Appendix II

Non-Selected Companies Under Review

1. Best Industries Ltd.
2. BC Tyre Group Limited
3. Crown International Corporation
4. Dongying Zhongyi Rubber Co., Ltd.
5. Hankook Tire China Co., Ltd.
6. Hong Kong Tiancheng Investment & Trading Co., Limited
7. Hongtyre Group Co.
8. Jiangsu Hankook Tire Co., Ltd.
9. Jiangsu Sanhe Aluminum
10. Kenda Rubber (China) Co., Ltd.
11. Koryo International Industrial Limited
12. Mayrun Tyre (Hong Kong) Limited
13. Qingdao Jinhaoyang International Co., Ltd.
14. Qingdao Nama Industrial Co., Ltd.
15. Qingdao Odyking Tyre Co., Ltd.
16. Roadclaw Tyre (Hong Kong) Limited
17. Shandong Anchi Tyres Co., Ltd.
18. Shandong Haohua Tire Co., Ltd.
19. Shandong Haolong Rubber Co., Ltd.
20. Shandong Hengyu Science & Technology Co., Ltd.
21. Shandong Linglong Tyre Co., Ltd.
22. Shandong Longyue Rubber Co., Ltd.
23. Shandong New Continent Tire Co., Ltd.
24. Shandong Province Sanli Tire
25. Shandong Province Sanli Tire Manufactured Co., Ltd.
26. Shandong Shuangwang Rubber Co., Ltd.
27. Shandong Wanda Boto Tyre Co., Ltd.
28. Shandong Yongsheng Rubber Group Co., Ltd.
29. Shouguang Firemax Tyre Co., Ltd.
30. The Yokohama Rubber Company, Ltd.
31. Tyrechamp Group Co., Limited
32. Winrun Tyre Co., Ltd.
33. Zhaoqing Junhong Co., Ltd.

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XG612

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Site Characterization Surveys off the Coast of North Carolina

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

ACTION: Notice; proposed incidental harassment authorization; request for comments on proposed authorization and possible renewal.

SUMMARY: NMFS has received a request from Avangrid Renewables, LLC for authorization to take marine mammals incidental to high-resolution geophysical (HRG) survey investigations associated with marine site characterization activities off the coast of North Carolina in the area of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS–A 0508) (the Lease Area) and the coastal waters off North Carolina and Virginia where one or more cable route corridors will be established. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an incidental harassment authorization (IHA) to incidentally take marine mammals during the specified activities. NMFS is also requesting comments on a possible one-year renewal that could be issued under certain circumstances and if all requirements are met, as described in *Request for Public Comments* at the end of this notice. NMFS will consider public comments prior to making any final decision on the issuance of the requested MMPA authorizations and agency responses will be summarized in the final notice of our decision.

DATES: Comments and information must be received no later than May 28, 2019.

ADDRESSES: Comments should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service. Physical comments should be sent to 1315 East-West Highway, Silver Spring, MD 20910 and electronic comments should be sent to *ITP.pauline@noaa.gov*.

Instructions: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments received electronically, including all attachments, must not exceed a 25-megabyte file size. Attachments to electronic comments will be accepted in Microsoft Word or Excel or Adobe PDF file formats only. All comments received are a part of the public record and will generally be posted online at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*. All personal identifying information (*e.g.,* name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: Rob Pauline, Office of Protected Resources, NMFS, (301) 427–8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable*. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

The MMPA prohibits the ''take'' of marine mammals, with certain exceptions. Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed incidental take authorization may be provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other means of effecting the least practicable adverse impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stocks for taking for certain subsistence uses (referred to in shorthand as ''mitigation''); and requirements pertaining to the monitoring and reporting of such takings must be set forth.

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216–6A, NMFS must review our proposed action (*i.e.,* the issuance of an incidental harassment authorization) with respect to potential impacts on the human environment.

NMFS is preparing an Environmental Assessment (EA) to consider the environmental impacts associated with the issuance of the proposed IHA. NMFS' EA will be made available at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*.

We will review all comments submitted in response to this notice prior to concluding our NEPA process or making a final decision on the IHA request.

Summary of Request

On October 4, 2018, NMFS received a request from Avangrid for an IHA to take marine mammals incidental to HRG survey investigations off the coast of North Carolina in the OCS–A 0508 Lease Area and in the coastal waters of Virginia and North Carolina where one or more cable route corridors will be established to support the development of an offshore wind project. The application was deemed adequate and complete on February 21, 2019. Avangrid's request is for take of small numbers of nine species by Level B harassment only. Neither Avangrid nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

Description of Proposed Activity

Overview

The purpose of the marine site characterization survey is to support the siting, design, and deployment of up to three meteorological data buoy deployment areas and obtain a baseline assessment of seabed/sub-surface soil conditions in the Lease Area and cable route corridors to support the siting of a proposed wind farm. Underwater sound resulting from use of HRG equipment for site characterization purposes can have the potential to result in incidental take of marine mammals. The survey area extends along the coast from near the mouth of the Chesapeake Bay to Currituck, North Carolina. Up to 37 days of active HRG survey operations are planned and could take place at time during the one year authorization period. This take of marine mammals is anticipated to be in the form of harassment only; no serious injury or mortality is anticipated, nor is any proposed for authorization here.

Dates and Duration

HRG Surveys are anticipated to commence no earlier than June 1, 2019, and will last for approximately 37 days. This survey schedule is based on 24-hour operations and includes estimated weather down time. The proposed surveys are planned to take place during the summer months. The IHA would be effective for one year.

Specific Geographic Region

Avangrid's survey activities will occur in the approximately 122,317-acre Lease Area located approximately 31.3 nautical miles off the coast of Currituck, North Carolina, in Federal waters of the United States (see Figure 1 in Application). In addition, multiple cable route corridors will be surveyed within the area identified in Figure 1 in the Application. Each survey corridor is anticipated to be 30 to 70 nautical miles and extend from the lease area to landfall locations to be determined. For the purpose of this proposed IHA, the survey area is considered to be the Lease Area and cable route corridors. Water depths across the survey area are relatively shallow. Lease Area depths range from approximately 20 to 50 m (66 to 164 feet (ft)) while the cable route corridors will extend to shallow water close to landfall.

Detailed Description of Specific Activity

HRG surveys are employed to detect geohazards, archaeological resources, certain types of benthic communities, and to assess seafloor suitability for supporting structures such as platforms, pipelines, cables, and wind turbines. These surveys for renewable energy occur in shallow waters. HRG surveys typically use only electromechanical sources such as side-scan sonars; boomer, sparker, and chirp sub-bottom profilers; and multibeam depth sounders, some of which are expected to be beyond the functional hearing range of marine mammals or would be detectable only at very close range.[1]

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

- Multibeam echosounder use to determine site bathymetry and elevations;
- Seafloor imaging (sidescan sonar survey) for seabed sediment classification purposes, to identify natural and man-made acoustic targets resting on the bottom as well as any anomalous features;
- Shallow penetration sub-bottom profiler (pinger/chirp) to map the near surface stratigraphy (top 0 to 5 m (0 to 16 ft) of soils below seabed);
- Medium penetration sub-bottom profiler (sparker) to map deeper subsurface stratigraphy as needed (soils down to 75 to 100 m (246 to 328 ft) below seabed);
- Magnetic intensity measurements for detecting local variations in regional magnetic field from geological strata and potential ferrous objects on and below the bottom; and
- Benthic Drop-down Video (DDV) and grab samples to inform and confirm geophysical interpretations and to provide further detail on areas of potential benthic and ecological interest.

Note that take of marine mammals is not associated with use of magnetic intensity measurement devices, DDV, or grab sample equipment.

A technical report conducted by the Naval Undersea Warfare Center (NUWC), through support from the Bureau of Ocean Energy Management (BOEM) and the United States Geological Survey, published measurements of the acoustic output from a variety of sources used during HRG surveys (Crocker and Fratantonio,

[1] HRG surveys are distinguishable from deep penetration seismic surveys, which occur in deeper offshore waters and are associated with oil and gas exploration. Seismic surveys are not used for renewable energy development. Deep penetration seismic airgun surveys are conducted by vessels towing an array of airguns that emit acoustic energy pulses into the seafloor, and which may occur over long durations and over large areas. In contrast with HRG surveys, airguns are considered a low-frequency source since most of its acoustic energy is radiated at frequencies below 200 Hz.

2016). The HRG test equipment were operated over a wide range of settings with different acoustic levels measured. As a conservative measure, the highest sound source levels and pulse duration for each piece of equipment were applied to the analysis herein. Representative equipment and source level characteristics are listed in Table 1. The exact make and model of the listed HRG equipment may vary depending on availability but will be equivalent to those described here.

TABLE 1—MEASURED SOURCE LEVELS OF REPRESENTATIVE HRG SURVEY EQUIPMENT

HRG system	Representative HRG survey equipment	Operating frequencies	Peak source level	RMS source level	Pulse duration (ms)	Beam width (degree)	Signal type
Subsea Positioning/USBL.[1]	Sonardyne Ranger 2 USBL.	35–50 kHz	200 dB_{peak}	188 dB_{RMS}	16	180	FM Chirp.
Sidescan Sonar.	Klein 3900 Sidescan Sonar.	445 kHz/900 kHz	226 dB_{peak}	220 dB_{RMS}	0.016 to 0.100	1 to 2	Impulse.
Shallow penetration sub-bottom profiler.	EdgeTech 512i.	0.4 to 12 kHz	186 dB_{peak}	179 dB_{RMS}	1.8 to 65.8	51 to 80	FM Chirp.
Parametric Shallow penetration sub-bottom profiler.	Innomar parametric SES–2000 Standard.	85 to 115 kHz	243 dB_{peak}	236 dB_{RMS}	0.07 to 2	1	FM Chirp.
Medium penetration sub-bottom profiler.	SIG ELC 820 Sparker.	0.9 to 1.4 kHz	215 dB_{peak}	206 dB_{RMS}	0.8	[2] 30	Impulse.
Multibeam Echo Sounder.	Reson T20–P	200/300/400 kHz	227 dB_{peak}	221 dB_{RMS}	2 to 6	1.8 ±0.2°	Impulse.

1: Equipment information not provided in Crocker and Fratantonio, 2016. Information provided is based on manufacturer specifications.
2: A beamwidth of 30 degrees from horizontal is considered typical for electrode sparker technologies. Specific beamwidth information is not readily available from the equipment manufacturer.

Note that the operating frequencies of both the multibeam echo sounder and side-scan sonar occur outside the hearing range of marine mammals. Since there are no impacts to cetaceans associated with use of this equipment, these sources are not considered further in this document.

