right whale presence, including daily monitoring of the Right Whale Sightings Advisory System, WhaleAlert app, and Coast Guard VHF Channel 16 throughout the day to receive notifications of any sightings and/or information associated with any Slow Zones (i.e., DMAs or acoustically-triggered slow zones) to plan vessel routes, if practicable, to minimize the potential for co-occurrence with any North Atlantic right whales.;
• Should a DMA be instituted during the course of the survey, NEETMA will contact NMFS within 24 hours to determine if any changes need to be made to project plans or activities in order to avoid right whales.

11.4 Seasonal Operating Procedures

Because the survey area overlaps with the NMFS North Atlantic Right Whale SMAs in the upper New York/New Jersey Bight, all vessels will transit at speeds less than 10 knots in the active SMA, which occurs annually from November 1 to April 30. Figure 11-1 shows the location of the SMA that will be in place annually.
11.5 Mitigation and Monitoring Zone Definitions and Implementation

Several types of zones will be utilized and monitored by PSOs to help mitigate the impacts of the project on marine mammals. The first is the monitoring zone, which includes all waters surrounding the vessels that are visible to PSOs. All detections of marine mammals in the monitoring zone will be recorded. The second type of zone is the calculated Level A and Level B zone (Table 5-1 and Table 11-1). The third type of zone is the pre-
clearance zone, which refers to the area which will be monitored until clear of marine mammals prior to specified HRG equipment start-up. The fourth type of zone is the shutdown zone (SZ). The entry of a marine mammal into the SZ zone after equipment start-up will trigger a shutdown.

To prevent marine mammals from exposure to disruptive and injurious levels of sound, pre-clearance and shutdown zones will be established in addition to the calculated Level A and B zones. Level A, pre-clearance, and shutdown zones will be established according to species/functional hearing groups (Table 11-1). The Level B zone will be the same for all species groups. Pre-clearance and shutdown zone sizes will be identical for all species except for mid-frequency cetaceans (other than sperm whales) for which no shutdown measures will be applied (Table 11-1). For all ESA-listed species, a 500-m pre-clearance will be implemented; and for North Atlantic right whales, a 500 m SZ will be implemented. For all other large whale species, a 100-m pre-clearance and SZ will be in place. If a large whale cannot be identified to species, it will be assumed to be a North Atlantic right whale. Pre-clearance zones will be monitored and cleared of marine mammals as per Section 11.6. PSOs will visually monitor the SZ and if a marine mammal is observed inside, approaching, or entering the designated SZ, PSOs will direct vessel crew to shut down the acoustic equipment, as per Section 11.8. Lateral distances to the Level A and B zones, pre-clearance zones, shutdown zones, and monitoring zone are shown in Table 11-1.

Figure 11-2 illustrates the shutdown zones, largest Level A and B zones, and the monitoring zones surrounding a survey vessel. While Level A mitigation and monitoring zones are provided in Table 11-1 and Figure 11-2, no Level A takes are being requested.

Table 11-1. Mitigation and Monitoring Zones for HRG Survey Activities.

<table>
<thead>
<tr>
<th>Species</th>
<th>Level A Zone (SEL) (m)</th>
<th>Level A Zone (PK) (m)</th>
<th>Level B Zone, All Sources (m)</th>
<th>Pre-start Clearance Zone (m)</th>
<th>Shutdown Zone (m)</th>
<th>Monitoring Zone for Reporting (m)</th>
<th>Vessel Separation Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Frequency Cetaceans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Atlantic right whale*</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td></td>
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<tr>
<td>Bottlenose dolphin, offshore</td>
<td>&lt;1</td>
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<td></td>
<td>100</td>
<td>--</td>
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<tr>
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### High-Frequency Cetaceans

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<th>141</th>
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<th>100</th>
<th>&gt; 500</th>
<th>50</th>
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</table>

#### Pinnipeds in Water

<table>
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<th>Species</th>
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<th>100</th>
<th>--</th>
<th>&gt; 500</th>
<th>50</th>
</tr>
</thead>
</table>

* = denotes species listed under the Endangered Species Act; SEL = sound exposure level in units of decibels referenced to 1 micropascal squared second; PK = peak sound pressure level in units of decibels referenced to 1 micropascal.

-- = no shutdown zone mitigation measures will be applied.