The survey activities will be supported by a vessel, or vessels, capable of maintaining course and a survey speed of approximately 4 nautical miles per hour (knots, 7 kilometers per hour (km/hr)) while transiting survey lines. Surveys will be conducted along tracklines spaced 150 m (98 ft) apart, with tie-lines spaced every 500 m (1640 ft). Several survey vessels may be used simultaneously, but it is more likely that only a single vessel would conduct surveys at any one time.

To minimize cost, the duration of survey activities, and the period of potential impact on marine species while surveying, Avangrid has proposed conducting continuous HRG survey operations 24 hours per day. Based on 24-hour operations, the estimated duration of the HRG survey activities would be approximately 37 days. Additional time (up to 30 days) may be required to obtain full multibeam coverage in shallow water areas, however the multibeam sensor operates at frequencies above the functional hearing ranges of marine mammals; therefore take of marine mammals is not expected as a result of multibeam-only survey activity, and multibeam-only survey activity is not analyzed further in this document.

The deployment of HRG survey equipment, including the use of sound-producing equipment operating below 200 kHz (*e.g.,* sub-bottom profilers), may have the potential to result in harassment of marine mammals. Based on the frequency ranges of the potential equipment to be used in support of the HRG survey activities; the ultra-short baseline (USBL) positioning system and the sub-bottom profilers (shallow and medium penetration) operate within the established marine mammal hearing ranges and have the potential to result in Level B harassment of marine mammals.

NMFS has previously issued IHAs for HRG surveys conducted in the Atlantic Ocean, off the east coast of the United States. Most of these have occurred in the coastal waters of southern New England, although NMFS recently issued an IHA for an HRG survey investigating unexploded ordnance (UXO) off the coast of Virginia as part of an offshore wind project (83 FR 39062, August 8, 2018). Marine mammal monitoring reports submitted after completion of HRG surveys indicated that authorized take numbers have never been exceeded.

Proposed mitigation, monitoring, and reporting measures are described in detail later in this document (please see *Proposed Mitigation* and *Proposed Monitoring and Reporting*).

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history of the potentially affected species. Additional information regarding population trends and threats may be found in NMFS's Stock Assessment Reports (SARs; *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments)* and more general information about these species (*e.g.,* physical and behavioral descriptions) may be found on NMFS's website (*https://www.fisheries.noaa.gov/find-species*).

Table 2 lists species with expected potential for take in the survey area and summarizes information related to the population or stock, including regulatory status under the MMPA and ESA and potential biological removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2018). PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS's SARs). While no mortality or serious injury is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS's stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS' U.S. Atlantic SARs (*e.g.,* Hayes *et al.,* 2018). All values presented in Table 2 are the most recent available at the time of publication and are available in the 2017 SARs (Hayes *et al.,* 2018) and draft 2018 SARs (available online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/draftmarine-mammal-stock-assessment-reports*).

TABLE 2—MARINE MAMMAL SPECIES THAT MAY OCCUR NEAR THE SURVEY AREA

Common name	Scientific name	Stock	ESA/MMPA status; strategic (Y/N) [1]	Stock abundance (CV, N_{min}, most recent abundance survey) [2]	PBR	Annual M/SI [3]
Order Cetartiodactyla—Cetacea—Superfamily Mysticeti (baleen whales)						
Family Balaenidae						
North Atlantic Right whale.	*Eubalaena glacialis*.	Western North Atlantic (WNA)	E/D; Y	451 (0; 445; 2017)	0.9	5.56
Family Balaenopteridae (rorquals)						
Humpback whale	*Megaptera novaeangliae*.	Gulf of Maine	-/-; N	896 (0; 896; 2012)	14.6	9.8
Fin whale	*Balaenoptera physalus*.	WNA	E/D; Y	1,618 (0.33; 1,234; 2011)	2.5	2.5
Sei whale	*Balaenoptera borealis*.	Nova Scotia	E/D; Y	357 (0.52; 236	0.5	0.6
Minke whale	*Balaenoptera acutorostrata*.	Canadian East Coast	-/-; N	2,591 (0.81; 1,425	14	7.5
Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Short-finned pilot whale.	*Globicephala macrorhyn-. chus*	WNA	-/-; Y	21,515 (0.37; 15,913:2011)	159	192
Long-finned pilot whale.	*Globicephala melas*.	WNA	-/-; Y	5,636 (0.63; 3,464)	35	38
Bottlenose dolphin.	*Tursiops spp.*	WNA Offshore	-/-; N	77,532 (0.40; 56053; 2016)	561	39.4
		WNA Southern Migratory Coastal	-/-; Y	3,751 (0.060; 2,353; 2017)	23	0–12.3
Short beaked common dolphin.	*Delphinus delphis*.	WNA	-/-; N	70,184 (0.28; 55,690;2011)	557	406
Atlantic white-sided dolphin.	*Lagenorhynchus acutus*.	WNA	-/-; N	48,819 (0.61; 30,403; 2011)	304	30
Atlantic spotted dolphin.	*Stenella frontalis*	WNA	-/-: N	44,715 (0.43; 31,610; 2013)	316	0
Risso's dolphin	*Grampus griseus*	WNA	-/-; N	18,250 (0.5; 12,619; 2011)	126	49.7
Family Phocoenidae (porpoises)						
Harbor porpoise	*Phocoena phocoena*.	Gulf of Maine/Bay of Fundy	-/-; N	79,833 (0.32; 61,415; 2011)	706	255

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

2—NMFS marine mammal stock assessment reports online at*: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region/*. CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance. In some cases, CV is not applicable.

3—These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.,* commercial fisheries, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range.

Three marine mammal species that are listed under the Endangered Species Act (ESA) may be present in the survey area: The North Atlantic right whale, fin whale, and sei whale. However, NMFS is not proposing authorized take of any of these species. The proposed authorization of take for 10 species (with 11 managed stocks) is described in the *Estimated Take* section. However, the temporal and/or spatial occurrence of Bryde's whale, blue whale and sperm whale is such that take is not expected to occur. While the BOEM Environmental Assessment (EA) for the North Carolina Wind Energy Areas (2015) indicates that Bryde's whales may be present during fall and winter, their presence in the survey area is very rare and unlikely during the summer (BOEM 2015). The blue whale is an occasional visitor along the northeast Atlantic coast. Sightings of blue whales off Cape Cod, Massachusetts, in summer and fall may represent the southern limit of the feeding range of the western North Atlantic stock that feeds primarily off the Canadian coast. The sperm whale occurs on the continental shelf edge, over the continental slope, and into mid-ocean regions in deeper waters than those in the project area. (NMFS 2015). Because the potential for the Bryde's whale, blue whale and sperm whale to occur within the survey area is unlikely, these species will not be described further. In addition, while strandings data exists for harbor and gray seals along the Mid-Atlantic coast south of New Jersey, their preference for colder, northern waters during the survey period makes their presence in the survey area unlikely during the summer and fall (Hayes *et al* 2018). Winter haulout sites for harbor seals have been identified within the Chesapeake Bay region and Outer Banks beaches, however the seals are only occasionally sited as far south as the Carolinas and are not likely to be present during spring and summer months during which survey activities are planned (Hayes *et al.* 2018). In addition, coastal Virginia and North Carolina represent the southern extent of the habitat range for gray seals, with few stranding records reported for the even more southern waters of North Carolina and sightings occurring only during winter months as far south as New Jersey (Waring *et al.* 2016). Therefore, these seal species will not be described further in this analysis.

North Atlantic Right Whale

The North Atlantic right whale was listed as a Federal endangered species in 1970. The right whale is a strongly migratory species, with some portion of the population moving 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 United States, which is utilized for wintering and calving by some individuals, to summer feeding and nursery grounds between New England and the Bay of Fundy and the Gulf of St. Lawrence (Kenney 2002; Waring *et al.* 2011). The winter distribution of much of the population that does not take part in seasonal migration is largely unknown, although offshore surveys have reported 1 to 13 detections annually in northeastern Florida and southeastern Georgia (Waring *et al.* 2013). Right whales have been observed in or near Virginia and North Carolina waters from October through December, as well as in February and March, which coincides with the migratory time frame for this species (Knowlton *et al.* 2002). A few events of right whale calving have been documented from shallow coastal areas and bays (Kenney 2002). Some evidence provided through acoustic monitoring suggests that not all individuals of the population participate in annual migrations, with a continuous presence of right whales occupying their entire habitat range throughout the year, particularly north of Cape Hatteras (Davis *et al.* 2017). However, an analysis of the composition and distribution of individual right whale sightings archived by the North Atlantic Right Whale Consortium from 1998 through 2015 suggests that very few whales would be present year-round. 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 (Davis *et al.* 2017).

The proposed survey area is part of a migratory Biologically Important Area (BIA) for North Atlantic right whales; this important migratory area is comprised of the waters of the continental shelf offshore the East Coast of the United States and extends from Florida through Massachusetts. Additionally, NMFS' regulations at 50 CFR 224.105 impose vessel speed limits in designated Seasonal Management Areas (SMA) in nearshore waters of the Mid-Atlantic Bight. SMAs were developed to reduce the threat of collisions between ships and right whales around their migratory route and calving grounds. NMFS requires that all vessels 65 ft (19.8 m) or longer must travel at 10 knots or less within the right whale SMA from November 1 through April 30 when right whales are most likely to pass through these waters (NOAA 2010). A small section of the cable routing area overlaps spatially with the Chesapeake Bay SMA.

The western North Atlantic population demonstrated overall growth of 2.8 percent per year between 1990 and 2010 and no growth between 1997 and 2000 (Pace *et al.* 2017). However, since 2010 the population has been in decline, with a 99.99 percent probability of a decline of just under 1 percent per year (Pace *et al.* 2017). Between 1990 and 2015, calving rates varied substantially, with low calving rates coinciding with all three periods of decline or no growth (Pace *et al.* 2017). In 2018, no new North Atlantic right whale calves were documented in their calving grounds; this represented the first time since annual NOAA aerial surveys began in 1989 that no new right whale calves were observed. However, in 2019 at least seven right whale calves have been identified (Savio 2019).

Elevated North Atlantic right whale mortalities have occurred since June 7, 2017. A total of 20 confirmed dead stranded whales (12 in Canada; 8 in the United States), have been documented to date. This event has been declared an Unusual Mortality Event (UME), with human interactions (*i.e.,* fishery-related entanglements and vessel strikes) identified as the most likely cause. More information is available online at: *https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2018-north-atlantic-right-whale-unusual-mortality-event*.

Humpback Whale

Humpback whales are found worldwide in all oceans. In 1973, the

ESA listed humpbacks as endangered. NMFS recently evaluated the status of the species, and on September 8, 2016, NMFS divided the species into 14 distinct population segments (DPS), removed the current species-level listing, and in its place listed four DPSs as endangered and one DPS as threatened (81 FR 62259; September 8, 2016). The remaining nine DPSs were not listed. The West Indies DPS, which is not listed under the ESA, is the only DPS of humpback whale that is expected to occur in the survey area. The best estimate of population abundance for the West Indies DPS is 12,312 individuals, as described in the NMFS Status Review of the Humpback Whale under the Endangered Species Act (Bettridge *et al.,* 2015). This abundance estimate, for the West Indies breeding population, is more appropriate for use in reference to whales that may occur in the survey area than is the estimate given in Table 2, which is specific to the Gulf of Maine feeding population.