---

### Figure 11-2. Mitigation and Monitoring Zones for NEETMA HRG surveys.

#### 11.6 Pre-Clearance Procedures

NEETMA will implement a 30-minute pre-clearance period prior to initiation of sound sources <180 kHz. PSOs will monitor all pre-clearance zones and ensure that there are no marine mammals within 100 m of the acoustic source (or 500 m for ESA-listed species). The acoustic source will not start until the 100 m pre-clearance zone (or 500-m zone for ESA-listed species) is clear of marine mammals for at least 30 minutes. If after 30 minutes of visual monitoring, there are no marine mammals detected in the relevant zone, ramp-up or initiation of the acoustic source may begin. If during the pre-clearance period, a marine mammal is detected, the acoustic source will not begin until after the animal has been observed exiting the relevant zone, or until a specified
amount of time has passed since the last detection of the animal in the zone. A 30-minute period is required to wait after last detection of whales inside the pre-clearance zone prior to ramp-up and a 15-minute period is required to wait after last detection of dolphins, porpoises, and pinnipeds inside the pre-clearance zone prior to ramp-up.

11.7 Ramp-Up Procedures

For specified HRG survey equipment that can adjust energy levels, a ramp-up procedure will be used at the start of any survey activities. This mitigation measure is in place to give marine mammals in the area an acoustic warning of the sounds to follow and allow them to leave the area prior to survey equipment being operated at a louder volume. A ramp-up involves starting survey equipment at the lowest power level possible and gradually increasing that level until full power is reached.

Ramp-up will be delayed by the presence of marine mammals in the relevant SZ during the pre-clearance period (Section 11.6). If a marine mammal is detected in the relevant SZ during ramp-up, a shutdown will be immediately initiated (Section 11.8).

11.8 Shutdown Procedures

Shutdown of the acoustic sources <180 kHz will be utilized as a mitigation measure according to the procedures outlined below. Any PSO on watch will have the authority to call for a shutdown; furthermore, if any disputes exist about the necessity of a shutdown, the acoustic source will be deactivated first, then the dispute can be resolved after the shutdown has occurred.

- If the acoustic source is active and marine mammals are detected within or entering the relevant SZ, an immediate shutdown will be implemented.
- After a shutdown, the acoustic source can be restarted if the marine mammal has been detected exiting the relevant SZ or until an additional amount of time has passed with no further detection of the marine mammal — 15 minutes for dolphins, porpoises, and pinnipeds; 30 minutes for whales.
- For shutdowns lasting longer than 30 minutes or if visual watch is not maintained for the entirety of the shutdown, an additional pre-clearance period will be required (Section 11.6).
- A shutdown will be implemented if a marine mammal species for which take has not been authorized is observed approaching or entering the Level B zone; similarly, a shutdown will be implemented if a species for which the authorized number of takes have been met is observed approaching or entering the Level B zone.

12. Mitigation Measures to Protect Subsistence Uses – Arctic Plan of Cooperation

As stated in Section 8, there are no traditional subsistence hunting areas in the Survey area and the Project is not located in Arctic waters. Therefore, no relevant subsistence uses of marine mammals will be impacted by this action.

13. Monitoring and Reporting

13.1 Monitoring

NEETMA proposes a marine mammal monitoring program as described in Sections 11.1 and 11.2, which involves the use of PSOs on project vessels to detect and collect data on marine mammals in the project area. Visual watch will be conducted by PSOs during daylight hours; monitoring during darkness will be conducted by PSOs with night vision equipment and thermal cameras. PSOs will meet the requirements outlined in Section
13.2 to be qualified to work on the project. All data collected by PSOs will be reported to NMFS as described in Section 13.5.

13.2 PSO Requirements

The visual monitoring program will be implemented by qualified and NMFS-approved PSOs. PSO qualifications include the following:

- PSOs will be independent and dedicated meaning they will be hired by a third-party provider and will not have duties beyond conducting watch, collecting data, communicating with vessel crew about sightings, mitigation measures, ramp-up and pre-clearance, and alerting vessel crew to navigational hazards.
- PSOs will have completed a NMFS-approved PSO training course prior to working on the project.
- PSOs will have demonstrated ability to conduct field observations, collect data, communicate with other project personnel, and implement mitigation measures. This requirement can be met via formal education, prior experience, and/or NMFS-approved PSO training.
- PSO resumes will be provided to NMFS for approval prior to the start of the survey.

A designated Lead PSO will be present on each survey vessel, who meets the above qualifications and has prior experience working as a PSO in the Atlantic Ocean and/or Gulf of Mexico.