Since January 2016, elevated humpback whale mortalities have occurred along the Atlantic coast from Maine through Florida. The event has been declared a UME. Partial or full necropsy examinations have been conducted on approximately half of the 88 known cases. A portion of the whales have shown evidence of pre-mortem vessel strike; however, this finding is not consistent across all of the whales examined so more research is needed. NOAA is consulting with researchers that are conducting studies on the humpback whale populations, and these efforts may provide information on changes in whale distribution and habitat use that could provide additional insight into how these vessel interactions occurred. More detailed information is available at*: https://www.fisheries.noaa.gov/national/marine-life-distress/2016-2018-humpback-whale-unusual-mortality-event-along-atlantic-coast#causes-of-the-humpback-whale-ume* (accessed February 25, 2019). Three previous UMEs involving humpback whales have occurred since 2000, in 2003, 2005, and 2006.

During winter, the majority of humpback whales from North Atlantic feeding areas mate and calve in the West Indies, where spatial and genetic mixing among feeding groups occurs, though significant numbers of animals are found in mid- and high-latitude regions at this time and some individuals have been sighted repeatedly within the same winter season, indicating that not all humpback whales migrate south every winter (Waring *et al.,* 2017). While migrating, humpback whales utilize the Mid-Atlantic as a migration pathway between calving/mating grounds to the south and feeding grounds in the north (Waring *et al.* 2013). Humpbacks typically occur within the Mid-Atlantic region during fall, winter, and spring months (Waring *et al.* 2012).

Fin Whale

Fin whales are common in waters of the U. S. Atlantic Exclusive Economic Zone (EEZ), principally from Cape Hatteras northward (Waring *et al.,* 2017). Fin whales are present north of 35-degree latitude in every season and are broadly distributed throughout the western North Atlantic for most of the year, though densities vary seasonally (Waring *et al.,* 2017). They are found in small groups of up to five individuals (Brueggeman *et al.,* 1987).

Present threats to fin whales are similar to other whale species, namely fishery entanglements and vessel strikes. Fin whales seem less likely to become entangled than other whale species. Glass *et al.* (2008) reported that between 2002 and 2006, fin whales belonging to the Gulf of Maine population were involved in only eight confirmed entanglements with fishery equipment. Furthermore, Nelson *et al.* (2007) reported that fin whales exhibited a low proportion of entanglements (eight reported events) during their 2001 to 2005 study along the western Atlantic. On the other hand, vessel strikes may be a more serious threat to fin whales. Eight and 10 confirmed vessel strikes with fin whales were reported by Glass *et al.* (2008) and Nelson *et al.* (2007), respectively. This level of incidence was similar to that exhibited by the other whales studied. Conversely, a study compiling whale/vessel strike reports from historical accounts, recent whale strandings, and anecdotal records by Laist *et al.* (2001) reported that of the 11 great whale species studied, fin whales were involved in collisions most frequently.

Fin whales are present in the Mid-Atlantic region during all four seasons, although sightings data indicate that they are more prevalent during winter, spring, and summer (Waring et al 2012). While fall is the season of lowest overall abundance off Virginia and North Carolina, they do not depart the area entirely.

Sei Whale

The sei whale is a widespread species in the world's temperate, subpolar, subtropical, and tropical marine waters. NOAA Fisheries considers sei whales occurring from the U.S. East Coast to Cape Breton, Nova Scotia, and east to 42° W as the ''Nova Scotia stock'' of sei whales (Waring *et al.* 2016; Hayes *et al.* 2018). Sei whales occur in deep water characteristic of the continental shelf edge throughout their range (Hain *et al.* 1985). They are often found in pairs (Schilling, 1992). In the Northwest Atlantic, it is speculated that the whales migrate from south of Cape Cod along the eastern Canadian coast in June and July, and return on a southward migration again in September and October (Waring *et al.* 2014; 2016). The sei whale is most common on Georges Bank and into the Gulf of Maine/Bay of Fundy region during spring and summer, primarily in deeper waters.

There is limited information on the stock identity of sei whales in the North Atlantic and insufficient data to determine trends of the Nova Scotian sei whale population (Hayes *et al.* 2018). A final recovery plan for the sei whale was published in 2011 (NOAA Fisheries 2011). Sei whale occurrence is relatively rare in the survey area.

Minke Whale

Minke whales can be found in temperate, tropical, and high-latitude waters. The Canadian East Coast stock can be found in the area from the western half of the Davis Strait (45° W) to the Gulf of Mexico (Waring *et al.,* 2017). This species generally occupies waters less than 100 m deep on the continental shelf (Waring *et al.,* 2017).

Since January 2017, elevated minke whale strandings have occurred along the Atlantic coast from Maine through South Carolina, with highest numbers in Massachusetts, Maine, and New York. As of September 30, 2018, partial or full necropsy examinations have been conducted on more than 60 percent of the 57 known cases. Preliminary findings in several of the whales have shown evidence of human interactions or infectious disease. These findings are not consistent across all of the whales examined, so more research is needed. As part of the UME investigation process, NOAA is assembling an independent team of scientists to coordinate with the Working Group on Marine Mammal Unusual Mortality Events to review the data collected, sample stranded whales, and determine the next steps for the investigation. More information is available at: *www.fisheries.noaa.gov/national/marine-life-distress/2017-2018-minke-whale-unusual-mortality-event-along-atlantic-coast* (accessed February 25, 2019).

Pilot Whale

Both the long-finned and short-finned pilot whale could occur in the survey area. However, the long-finned pilot whale is more generally found farther north in deeper waters along the edge of the continental shelf (a depth of 330 to 3,300 feet (100 to 1,000 meters). While long-finned pilot whales have occasionally been observed stranded as far south as South Carolina, long-finned and short-finned pilot whales tend to overlap spatially along the mid-Atlantic shelf break between New Jersey and the southern flank of Georges Bank (Payne and Heinemann 1993; Rone and Pace 2012). The latitudinal ranges of the two species remain uncertain, although south of Cape Hatteras, most pilot whale sightings are expected to be short-finned pilot whales, while north of ~42° N most pilot whale sightings are expected to be long-finned pilot whales (Hayes *et al.* 2018).

Bottlenose Dolphin

The bottlenose dolphin 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).

There are two distinct bottlenose dolphin morphotypes: Coastal and offshore. The coastal morphotype resides in waters typically less than 65.6 ft (20 m) deep, along the inner continental shelf (within 7.5 km (4.6 miles) of shore), around islands, and is continuously distributed south of Long Island, New York into the Gulf of Mexico. These coastal populations are subdivided into seven stocks based largely upon spatial distribution (Waring *et al.* 2016). Of these 7 coastal stocks, the Western North Atlantic Southern Migratory Coastal stock is common in the coastal continental shelf waters off the coast of Virginia and North Carolina (Waring *et al.* 2018). These animals often move into or reside in bays, estuaries, the lower reaches of rivers, and coastal waters. The Southern Migratory Coastal Stock is one of only two (the other being the Northern Migratory Coastal Stock) thought to make broad-scale, seasonal migrations in coastal waters of the western North Atlantic. The spatial distribution and migratory movements of the Southern Migratory Coastal Stock are poorly understood and have been defined based on movement data from satellite-tag telemetry and photo-ID studies, and stable isotope studies. The distribution of this stock is best described by satellite tag-telemetry data which provided evidence for a stock of dolphins migrating seasonally along the coast between North Carolina and northern Florida (Garrison *et al.* 2017b). Tag-telemetry data collected from two dolphins tagged in November 2004 just south of Cape Fear, North Carolina, suggested that, during October–December, this stock occupies waters of southern North Carolina (south of Cape Lookout) where it may overlap spatially with the Southern North Carolina Estuarine System (SNCES) Stock in coastal waters ≤3 km from shore. Based on the satellite telemetry data, during January–March, the Southern Migratory Coastal Stock appears to move as far south as northern Florida. During April–June, the stock moves back north to North Carolina past the tagging site to Cape Hatteras, North Carolina (Garrison *et al.* 2017b). During the warm water months of July–August, the stock is presumed to occupy coastal waters north of Cape Lookout, North Carolina, to Assateague, Virginia, including Chesapeake Bay.

The Southern Migratory Coastal stock may also overlap to some degree with the western North Atlantic Offshore stock of common bottlenose dolphins. A combined genetic and logistic regression analysis that incorporated depth, latitude, and distance from shore was used to model the probability that a particular common bottlenose dolphin group seen in coastal waters was of the coastal versus offshore morphotype (Garrison *et al.* 2017a). North of Cape Hatteras during summer months, there is strong separation between the coastal and offshore morphotypes (Kenney 1990; Garrison *et al.* 2017a), and the coastal morphotype is nearly completely absent in waters >20 m depth. South of Cape Hatteras, the regression analysis indicated that the coastal morphotype is most common in waters <20 m deep, but occurs at lower densities over the continental shelf, in waters >20 m deep, where it overlaps to some degree with the offshore morphotype. For the purposes of defining stock boundaries, estimating abundance, and identifying bycaught samples, the offshore boundary of the Southern Migratory Coastal Stock is defined as the 20-m isobath north of Cape Hatteras and the 200-m isobath south of Cape Hatteras. In summary, this stock is best delimited in warm water months, when it overlaps least with other stocks, as common bottlenose dolphins of the coastal morphotype that occupy coastal waters from the shoreline to 200 m depth from Cape Lookout to Cape Hatteras, North Carolina, and coastal waters 0–20 m in depth from Cape Hatteras to Assateague, Virginia, including Chesapeake Bay (Hayes *et al.* 2018).

The biggest threat to the population is bycatch because they are frequently caught in fishing gear, gillnets, purse seines, and shrimp trawls (Waring *et al.,* 2016). They have also been adversely impacted by pollution, habitat alteration, boat collisions, human disturbance, and are subject to bioaccumulation of toxins. Scientists have found a strong correlation between dolphins with elevated levels of PCBs and illness, indicating certain pollutants may weaken their immune system (ACSonline 2004).

Common Dolphin

The short-beaked common dolphin is found world-wide in temperate to subtropical seas. In the North Atlantic, short-beaked common dolphins are commonly found over the continental shelf between the 100-m and 2,000-m isobaths and over prominent underwater topography and east to the mid-Atlantic Ridge. Common dolphins have been noted to be associated with Gulf Stream features (CETAP 1982; Selzer and Payne 1988; Waring *et al.,* 1992). The species is less common south of Cape Hatteras, although schools have been reported as far south as the Georgia/South Carolina border (Hayes *et al.,* 2018).