A minimum of one PSO will be on duty observing for listed species at all times that noise-producing equipment <180 kHz is operating, or the survey vessel is actively transiting during daylight hours (i.e. from 30 minutes prior to sunrise and through 30 minutes following sunset). Two PSOs will be on duty during nighttime operations. PSOs will not be on watch for more than 4 consecutive hours, with at least a 2-hour break after a 4-hour watch. PSOs will not be on active duty observing for more than 12 hours in any 24-hour period.

Visual monitoring will occur from the most appropriate vantage point on the associated operational platform that allows for 360-degree visual coverage around the vessel. If 360-degree visual coverage is not possible from a single vantage point, multiple PSOs will be on watch to ensure such coverage.

13.3 Data Collection

All data collected by PSOs will be recorded and stored electronically, via a computer or tablet; however, paper data sheets will be available in case of equipment malfunction. PSOs will collect activity, environmental, and marine mammal sighting data. Activity and environmental data will be collected at the beginning and ends of watch shifts, any time there is a significant change in activity or environmental conditions, and every half hour throughout PSO watch shifts. Marine mammal data will be collected when marine mammals are observed. PSOs will collect the following information:

**Activity**

- Date
- Time
- Names of PSOs on watch
- General watch location of each PSO (port, starboard, bow, stern)
- Vessel latitude and longitude
- Vessel activity
- Vessel speed
- Information about the survey - what type of equipment is being used, the acoustic output of the equipment, if activity is starting, ending, ramping up, shut down, or waiting on pre-clearance from PSOs


• Other vessels in the area, activity of other vessels (if known), and approximate distance between vessels

Environmental
• Date
• Time
• Wind speed
• Wind direction
• Water depth
• Beaufort Sea state
• Precipitation or other weather conditions
• Cloud cover
• Glare
• Overall visibility to horizon

Marine mammal sighting
• Date and time of sighting
• PSO who sighted animal
• PSO who recorded data
• Watch status- on effort, off effort, pre-clearance, crew sighting
• Vessel latitude and longitude at time of sighting
• Direction of vessel’s travel
• Identification of animal to lowest taxonomic level possible or unidentified; note composition of group if mixed species
• Estimated high, low, and best counts of animals
• Group composition by age- estimated number of calves, juveniles, and adult animals
• Estimated distance between animal and vessel at first sighting
• Animal’s heading relative to vessel at first sighting
• Animal’s behavior- swimming, diving, surface active, breaching, milling, etc.; note any changes in behavior during sighting
• Pace of animal
• Direction of animal’s travel relative to vessel; note any changes in direction of travel during sighting
• Animal’s closest point of approach to the vessel and the sound source
• Animal presence in buffer, shutdown, or Level A or B zones during sighting and times in zone(s)
• Mitigation measures implemented in response to sighting (delay, shutdown, alter vessel course or speed) and the time and vessel location mitigation measures were implemented
• Additional information- physical description of animals (distinguishing features, scars, markings, coloration, etc.), notes about animal behavior, travel patterns, and implementation of mitigation measures

13.4 Equipment

PSOs will have the following equipment available to them to assist with monitoring for marine mammals and recording the data listed in Section 13.3.

• Handheld reticulated binoculars (7x magnification or better);
• Handheld global positioning system (GPS) units as backup or if PSOs are unable to access vessel GPS system for documenting location;
• Portable radios for PSOs to communicate with each other and with vessel crew;
• Laptop computer or tablet and electronic data collection system;
• Paper data sheets for back up in case of equipment malfunction;
• Marine mammal identification guide;
• NMFS-approved night vision devices and thermal camera; and
• Copies of IHA and any other relevant permits, the Protected Species Mitigation and Monitoring Plan (PSMMP), and data collection definitions.

13.5 Reporting

NEETMA will notify NMFS within 24 hours of both commencement and completion of survey activities.

13.5.1 Monitoring Report

A draft marine mammal monitoring report will be submitted to NMFS (to renewable_reporting@boem.gov and nmfs.gar.incidental-take@noaa.gov) within 90 calendar days after the completion of survey activities, or 60 days prior to a requested date or issuance of any future IHAs for surveys at the same location, whichever comes first. This report will summarize the data collected by PSOs (Section 13.3) as well as an estimate of marine mammals that were potentially taken over the course of the project. The report will also describe the mitigation and monitoring measures utilized and an assessment of the effectiveness of those measures. All raw PSO data will be provided to NMFS as well in an electronic format. Within 30 days following receipt of recommendations from NMFS, NEETMA will submit a final monitoring report addressing those recommendations. If no recommendations are made, the draft report will be considered the final report.

13.5.2 North Atlantic Right Whale Sightings

If a North Atlantic right whale is observed by any project personnel during vessel transit or survey activities, the sighting will be immediately reported to the NMFS North Atlantic Right Whale Sighting Advisory System at 866-755-6622.

WhaleAlert will be monitored for North Atlantic right whale sightings, at least daily, and throughout the day, as possible.

13.5.3 Reporting Injured or Dead Marine Mammals

In the event that any project activities cause take of an animal for which take was not authorized, such as by injury or mortality, HRG surveys will immediately cease, and the incident will be reported immediately to NMFS as soon as feasible by phone (866-755-6622) and by email (nmfs.gar.stranding@noaa.gov and PR.ITP.MonitoringReports@noaa.gov) as soon as feasible. Reports of injured or dead marine mammals will include the following information:

• Time, date, and latitude and longitude of the first discovery (and updated location information if known and applicable);
• Condition of the animal(s) (including carcass condition if the animal is dead);
• Species identification (if known), description, and fate of animal(s) involved;
• Observed behaviors of the animal(s), if alive;
• General circumstances under which the animal was discovered;
• Name and type of vessel involved;
• Vessel speed prior to and during the incident;
• A thorough description of the incident;
• The status of all sound source use in the 24 hours prior to the incident;
• Environmental conditions, such as visibility, Beaufort sea state, cloud cover, glare, wind speed and direction;
• Water depth;
• Description of all marine mammal observations in the 24 hours prior to the incident, and
• Photographs or video footage of animal(s) or incident if available.

When reporting injured or dead listed species, the following information will be provided:

• Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
• Species identification (if known) or description of the animal(s) involved;
• Condition of the animal(s) (including carcass condition if the animal is dead);
• Observed behaviors of the animal(s), if alive;
• If available, photographs or video footage of the animal(s); and
• General circumstances under which the animal was discovered.

Surveys shall not resume until NMFS is able to review the circumstances surrounding the unauthorized take and authorizes recommencing work. NEETMA will collaborate with NMFS to minimize the risk of any further unauthorized take.

Should any project personnel discover an injured or dead marine mammal, NEETMA will report the injured/dead marine mammal as soon as possible to NMFS as soon as feasible by phone (866-755-6622) and by email (nmfs.gar.stranding@noaa.gov and PR.ITP.MonitoringReports@noaa.gov) as soon as feasible.

Reports of injured or dead marine mammals will include the following information:

• Time, date, and latitude and longitude at first discovery of the animal;
• Species identification (if possible), description, and fate of animal(s) involved;
• Condition of animal or carcass;
• Observed behavior of the animal if alive;
• General description of the circumstances under which the animal was discovered; and
• Photographs or video footage of animal(s) or incident if available.

14. Suggested Means of Coordination

Direct research on marine mammals is not proposed as a part of the HRG and geotechnical survey efforts. However, the surveys provide an opportunity to collect incidental marine mammal data, such as marine mammal sightings and behavioral observations which can help inform future research and monitoring. All marine mammal observations and associated sighting data (e.g., date, time, weather, species, sighting distance, and behavior such as swimming direction in relation to sound sources) will be recorded. Hydroacoustic data will also be recorded. All marine mammal and hydroacoustic data will be provided to NMFS and BOEM. Data may also be provided to interested government agencies, educational institutions, and other environmental agencies upon request.

In addition, the applicant will record and share all sightings of North Atlantic right whales to NMFS as soon as reasonably possible. The applicant will also share actual take numbers with NMFS following the HRG survey efforts.

15. List of Preparers

HDR, Inc.
Kristen Ampela, Ph.D., Senior Marine Biologist
Brett Carrothers, Marine Scientist
16. References


Satellite telemetry reveals spatial overlap between vessel high-traffic areas and humpback whales (*Megaptera novaeangliae*) near the mouth of the Chesapeake Bay. Frontiers in Marine Science 7:121.


Garrison, L.P. 2020. Abundance of cetaceans along the southeast U.S. east coast from a summer 2016 vessel survey. Southeast Fisheries Science Center, Protected Resources and Biodiversity Division, 75 Virginia Beach Dr., Miami, Florida 33140. PRD Contribution # PRD-2020-04.