Atlantic White-Sided Dolphin

White-sided dolphins are found in temperate and sub-polar waters of the North Atlantic, primarily in continental shelf waters to the 100-m depth contour from central West Greenland to North Carolina (Waring *et al.,* 2017). The Gulf of Maine stock is most common in continental shelf waters from Hudson Canyon to Georges Bank, and in the Gulf of Maine and lower Bay of Fundy. Sighting data indicate seasonal shifts in distribution (Northridge *et al.,* 1997). During January to May, low numbers of white-sided dolphins are found from Georges Bank to Jeffreys Ledge (off New Hampshire), with even lower numbers south of Georges Bank, as documented by a few strandings collected on beaches of Virginia to South Carolina. From June through September, large numbers of white-sided dolphins are found from Georges Bank to the lower Bay of Fundy. From October to December, white-sided dolphins occur at intermediate densities from southern Georges Bank to southern Gulf of Maine. Infrequent Virginia and North Carolina observations appear to represent the southern extent of the species' range during the winter months (Hayes *et al.,* 2018).

Atlantic Spotted Dolphin

There are two species of spotted dolphin in the Atlantic Ocean, the Atlantic spotted dolphin (*Stenella frontalis*) and the pantropical spotted dolphin (*S. attenuata*) (Perrin *et al.,* 1987).

The Atlantic spotted dolphin ranges from southern New England, south through the Gulf of Mexico and the Caribbean to Venezuela (Leatherwood *et al.,* 1976; Perrin *et al.,* 1994). The Atlantic spotted dolphin prefers tropical to warm temperate waters along the continental shelf 10 to 200 meters (33 to 650 feet) deep to slope waters greater than 500 meters (1640 feet) deep. They regularly occur in continental shelf waters south of Cape Hatteras and in continental shelf edge and continental slope waters north of this region (Payne *et al.,* 1984; Mullin and Fulling 2003). Pantropical spotted dolphin sightings during surveys in the Atlantic have been concentrated in the slope waters north of Cape Hatteras while in waters south of Cape Hatteras sightings are recorded over the Blake Plateau and in deeper offshore waters of the mid-Atlantic. (NMFS 2014). Given that pantropical spotted dolphins are found in deeper slope waters, it is likely that only Atlantic spotted dolphins, preferring shallower waters, would be found in the survey area.

Risso's Dolphins

Risso's dolphins are distributed worldwide in tropical and temperate seas and in the Northwest Atlantic occur from Florida to eastern Newfoundland. Off the northeastern U.S. coast, Risso's dolphins are distributed along the continental shelf edge from Cape Hatteras northward to Georges Bank during spring, summer, and autumn. In winter, the range is in the mid-Atlantic Bight and extends outward into oceanic waters. In general, the population occupies the mid-Atlantic continental shelf edge year round (Hayes *et al.,* 2018).

Harbor Porpoise

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. During summer (July to September), harbor porpoises are concentrated in the northern Gulf of Maine and southern Bay of Fundy region, generally in waters less than 150 m deep with a few sightings in the upper Bay of Fundy and on Georges Bank. During fall (October–December) and spring (April–June), harbor porpoises are widely dispersed from New Jersey to Maine, with lower densities farther north and south. They are seen from the coastline to deep waters (>1800 m) although the majority of the population is found over the continental shelf. During winter (January to March), intermediate densities of harbor porpoises can be found in waters off New Jersey to North Carolina, and lower densities are found in waters off New York to New Brunswick, Canada. There does not appear to be a temporally coordinated migration or a specific migratory route to and from the Bay of Fundy region. However, during the fall, several satellite-tagged harbor porpoises did favor the waters around the 92-m isobaths (Hayes *et al.,* 2018)

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.,* Richardson *et al.,* 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al.* (2007) recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.,* low-frequency cetaceans). Subsequently, NMFS (2018) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 dB threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.,* (2007) retained. The functional groups and the associated frequencies are indicated below (note that these frequency ranges correspond to the range for the composite group, with the entire range not necessarily reflecting the capabilities of every species within that group):

- Low-frequency cetaceans (mysticetes): generalized hearing is estimated to occur between approximately 7 Hz and 35 kHz;
- Mid-frequency cetaceans (larger toothed whales, beaked whales, and most delphinids): Generalized hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- High-frequency cetaceans (porpoises, river dolphins, and members of the genera Kogia and Cephalorhynchus; including two members of the genus Lagenorhynchus, on the basis of recent echolocation data and genetic data): Generalized hearing is estimated to occur between approximately 275 Hz and 160 kHz.

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. Twelve marine mammal species, all cetaceans, have the reasonable potential to co-occur with the proposed survey activities. Please refer to Table 2. Of these cetacean species, 5 are classified as low-frequency cetaceans (*i.e.,* all mysticete species), 6 are classified as mid-frequency cetaceans (*i.e.,* all delphinid species), and 1 is classified as a high-frequency cetacean (*i.e.,* harbor porpoise).

Potential Effects of Specified Activities on Marine Mammals and Their Habitat

This section includes a summary and discussion of the ways that components of the specified activity may impact marine mammals and their habitat. The *Estimated Take* section later in this document includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The *Negligible Impact Analysis and Determination* section considers the content of this section, the *Estimated Take* section, and the *Proposed Mitigation* section, to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and how those impacts on individuals are likely to impact marine mammal species or stocks.

Background on Sound

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

Acoustic Impacts

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

When sound travels (propagates) from its source, its loudness decreases as the distance traveled by the sound increases. Thus, the loudness of a sound at its source is higher than the loudness of that same sound a kilometer away. Acousticians often refer to the loudness of a sound at its source (typically referenced to one meter from the source) as the source level and the loudness of sound elsewhere as the received level (*i.e.,* typically the receiver). For example, a humpback whale 3 km from a device that has a source level of 230 dB may only be exposed to sound that is 160 dB loud, depending on how the sound travels through water (*e.g.,* spherical spreading (6 dB reduction with doubling of distance) was used in this example) and assuming no other sources of propagation loss (see below). As a result, it is important to understand the difference between source levels and received levels when discussing the loudness of sound in the ocean or its impacts on the marine environment.

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

Hearing Impairment

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

Temporary Threshold Shift

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

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

Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin, beluga whale, harbor porpoise, and Yangtze finless porpoise) exposed to a limited number of sound sources (*i.e.,* mostly tones and octave-band noise) in laboratory settings (*e.g.,* Finneran *et al.,* 2002 and 2010; Nachtigall *et al.,* 2004; Lucke *et al.,* 2009; Mooney *et al.,* 2009; Popov *et al.,* 2011; Finneran and Schlundt, 2010). In general, harbor porpoises (Lucke *et al.,* 2009; Kastelein *et al.,* 2012b) have a lower TTS onset than other measured cetacean species. However, even for these animals, which are better able to hear higher frequencies and may be more sensitive to higher frequencies, exposures on the order of approximately 170 dB_{RMS} or higher for brief transient signals are likely required for even temporary (recoverable) changes in hearing sensitivity that would likely not be categorized as physiologically damaging (Lucke *et al.,* 2009). Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species. There are no data available on noise-induced hearing loss for mysticetes. For summaries of data on TTS in marine mammals or for further discussion of TTS onset thresholds, please see NMFS (2018), Southall *et al.* (2019), Finneran and Jenkins (2012), and Finneran (2015).

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

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

Masking

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

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

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

Marine mammal communications would not likely be masked appreciably by the sub-bottom profiler signals given the directionality of the signal and the brief period when an individual mammal is likely to be within its beam.

Non-Auditory Physical Effects (Stress)

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

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

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

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

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

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

Hearing is one of the primary senses marine mammals use to gather information about their environment and to communicate with conspecifics. Although empirical information on the effect of sensory impairment (TTS, PTS, and acoustic masking) on marine mammals remains limited, it seems reasonable to assume that reducing an animal's ability to gather information about its environment and to communicate with other members of its species would be stressful for animals that use hearing as their primary sensory mechanism. Therefore, we assume that acoustic exposures sufficient to trigger onset PTS or TTS would be accompanied by physiological stress responses because terrestrial animals exhibit those responses under similar conditions (NRC, 2003). More importantly, marine mammals might experience stress responses at received levels lower than those necessary to trigger onset TTS. Based on empirical studies of the time required to recover from stress responses (Moberg, 2000), we also assume that stress responses are likely to persist beyond the time interval required for animals to recover from TTS and might result in pathological and pre-pathological states that would be as significant as behavioral responses to TTS. NMFS does not expect that the generally short-term, intermittent, and transitory HRG surveys would create conditions of long-term, continuous noise and chronic acoustic exposure leading to long-term physiological stress responses in marine mammals.

Behavioral Disturbance

Behavioral responses to sound are highly variable and context-specific. An animal's perception of and response to (in both nature and magnitude) an acoustic event can be influenced by prior experience, perceived proximity, bearing of the sound, familiarity of the sound, etc. (Southall *et al.,* 2007; DeRuiter *et al.,* 2013a and 2013b). If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (*e.g.,* Lusseau and Bejder, 2007; Weilgart, 2007).

Southall *et al.* (2007) reports the results of the efforts of a panel of experts in acoustic research from behavioral, physiological, and physical disciplines that convened and reviewed the available literature on marine mammal hearing and physiological and behavioral responses to human-made sound with the goal of proposing exposure criteria for certain effects. This peer-reviewed compilation of literature is very valuable, though Southall *et al.* (2007) note that not all data are equal, some have poor statistical power, insufficient controls, and/or limited information on received levels, background noise, and other potentially important contextual variables—such data were reviewed and sometimes used for qualitative illustration but were not included in the quantitative analysis for the criteria recommendations. All of the studies considered, however, contain an estimate of the received sound level when the animal exhibited the indicated response.

Studies that address responses of low-frequency cetaceans to sounds include data gathered in the field and related to several types of sound sources, including: vessel noise, drilling and machinery playback, low-frequency M-sequences (sine wave with multiple phase reversals) playback, tactical low-frequency active sonar playback, drill ships, and non-pulse playbacks. These studies generally indicate no (or very limited) responses to received levels in the 90 to 120 dB re: 1μPa range and an increasing likelihood of avoidance and other behavioral effects in the 120 to 160 dB range. As mentioned earlier, though, contextual variables play a very important role in the reported responses and the severity of effects do not increase linearly with received levels. Also, few of the laboratory or field datasets had common conditions, behavioral contexts, or sound sources, so it is not surprising that responses differ.

The studies that address responses of mid-frequency cetaceans to sounds include data gathered both in the field and the laboratory and related to several different sound sources, including: pingers, drilling playbacks, ship and ice-breaking noise, vessel noise, acoustic harassment devices (AHDs), acoustic deterrent devices (ADDs), mid-frequency active sonar, and non-pulse bands and tones. Southall *et al.* (2007) were unable to come to a clear conclusion regarding the results of these studies. In some cases animals in the field showed significant responses to received levels between 90 and 120 dB, while in other cases these responses were not seen in the 120 to 150 dB range. The disparity in results was likely due to contextual variation and the differences between the results in the field and laboratory data (animals typically responded at lower levels in the field). The studies that address the responses of mid-frequency cetaceans to impulse sounds include data gathered both in the field and the laboratory and related to several different sound sources, including: small explosives, airgun arrays, pulse sequences, and natural and artificial pulses. The data show no clear indication of increasing probability and severity of response with increasing received level. Behavioral responses seem to vary depending on species and stimuli.

The studies that address responses of high-frequency cetaceans to sounds include data gathered both in the field and the laboratory and related to several different sound sources, including: Pingers, AHDs, and various laboratory non-pulse sounds. All of these data were collected from harbor porpoises.

Marine mammals are likely to avoid the HRG survey activity, especially harbor porpoises. However, because the sub-bottom profilers and other HRG survey equipment operate from a moving vessel, and the assumed behavioral harassment distance is small (see *Estimated Take*), the area and time that this equipment would be affecting a given location is very small. Further, once an area has been surveyed, it is not likely that it will be surveyed again, therefore reducing the likelihood of repeated HRG-related impacts within the survey area.

We have also considered the potential for severe behavioral responses such as stranding and associated indirect injury or mortality from Avangrid's use of HRG survey equipment, on the basis of a 2008 mass stranding of approximately one hundred melon-headed whales in a Madagascar lagoon system. An investigation of the event indicated that use of a high-frequency mapping system (12-kHz multibeam echosounder) was the most plausible and likely initial behavioral trigger of the event, while providing the caveat that there is no unequivocal and easily identifiable single cause (Southall *et al.,* 2013). The investigatory panel's conclusion was based on (1) very close temporal and spatial association and directed movement of the survey with the stranding event; (2) the unusual nature of such an event coupled with previously documented apparent behavioral sensitivity of the species to other sound types (Southall *et al.,* 2006; Brownell *et al.,* 2009); and (3) the fact that all other possible factors considered were determined to be unlikely causes. Specifically, regarding survey patterns prior to the event and in relation to bathymetry, the vessel transited in a north-south direction on the shelf break parallel to the shore, ensonifying large areas of deep-water habitat prior to operating intermittently in a concentrated area offshore from the stranding site; this may have trapped the animals between the sound source and the shore, thus driving them towards the lagoon system. The investigatory panel systematically excluded or deemed highly unlikely nearly all potential reasons for these animals leaving their typical pelagic habitat for an area extremely atypical for the species (*i.e.,* a shallow lagoon system). Notably, this was the first time that such a system has been associated with a stranding event. The panel also noted several site- and situation-specific secondary factors that may have contributed to the avoidance responses that led to the eventual entrapment and mortality of the whales. Specifically, shoreward-directed surface currents and elevated chlorophyll levels in the area preceding the event may have played a role (Southall *et al.,* 2013).

The report also notes that prior use of a similar system in the general area may have sensitized the animals and also concluded that, for odontocete cetaceans that hear well in higher frequency ranges where ambient noise is typically quite low, high-power active sonars operating in this range may be more easily audible and have potential effects over larger areas than low frequency systems that have more typically been considered in terms of anthropogenic noise impacts. It is, however, important to note that the relatively lower output frequency, higher output power, and complex nature of the system implicated in this event, in context of the other factors noted here, likely produced a fairly unusual set of circumstances that indicate that such events would likely remain rare and are not necessarily relevant to use of lower-power, higher-frequency systems more commonly used for HRG survey applications. The risk of similar events recurring may be very low, given the extensive use of active acoustic systems used for scientific and navigational purposes worldwide on a daily basis and the lack of direct evidence of such responses previously reported.

Tolerance

Numerous studies have shown that underwater sounds from industrial activities are often readily detectable by marine mammals in the water at distances of many kilometers. However, other studies have shown that marine mammals at distances more than a few kilometers away often show no apparent response to industrial activities of various types (Miller *et al.,* 2005). This is often true even in cases when the sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales and toothed whales have been shown to react behaviorally to underwater sound from sources such as airgun pulses or vessels under some conditions, at other times, mammals of all three types have shown no overt reactions (*e.g.,* Malme *et al.,* 1986; Richardson *et al.,* 1995; Madsen and Mohl, 2000; Croll *et al.,* 2001; Jacobs and Terhune, 2002; Madsen *et al.,* 2002; Miller *et al.,* 2005). Due to the relatively high vessel traffic in the survey area it is possible that marine mammals are habituated to noise from project vessels in the area.

Vessel Strike

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

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

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

Effects on Marine Mammal Habitat

There are no feeding areas, rookeries, or mating grounds known to be biologically important to marine mammals within the proposed project area with the exception of a migratory BIA for right whales which was described previously. There is also no designated critical habitat for any ESA-listed marine mammals. NMFS' regulations at 50 CFR 224.105 designated the nearshore waters of the Mid-Atlantic Bight as the Mid-Atlantic SMA for right whales in 2008. Mandatory vessel speed restrictions are in place in that SMA from November 1 through April 30 to reduce the threat of collisions between ships and right whales around their migratory route and calving grounds.

We are not aware of any available literature on impacts to marine mammal prey species from HRG survey equipment. However, because the HRG survey equipment introduces noise to the marine environment, there is the potential for avoidance of the area around the HRG survey activities by marine mammal prey species. Any avoidance of the area on the part of marine mammal prey species would be expected to be short term and temporary. Because of the temporary nature of the disturbance, the availability of similar habitat and resources (*e.g.,* prey species) in the surrounding area, and the lack of important or unique marine mammal habitat, the impacts to marine mammals and the food sources that they utilize are not expected to cause significant or long-term consequences for individual marine mammals or their populations. Impacts on marine mammal habitat from the proposed activities will be temporary, insignificant, and discountable.

Estimated Take

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

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines ''harassment'' as: Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

As described previously, no mortality is anticipated or proposed to be authorized for this activity. Below we describe how the take is estimated.

Generally speaking, we estimate take by considering: (1) Acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) and the number of days of activities. We note that while these basic factors can contribute to a calculation to provide an initial prediction of takes, additional information that can qualitatively inform take estimates is also sometimes available (*e.g.,* previous monitoring results or average group size). Below, we describe the factors considered here in more detail and present the proposed take estimate.

Acoustic Thresholds

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment for non-explosive sources—Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.,* frequency, predictability, duty cycle), the environment (*e.g.,* bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.,* 2007, Ellison *et al.,* 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.,* seismic airguns) or intermittent (*e.g.,* scientific sonar) sources. Avangrid's proposed activity includes the use of impulsive and/or intermittent sources (HRG equipment) and, therefore, the 160 dB re 1 μPa (rms) is applicable.

Level A harassment for non-explosive sources—NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (NMFS, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). Avangrid's proposed activity includes the use of impulsive sources (medium penetration sub-bottom profiler) and non-impulsive sources (shallow penetration sub-bottom profiler).

These thresholds are provided in the table below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2018 Technical Guidance, which may be accessed at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance*.

TABLE 3—THRESHOLDS IDENTIFYING THE ONSET OF PERMANENT THRESHOLD SHIFT

Hearing group	PTS onset acoustic thresholds * (received level)	
	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	*Cell 1:* $L_{pk,flat}$: 219 dB; $L_{E,LF,24h}$: 183 dB	*Cell 2:* $L_{E,LF,24h}$: 199 dB.
Mid-Frequency (FF) Cetaceans	*Cell 3:* $L_{pk,flat}$: 230 dB; $L_{E,MF,24h}$: 185 dB	*Cell 4:* $L_{E,MF,24h}$: 198 dB.
High-Frequency (HF) Cetaceans	*Cell 5:* $L_{pk,flat}$: 202 dB; $L_{E,HF,24h}$: 155 dB	*Cell 6:* $L_{E,HF,24h}$: 173 dB.
Phocid Pinnipeds (PW) (Underwater)	*Cell 7:* $L_{pk,flat}$: 218 dB; $L_{E,PW,24h}$: 185 dB	*Cell 8:* $L_{E,PW,24h}$: 201 dB.
Otariid Pinnipeds (OW) (Underwater)	*Cell 9:* $L_{pk,flat}$: 232 dB; $L_{E,OW,24h}$: 203 dB	*Cell 10:* $L_{E,OW,24h}$: 201 dB.

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

Note: Peak sound pressure (L_{pk}) has a reference value of 1 μPa, and cumulative sound exposure level (L_E) has a reference value of 1μPa²s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

Ensonified Area

Here, we describe operational and environmental parameters of the activity that will feed into identifying the area ensonified above the acoustic thresholds, which include source levels and transmission loss coefficient.

Previously we explained that auditory injury of marine mammals is unlikely given the higher level of sound and/or longer durations of exposure necessary to cause PTS and the small zone within which sound levels would exceed criteria for onset of PTS. The information provided in Tables 4 and 5 support this position and demonstrate that the proposed mitigation measures are based on a highly conservative evaluation of potential acoustic impacts.

When the NMFS Technical Guidance was first published in 2016, in recognition of the fact that ensonified area/volume could be more technically challenging to predict because of the duration component in the new thresholds, we developed a User Spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or occurrence to help predict takes. We note that because of some of the assumptions included in the methods used for these tools, we anticipate that isopleths produced are typically going to be overestimates of some degree, which may result in some degree of overestimate of Level A harassment take. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available. NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For mobile sources, including the HRG survey equipment, the User Spreadsheet predicts the closest distance at which a stationary animal would not incur PTS if the sound source traveled by the animal in a straight line at a constant speed. Note however, that use of the spreadsheet is generally not appropriate for use in assessing potential for Level A harassment for very highly directional sources, such as the Innomar SES–2000, for reasons explained below. Inputs used in the User Spreadsheet and the resulting isopleths are reported below.

TABLE 4—USER SPREADSHEET INPUT PARAMETERS USED FOR CALCULATING HARASSMENT ISOPLETHS

Spreadsheet tab used	USBL	Shallow penetration SBP	Medium penetration SBP
	D: Mobile source: Non-impulsive, intermittent	D: Mobile source: Non-impulsive, intermittent	F: Mobile source: Impulsive, intermittent
Source Level (dB)	188 RMS SPL	179 RMS SPL	206 RMS SPL
Weighting Factor Adjustment (kHz)	26.5	2.6	1.4
Source Velocity (m/s)	2.058	2.058	2.058
Pulse Duration (seconds)	0.016	0.0658	0.008
1/Repetition rate− (seconds)	0.33	0.25	0.25
Source Level (PK SPL)			215
Propagation (xLogR)	20	20	20

Note that the Innomar SES–2000 is a specialized type of HRG sub-bottom profiler that uses the principle of ''parametric'' or ''nonlinear'' acoustics to generate short narrow-beam sound pulses. As no field data currently exists for the Innomar sub-bottom profiler acoustic modeling was completed using a version of the U.S. Naval Research Laboratory's Range-dependent Acoustic Model (RAM) and BELLHOP Gaussian beam ray-trace propagation model (Porter and Liu 1994). Calculations of the ensonified area are conservative due to the directionality of the sound sources. Due to the short sound pulses and the highly directional sound pulse transmission (1° beamwidth) of parametric sub-bottom profilers, the volume of area affected is much lower than using conventional (linear) acoustics devices such as sparker and chirp systems. Level A harassment zones of less than 5 meters (Table 5) for HF cetaceans were calculated for this HRG equipment in the proposed survey area while Level B harassment isopleths were found to range from 120 to 135 meters (Table 6).

TABLE 5—MAXIMUM DISTANCES TO LEVEL A HARASSMENT THRESHOLDS BY EQUIPMENT CATEGORY

Representative HRG survey equipment	Marine mammal group	PTS onset	Lateral distance (m)
USBL/GAPS Positioning Systems			
Sonardyne Ranger 2 USBL HPT 5/7000	LF cetaceans	199 dB SEL$_{cum}$.	
	MF cetaceans	198 dB SEL$_{cum}$.	
	HF cetaceans	173 dB SEL$_{cum}$	3
Shallow Sub-bottom Profiler			
Edgetech 512i	LF cetaceans	199 dB SEL$_{cum}$.	
	MF cetaceans	198 dB SEL$_{cum}$.	
	HF cetaceans	173 dB SEL$_{cum}$.	
Shallow Parametric Sub-bottom Profiler			
Innomar SES–2000 Standard Parametric Sub-bottom Profiler.	LF cetaceans	199 dB SEL$_{cum}$	N/A
	MF cetaceans	198 dB SEL$_{cum}$.	
	HF cetaceans	173 dB SEL$_{cum}$	<5
Medium Penetration Sub-bottom Profiler			
SIG ELC 820 Sparker	LF cetaceans	219 dBpeak, 183 dB SEL$_{cum}$	—, 10
	MF cetaceans	230 dBpeak, 185 dB SEL$_{cum}$	—,—
	HF cetaceans	202 dBpeak, 155 dB SEL$_{cum}$	5, 4

Notes:
The peak SPL criterion is un-weighted (*i.e.,* flat weighted), whereas the cumulative SEL criterion is weighted for the given marine mammal functional hearing group.
The calculated sound levels and results are based on NMFS Technical Guidance's companion User Spreadsheet except as indicated.
— indicates that no injury was predicted for the given HRG equipment noise profile.
N/A indicates not applicable as the HRG sound source operates outside the effective marine mammal hearing range

Distances to Level B harassment noise thresholds were calculated using the conservative practical spreading model (transmission loss (TL) equation: TL = $15\log_{10}r$), with the exception of the Innomar SES–2000 described previously. The Sig ELC 820 Sparker was calculated to have the largest Level B harassment isopleth of 200 m (656.2 ft). To account for some of the potential variation of operating conditions, the maximum distance of 200 m to the harassment thresholds is used to determine estimated exposure. The 200 m distance to the medium penetration sub-bottom profiler represents the largest distance and is likely a very conservative estimate based on sound source field verification assessments of similar sparker electrode equipment.

The 200 m distance to the medium penetration sub-bottom profiler represents the largest distance and is likely a very conservative estimate based on sound source field verification assessments of similar sparker electrode equipment.

TABLE 6—DISTANCES TO LEVEL B HARASSMENT THRESHOLDS

[160 dB_{RMS}]

Survey equipment	Marine mammal level B harassment 160 dB_{RMS} re 1 μPa (m)
USBL	
Sonardyne Ranger 2 USBL	25
Shallow penetration sub-bottom profiler	
EdgeTech 512i	10
Innomar parametric SES–2000 Standard	120–135
Medium penetration sub-bottom profiler	
SIG ELC 820 Sparker	200

Marine Mammal Occurrence

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations. The data used as the basis for estimating cetacean density (''D'') for the survey area are sightings per unit effort (SPUE) derived by Duke University (Roberts *et al.* 2016a), updated with new modeling results (Roberts *et al.* 2016b; 2017; 2018). SPUE (or, the relative abundance of species) is derived by using a measure of survey effort and number of individual cetaceans sighted. SPUE allows for comparison between discrete units of time (*i.e.* seasons) and space within a project area (Shoop and Kenney, 1992). The Duke University (Roberts *et al.* 2016) cetacean density data represent models derived from aggregating line-transect surveys conducted over 23 years by five institutions (NOAA NMFS Northeast Fisheries Science Center, New Jersey Department of Environmental Protection, NOAA NMFS Southeast Fisheries Science Center, University of North Carolina Wilmington, and Virginia Aquarium & Marine Science Center). Model versions discussed in Roberts et al. (2016a) are freely available online at the Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebrate Populations (OBISSEAMAP) repository. Monthly mean density values within the survey area were averaged by season (Winter (December, January, February), Spring (March, April, May), Summer (June, July, August), Fall (September, October, November)) to provide seasonal density estimates for those taxa for which monthly model results are available. The highest seasonal density estimates during the duration of the proposed survey were used to estimate take (*i.e.,* summer or fall). (2016b; 2017; 2018).

Take Calculation and Estimation

Here we describe how the information provided above is brought together to produce a quantitative take estimate. In order to estimate the number of marine mammals predicted to be exposed to sound levels that would result in harassment, radial distances to predicted isopleths corresponding to harassment thresholds are calculated, as described above. Those distances are then used to calculate the area(s) around the HRG survey equipment predicted to be ensonified to sound levels that exceed harassment thresholds. The area estimated to be ensonified to relevant thresholds in a single day of the survey is then calculated, based on areas predicted to be ensonified around the HRG survey equipment and the estimated survey vessel trackline distance traveled per day.

The survey activities that have the potential to cause Level B harassment (160 dB_{RMS} re 1 μPa) are listed in Table 6. Based on the results of this assessment, the furthest distance to the Level B harassment criteria is 200 m from the use of the SIG ELC 820 Sparker. As a conservative measure to account for some of the potential variation of operating conditions, the maximum distance of 200 m to the Level B harassment isopleth for the SIG ELC 820 Sparker is used to determine estimated exposure for the entire HRG survey.

The estimated distance of the daily vessel trackline was determined using the estimated average speed of the vessel (4 knots) and the 24-hour operational period. Using the maximum distance to the Level B harassment threshold of 200 m (656 ft) and estimated daily vessel track of approximately 177.8 km (110.5 mi), estimates of take by survey equipment has been based on an ensonified area around the survey equipment of 71.2 km^2 (27.5 mi^2) per day over a projected survey period for each survey segment as shown in Table 7.

TABLE 7—SURVEY SEGMENT DISTANCES AND LEVEL B HARASSMENT ZONES

Survey segment	Number of active survey days	Estimated distances per day (km)	Estimated total line distance	Calculated level B harassment zone per day (km^2)
Lease Area	29	177.8	5,156	71.2
Cable Route Corridor	8	177.8	1,422	71.2

The parameters in Table 7 were used to estimate the potential take by incidental harassment for each segment of the HRG survey. Density data from Roberts *et al.* (2016b; 2017; 2018) were mapped within the boundary of the survey area for each segment (Figure 1 in application) using geographic information systems. For both survey segments, species densities, as reported by Roberts *et al.* (2016) within the maximum survey area, were averaged by season (spring and summer) based on the proposed HRG survey schedule (commencing no earlier than June 1, 2019). Potential take calculations were then based on the maximum average seasonal species density (between spring and summer) within the maximum survey area, given the survey start date and duration. Results of the take calculations by survey segment are provided in Table 8.

TABLE 8—MARINE MAMMAL DENSITY AND ESTIMATED TAKE BY LEVEL B HARASSMENT

Species	Lease area		Cable Corridor Route		Totals	
	Maximum average seasonal density [1] (No. /100 km ^{2})	Calculated Take (number)	Maximum average seasonal density [1] (No. /100 km ^{2})	Calculated Take (number)	Total take authorization (number)	Percent of population
North Atlantic right whale	0.051	1.063	0.051	0.288	[3] 0	
Humpback whale	0.466	9.631	0.102	0.581	10	1.11
Fin whale	0.328	6.773	0.128	0.729	[3] 0	
Sei whale	0.020	0.406	0.003	0.018	0	
Minke whale	0.757	15.643	0.171	0.9722	17	0.65
Pilot whale	0.100	2.073	0.034	0.195	[4 5] 10	<0.01
Harbor porpoise	1.252	25.874	0.690	3.931	30	<0.01
Bottlenose dolphin (WNA southern migratory coastal) [2]	0.000	0.000	49.102	104.944	105	2.8
Bottlenose dolphin (offshore) [2]	6.409	132.413	49.102	174.906	307	<0.01
Short beaked common dolphin	5.241	108.275	2.144	12.221	120	0.17
Atlantic white-sided dolphin	2.482	51.288	0.320	1.826	53	0.11
Atlantic spotted dolphin	8.895	183.772	3.493	19.910	204	0.46
Risso's dolphin	0.074	1.525	0.074	0.421	[4] 40	0.21

[1] Density values from Duke University (Roberts *et al.* 2016b; 2017; 2018).
[2] Estimates split based on bottlenose dolphin stock preferred water depths (Reeves *et al.* 2002; Waring *et al.* 2016).
[3] No take proposed for authorization, as discussed below.
[4] Adjusted for group size.
[5] For short-finned and long-finned pilot whales, percentage of stock taken is <0.01percent both species if all 10 takes are allocated separately to each species.

Since the calculated take value for pilot whales (2) is less than the mean group size (9.4), NMFS assumed that take of at least one group of pilot whales could occur (Silva et al, 2014). For bottlenose dolphin densities, Roberts *et al.* (2016b; 2017; 2018) does not differentiate by individual stock. Given the southern coastal migratory stock's propensity to be found in waters shallower than the 20 m depth isobath north of Cape Hatteras (Reeves *et al.* 2002; Waring *et al.* 2016), the Export Cable Corridor segment was roughly divided along the 20 m depth isobath. The Lease Area is located within depths exceeding 20 m, where the southern coastal migratory stock would be unlikely to occur. Roughly 40 percent of the Export Cable Corridor is 20 m or less in depth. Given the Export Cable Corridor area is estimated to take 8 days to complete survey activity, 3 days have been estimated for depths shallower than 20 m. Therefore, to account for the potential for mixed stocks within the Export Cable Corridor, 3 days has been applied to the take estimation equation for the southern coastal migratory stock and the remaining applied to the offshore stock (5 days). The offshore stock is the only stock of bottlenose dolphins that may occur in the lease area; therefore bottlenose dolphin densities within the Lease Area have been considered part of the offshore stock only for purposes of take estimation.

For Risso's dolphins, NMFS adjusted the calculated take number to account for group size. These dolphins are usually seen in groups of 12 to 40, but loose aggregations of 100 to 200 or more are seen occasionally (Reeves *et al.,* 2002). NMFS conservatively assumed that a group of 40 or several smaller groups not exceeding a total of 40 takes by Level B harassment.

The three ESA-listed large whales that could potentially be present in the survey area occur at very low densities, and the calculated numbers of potential acoustic exposures above the 160-dB threshold are small, *i.e.,* one right whale exposure, zero sei whale exposures, and eight fin whale exposures. In addition, Avangrid proposed a 500 m (1,640 ft) exclusion zone for the right whale and NMFS recommended a 200 m (656 ft) exclusion zone for sei and fin whales. Both of these measures are incorporated into the proposed IHA (see ''Proposed Mitigation''). These exclusion zones exceed (in the case of right whales) or equal (in the case of sei and fin whales) the distance to the conservatively calculated Level B harassment isopleth. Given the low likelihood of exposure in context of the proposed mitigation requirements (with relatively high detection probabilities for large whales at these distances during good visibility), we believe that there is not a reasonably anticipated potential for the specified activity to cause the disruption of behavioral patterns for these species. Therefore, we do not propose to authorize take by Level B harassment for these species.

Proposed Mitigation

In order to issue an IHA under Section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors:

(1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or

stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned) the likelihood of effective implementation (probability implemented as planned) and;

(2) the practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Avangrid's application included a list of proposed mitigation measures during site characterization surveys utilizing HRG survey equipment. NMFS proposes the additional measure of establishing an exclusion zone of 200 m for sei and fin whales. The mitigation measures outlined in this section are based on protocols and procedures that have been successfully implemented and previously approved by NMFS (DONG Energy, 2016, ESS, 2013; Dominion, 2013 and 2014).

Visual Monitoring

Visual monitoring of designated exclusion and Level B harassment zones will ensure that (1) Any take of ESA-listed species would be limited; (2) exposure to underwater noise does not result in injury (Level A harassment), and (3) the number of instances of take does not exceed the authorized amounts. PSOs will coordinate to ensure 360° visual coverage around the vessel and conduct visual observations while free from distractions and in a consistent, systematic, and diligent manner. Visual PSOs shall immediately communicate all observations of marine mammals to the on-duty acoustic PSO(s), including any determination by the PSO regarding species identification, distance, and bearing and the degree of confidence in the determination. Any observations of marine mammal species by crew members aboard any vessel associated with the survey shall be relayed to the PSO team.

PSOs will establish and monitor applicable exclusion zones. During use of HRG acoustic sources (*i.e.,* anytime the acoustic source is active), occurrences of marine mammal species approaching the relevant exclusion zone will be communicated to the operator to prepare for the potential shutdown of the acoustic source. Exclusion zones are defined, depending on the species and context, below:

- 500 m (1,640 ft) exclusion zone for North Atlantic right whales;
- 200 m (656 ft) exclusion zone for sei and fin whales; and
- 100 m (328 ft) exclusion zone for other large cetaceans (*i.e.,* humpback whale, minke whale, pilot whale, Risso's dolphin).

The Level B harassment zone represents the zone within which marine mammals would be considered taken by Level B harassment and will encompass a distance of 200 m (656 ft) from survey equipment for all marine mammal species.

Pre-Clearance

Avangrid will implement a 30-minute clearance period of the exclusion zones. This will help ensure marine mammals are not in the exclusion zones prior to startup of HRG equipment. During this period the exclusion zones will be monitored by the PSOs, using the appropriate visual technology for a 30-minute period. The intent of pre-clearance observation is to ensure no marine mammal species are observed within the exclusion zones prior to the beginning of operation of HRG equipment. A PSO conducting pre-clearance observations must be notified immediately prior to initiating start of HRG equipment and the operator must receive confirmation from the PSO to proceed.

Activation of HRG equipment may not be initiated if any marine mammal is observed within the applicable exclusion zones as described above. If a marine mammal is observed within the applicable exclusion zone during the 30 minute pre-clearance period, activation of HRG equipment may not begin until the animal(s) has been observed exiting the zones or until an additional time period has elapsed with no further sightings (15 minutes for small delphinoid cetaceans and 30 minutes for all other species). Activation of HRG equipment may occur at times of poor visibility, including nighttime, if continuous visual observation and has occurred with no detections of marine mammals in the 30 minutes prior to beginning of start-up.

Shutdown Procedures

An immediate shutdown of the HRG survey equipment will be required if a marine mammal is sighted at or within its respective exclusion zone to minimize or avoid behavioral impacts to ESA-listed species. The vessel operator must comply immediately with any call for shutdown by the lead PSO. The operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic source to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch. When shutdown is called for by a PSO, the acoustic source must be immediately deactivated and any dispute resolved only following deactivation.

Should there be any uncertainty regarding identification of a marine mammal species (*i.e.,* whether the observed marine mammal(s) belongs to one of the delphinid genera for which shutdown is waived or one of the species with a larger exclusion zone), visual PSOs may use best professional judgment in making the decision to call for a shutdown. If a species for which authorization has not been granted, or, a species for which authorization has been granted but the authorized number of takes have been met, approaches or is observed within the 200 m Level B harassment zone, shutdown must occur.

Subsequent restart of the survey equipment can be initiated if the animal has been observed exiting its respective exclusion zone within 30 minutes of the shutdown or an additional time period has elapsed with no further sighting (*i.e.,* 15 minutes for small odontocetes and 30 minutes for all other species).

If the acoustic source is shut down for reasons other than mitigation (*e.g.,* mechanical difficulty) for less than 30 minutes, it may be activated again without pre-clearance protocols, if PSOs have maintained constant observation and no detections of any marine mammal have occurred within the respective exclusion zones.

Vessel Strike Avoidance

In order to avoid striking animals, vessel operators and crews must maintain a vigilant watch for all marine mammal species and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size. A visual observer aboard the vessel must monitor a vessel strike avoidance zone around the vessel (distances stated below). Visual observers monitoring the vessel strike avoidance zone may be third-party observers (*i.e.,* PSOs) or crew members, but crew members responsible for these duties must be provided sufficient training to distinguish marine mammal species from other phenomena and broadly to identify a marine mammal as a right whale, other whale (defined in this context as sperm whales or baleen whales other than right whales), or other marine mammal. Vessel strike avoidance measures will include the following:

- All vessels (*e.g.,* source vessels, chase vessels, supply vessels), regardless of size, must observe a 10-knot speed restriction in specific areas designated by NMFS for the protection of North Atlantic right whales from vessel strikes: Any Dynamic Management Areas (DMA) when in effect, and the Mid-Atlantic Seasonal Management Areas (SMA) (from November 1 through April 30). See 50 CFR 224.105 and *www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-ship-strikes-north-atlantic-right-whales* for specific detail regarding these areas.
- Vessel speeds must also be reduced to 10 knots or less, regardless of location, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near a vessel;
- All vessels must maintain a minimum separation distance of 500 m from right whales. If a whale is observed but cannot be confirmed as a species other than a right whale, the vessel operator must assume that it is a right whale and take appropriate action;
- All vessels must maintain a minimum separation distance of 100 m from all other baleen whales and sperm whales;
- All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all other marine mammals, with an understanding that at times this may not be possible (*e.g.,* for animals that approach the vessel).
- When marine mammals are sighted while a vessel is underway, the vessel shall take action as necessary to avoid violating the relevant separation distance, *e.g.,* attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area. If marine mammals are sighted within the relevant separation distance, the vessel must reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear or any vessel that is navigationally constrained.
- These requirements do not apply in any case where compliance would create an imminent and serious threat to a person or vessel or to the extent that a vessel is restricted in its ability to maneuver and, because of the restriction, cannot comply.

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

Proposed Monitoring and Reporting

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

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.,* presence, abundance, distribution, density);
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) Action or environment (*e.g.,* source characterization, propagation, ambient noise); (2) affected species (*e.g.,* life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.,* age, calving or feeding areas);
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;
- How anticipated responses to stressors impact either: (1) Long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;
- Effects on marine mammal habitat (*e.g.,* marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and
- Mitigation and monitoring effectiveness.

Proposed Monitoring and Reporting Measures

Visual Monitoring

Visual monitoring shall be conducted by NMFS-approved PSOs. PSO resumes shall be provided to NMFS for approval prior to commencement of the survey. Avangrid must use independent, dedicated, trained PSOs, meaning that the PSOs must be employed by a third-party observer provider, must have no tasks other than to conduct observational effort, collect data, and communicate with and instruct relevant vessel crew with regard to the presence of marine mammals and mitigation requirements (including brief alerts regarding maritime hazards).

Observations shall take place from the highest available vantage point on the survey vessel. General 360-degree scanning shall occur during the monitoring periods, and target scanning by the PSO shall occur when alerted of a marine mammal presence. An observer team comprising a minimum of four NMFS-approved PSOs, operating in shifts, will be stationed aboard the survey vessel. PSO's will work in shifts such that no one monitor will work more than 4 consecutive hours without a 2-hour break or longer than 12 hours during any 24-hour period. During daylight hours the PSOs will rotate in shifts of 1 on and 3 off, and during nighttime operations PSOs will work in pairs.

PSOs must have all equipment (including backup equipment) needed to adequately perform necessary tasks, including accurate determination of distance and bearing to observed marine mammals. PSOs will be equipped with binoculars and have the ability to estimate distances to marine mammals located in proximity to their established zones using range finders. Reticulated binoculars will also be available to PSOs for use as appropriate based on conditions and visibility to support the siting and monitoring of marine species. Cameras of appropriate quality will be used for photographs and video to record sightings and verify species identification. Each PSO must have a camera and backup cameras should be available. During night operations, night-vision equipment (night-vision goggles with thermal clip-ons) and infrared technology will be used. Position data will be recorded using hand-held or vessel global positioning system (GPS) units for each sighting. Radios for each PSO are required in order to communicate among vessel crew and PSOs. PSO must also have compasses and any other tools necessary to perform other PSO tasks.

PSOs shall be responsible for visually monitoring and identifying marine mammals approaching or entering the established monitoring zones as well as beyond the monitoring zones to the maximum extent possible. PSOs will record animals both within and beyond the monitoring zones during survey activities.

Data on all PSO observations must be recorded based on standard PSO collection requirements. PSOs must use standardized data forms, whether hard copy or electronic. This shall include the following:

- Vessel names (source vessel and other vessels associated with survey), vessel size and type, maximum speed capability of vessel, port of origin, and call signs;
- PSO names and affiliations;
- Dates of departures and returns to port with port name;
- Date and participants of PSO briefings;
- Dates and times (Greenwich Mean Time) of survey effort and times corresponding with PSO effort;
- Vessel location (latitude/longitude) when survey effort begins and ends; vessel location at beginning and end of visual PSO duty shifts;
- Vessel heading and speed at beginning and end of visual PSO duty shifts and upon any line change;
- Environmental conditions while on visual survey (at beginning and end of PSO shift and whenever conditions change significantly), including wind speed and direction, Beaufort sea state, Beaufort wind force, swell height, weather conditions, cloud cover, sun glare, and overall visibility to the horizon;
- Factors that may be contributing to impaired observations during each PSO shift change or as needed as environmental conditions change (*e.g.,* vessel traffic, equipment malfunctions);
- Survey activity information, such as acoustic source power output while in operation, and any other notes of significance (*i.e.,* pre-ramp-up survey, ramp-up, shutdown, testing, ramp-up completion, end of operations, etc.);
- If a marine mammal is sighted, the following information should be reported:

(a) Watch status (sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform);

(b) PSO who sighted the animal;

(c) Time of sighting;

(d) Vessel location at time of sighting;

(e) Water depth;

(f) Direction of vessel's travel (compass direction);

(g) Direction of animal's travel relative to the vessel;

(h) Pace of the animal;

(i) Estimated distance to the animal and its heading relative to vessel at initial sighting;

(j) Identification of the animal (*e.g.,* genus/species, lowest possible taxonomic level, or unidentified); also note the composition of the group if there is a mix of species;

(k) Estimated number of animals (high/low/best);

(l) Estimated number of animals by cohort (adults, yearlings, juveniles, calves, group composition, etc.);

(m) Description (as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics);

(n) Detailed behavior observations (*e.g.,* number of blows, number of surfaces, breaching, spyhopping, diving, feeding, traveling; as explicit and detailed as possible; note any observed changes in behavior);

(o) Animal's closest point of approach and/or closest distance from the center point of the acoustic source;

(p) Platform activity at time of sighting (*e.g.,* deploying, recovering, testing, data acquisition, other); and

(q) Description of any actions implemented in response to the sighting (*e.g.,* delays, shutdown, ramp-up, speed or course alteration, etc.) and time and location of the action.

Proposed Reporting Measures

Within 90 days after completion of survey activities, a final report will be provided to NMFS that fully documents the methods and monitoring protocols, summarizes the data recorded during monitoring, estimates the number of marine mammals estimated to have been taken during survey activities, and provides an interpretation of the results and effectiveness of all mitigation and monitoring. All raw observational data shall be made available to NMFS. The draft report must be accompanied by a certification from the lead PSO as to the accuracy of the report, and the lead PSO may submit directly to NMFS a statement concerning implementation and effectiveness of the required mitigation and monitoring. Any recommendations made by NMFS must be addressed in the final report prior to acceptance by NMFS. A final report must be submitted within 30 days following resolution of any comments on the draft report.

Notification of Injured or Dead Marine Mammals

In the unanticipated event that the specified HRG activities lead to an injury of a marine mammal (Level A harassment) or mortality (*e.g.,* ship-strike, gear interaction, and/or entanglement), Avangrid would immediately cease the specified activities and report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources and the NMFS Southeast Regional Stranding Coordinator. The report would include the following information:

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

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

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

In the event that Avangrid discovers an injured or dead marine mammal and determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.,* previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), Avangrid would report the incident to the Chief of the Permits and Conservation Division, Office of

Protected Resources, and the NMFS Southeast Regional Stranding Coordinator, within 24 hours of the discovery. Avangrid would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS. Avangrid may continue its operations under such a case.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.,* population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be ''taken'' through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.,* intensity, duration), the context of any responses (*e.g.,* critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS's implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.,* as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

To avoid repetition, this introductory discussion of our analyses applies to all the species listed in Table 8, given that many of the anticipated effects of this project on different marine mammal stocks are expected to be relatively similar in nature. Where there are meaningful differences between species or stocks, or groups of species, in anticipated individual responses to activities, impact of expected take on the population due to differences in population status, or impacts on habitat, they are described independently in the analysis below.

As discussed in the ''Potential Effects of the Specified Activity on Marine Mammals and Their Habitat'' section, PTS, masking, non-auditory physical effects, and vessel strike are not expected to occur. Marine mammal habitat may be impacted by elevated sound levels but these impacts would be short term. Feeding behavior is not likely to be significantly impacted. Prey species are mobile, and are broadly distributed throughout the survey area; therefore, marine mammals that may be temporarily displaced during survey activities are expected to be able to resume foraging once they have moved away from areas with disturbing levels of underwater noise. Because of the availability of similar habitat and resources in the surrounding area, and the lack of important or unique marine mammal habitat, the impacts to marine mammals and the food sources that they utilize are not expected to cause significant or long-term consequences for individual marine mammals or their populations. Additionally, there are no feeding areas or mating grounds known to be biologically important to marine mammals within the proposed project area with the exception of a migratory BIA for North Atlantic right whales described below.

Biologically Important Areas (BIA)

The proposed survey area includes a biologically important migratory area for North Atlantic right whales (effective March-April and November-December) that extends from Massachusetts to Florida (LaBrecque, *et al.,* 2015). As previously noted, no take of North Atlantic right whales has been proposed, and HRG survey operations will be required to shut down at 500 m to further minimize any potential effects to this species. The fact that the spatial acoustic footprint of the proposed survey is very small relative to the spatial extent of the available migratory habitat leads us to expect that right whale migration will not be impacted by the proposed survey.

Unusual Mortality Events (UME)

A UME is defined under the MMPA as a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response. Two UMEs are ongoing and under investigation relevant to the HRG survey area for species for which authorization of take is proposed. These involve humpback whales and minke whales. There is currently no direct connection between the UMEs, as there is no evident cause of stranding or death that is common across the species involved in the UMEs. Additionally, strandings across the two species are not clustering in space or time. We are proposing to take only limited numbers of humpback (10) and minke whale (17) by Level B harassment in the form of minor, short-term behavioral modifications that are unlikely to directly or indirectly result in strandings or mortality.

Based on the foregoing preliminary information, direct physical interactions (ship strikes and entanglements) appear to be responsible for many of the UME mortalities recorded. The HRG survey with the proposed mitigation and monitoring is not likely to result in any mortalities. Fishing gear and in-water lines will not be employed by the survey vessel, and ship speed and avoidance mitigation measures will minimize risk of ship strikes.

The proposed mitigation measures are expected to reduce the number and/or severity of takes by preventing animals from being exposed to sound levels that have the potential to cause Level B harassment during HRG survey activities. Vessel strike avoidance requirements will further mitigate potential impacts to marine mammals during vessel transit to and within the survey area.

Avangrid did not request, and NMFS is not proposing to authorize, take of marine mammals by serious injury or mortality. NMFS expects that most takes would primarily consist of short-term Level B behavioral harassment in the form of temporary vacating of the area or decreased foraging (if such activity were occurring). These reactions are considered to be of low severity and with no lasting biological consequences (*e.g.,* Southall *et al.,* 2007). Since the source is mobile, a specified area would be ensonified by sound levels that could result in take for only a short period. Additionally, required mitigation measures would reduce exposure to sound that could result in harassment.

In summary, and as described above, the following factors primarily support our preliminary determination that the impacts resulting from this activity are not expected to adversely affect the species or stock through effects on annual rates of recruitment or survival:

- No mortality or injury is anticipated or authorized;
- Feeding behavior is not likely to be significantly impacted as effects on species that serve as prey species for marine mammals from the proposed survey are expected to be minimal;
- The availability of alternate areas of similar habitat value for marine mammals to temporarily vacate the survey area during the planned survey to avoid exposure to sounds from the activity;

• Take is anticipated to be by Level B behavioral harassment only, consisting of brief startling reactions and/or temporary avoidance of the survey area;

• While the survey area is within areas noted as biologically important for migration of the North Atlantic right whale, migration would not be affected since project activities would occur in such a comparatively small area. In addition, mitigation measures will be required to shut down sound sources at 500 m to further minimize any potential for effects to this species; and

• The proposed mitigation measures, including visual monitoring and shutdowns, are expected to minimize potential impacts to marine mammals, particularly in light of the small size of the take zones.

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

Small Numbers

As noted above, only small numbers of incidental take may be authorized under Sections 101(a)(5)(A) and (D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities relative to the species.

The numbers of marine mammals that we propose for authorization to be taken, for all species and stocks, would be considered small relative to the relevant stocks or populations (less than 3 percent for the bottlenose dolphin Western North Atlantic, southern migratory coastal stock and less than one percent for all other species and stocks proposed for authorization). See Table 8. Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the population sizes of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

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

Endangered Species Act (ESA)

Section 7(a)(2) of the Endangered Species Act of 1973 (ESA: 16 U.S.C. 1531 *et seq.*) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

No incidental take of ESA-listed species is proposed for authorization or expected to result from this activity. Therefore, NMFS has determined that formal consultation under section 7 of the ESA is not required for this action.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to Avangrid for HRG survey activities during geophysical survey activities off the Coast of Virginia and North Carolina from June 1, 2019, through May 31, 2020, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. A draft of the proposed IHA can be found at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*.

Request for Public Comments

We request comment on our analyses, the proposed authorization, and any other aspect of this Notice of Proposed IHA for the proposed HRG survey. We also request comment on the potential for renewal of this proposed IHA as described in the paragraph below. Please include with your comments any supporting data or literature citations to help inform our final decision on the request for MMPA authorization.

On a case-by-case basis, NMFS may issue a one-year IHA renewal with an expedited public comment period (15 days) when (1) another year of identical or nearly identical activities as described in the Specified Activities section is planned or (2) the activities would not be completed by the time the IHA expires and a second IHA would allow for completion of the activities beyond that described in the Dates and Duration section, provided all of the following conditions are met:

• A request for renewal is received no later than 60 days prior to expiration of the current IHA.

• The request for renewal must include the following:

(1) An explanation that the activities to be conducted under the proposed Renewal are identical to the activities analyzed under the initial IHA, are a subset of the activities, or include changes so minor (*e.g.,* reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take because only a subset of the initially analyzed activities remain to be completed under the Renewal); and

(2) A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

• Upon review of the request for renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings in the initial IHA remain valid.

Dated: April 22, 2019.

Catherine Marzin,

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

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BUREAU OF CONSUMER FINANCIAL PROTECTION

Academic Research Council Meeting

AGENCY: Consumer Financial Protection Bureau.

ACTION: Notice of public meeting.

SUMMARY: Under the Federal Advisory Committee Act (FACA), this notice sets forth the announcement of a public meeting of the Academic Research Council (ARC or Council) of the Bureau of Consumer Financial Protection (Bureau). The notice also describes the functions of the Council.

DATES: The meeting date is Friday, May 10, 2019, 10:30 a.m.–12:00 p.m. eastern standard time.