TUESDAY, JUNE 23, 2020—Continued

Time	Activity	Lead
9:15 a.m.–10:45 a.m	Atlantic Surf Clam	Dan Hennen.
10:45 a.m.–11 a.m	Break.	
11 a.m.–12 p.m	Atlantic Surf Clam cont.	Dan Hennen.
12 p.m.–1 p.m	Lunch.	
1 p.m.–1:30 p.m	Review/Discussion/Summary	Review Panel.
1:30 p.m.–3 p.m	Longfin Inshore Squid *(Doryteuthis)*	Lisa Hendrickson.
3 p.m.–3:15 p.m	Break.	
3:15 p.m.–4 p.m	Longfin Inshore Squid *(Doryteuthis)* cont.	Lisa Hendrickson.
4 p.m.–4:30 p.m	Review/Discussion/Summary	Review Panel.
4:30 p.m.–4:45 p.m	Public Comment	Public.
4:45 p.m	Adjourn.	

WEDNESDAY, JUNE 24, 2020

Time	Activity	Lead
9 a.m.–9:15 a.m	Brief Overview and logistics	Michele Traver/Mike Wilberg (Chair).
9:15 a.m.–10:15 a.m	Meeting Wrap Up/Discussion of Key Topics	Review Panel.
10:15 a.m.–10:30 a.m	Public Comment	Public.
10:30 a.m.–10:45 a.m	Break.	
10:45 a.m.–12 p.m	Report Writing	Review Panel.
12 p.m.–1 p.m	Lunch.	
1:05 p.m.–5 p.m	Report Writing	Review Panel.
5 p.m	Adjourn.	

THURSDAY, JUNE 25, 2020

Time	Activity	Lead
9 a.m.–5 p.m	Report Writing	Review Panel.

The meeting is open to the public; however, during the 'Report Writing' session on Wednesday, June 23rd, and Thursday, June 24th, the public should not engage in discussion with the Peer Review Panel.

Special Accommodations

This meeting is physically accessible to people with disabilities. Special requests should be directed to Michele Traver, 508–495–2195, at least 5 days prior to the meeting date.

Dated: June 12, 2020.

Hélène M.N. Scalliet,

Acting Director, Office of Sustainable Fisheries, National Marine Fisheries Service.

[FR Doc. 2020–13076 Filed 6–16–20; 8:45 am]

BILLING CODE 3510–22–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648–XA159]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Marine Site Characterization Surveys Off of Coastal Virginia

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 Dominion Energy Virginia (Dominion) for authorization to take marine mammals incidental to marine site characterization surveys in the areas of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS) Offshore Virginia (Lease No. OCS–A–0483) as well as in coastal waters where an export cable corridor will be established in support of the Coastal Virginia Offshore Wind Commercial (CVOW Commercial) Project. 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 July 17, 2020.

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 without change. All personal identifying information (*e.g.,* name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: Robert 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/permit/incidental-take-authorizations-under-marine-mammal-protection-act.* 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 the species or stocks for taking for certain subsistence uses (referred to in shorthand as ''mitigation''); and requirements pertaining to the mitigation, monitoring and reporting of the takings are set forth.

The definitions of all applicable MMPA statutory terms cited above are included in the relevant sections below.

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 IHA) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in Categorical Exclusion B4 (IHAs with no anticipated serious injury or mortality) of the Companion Manual for NOAA Administrative Order 216–6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has preliminarily determined that the issuance of the proposed IHA qualifies to be categorically excluded from further NEPA review.

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 February 7, 2020, NMFS received a request from Dominion for an IHA to take marine mammals incidental to marine site characterization surveys in the areas of the Commercial Lease of Submerged Lands for Renewable Energy Development on the OCS Offshore Virginia (Lease No. OCS–A–0483) as well as in coastal waters where an export cable corridor will be established in support of the offshore wind project. Dominion's proposed marine site characterization surveys include HRG and geotechnical survey activities. These survey activities would include two survey vessels and occur within both the Lease Area and the export cable corridor. For the purpose of this IHA the Lease Area and export cable corridors are collectively referred to as the Survey Area. Geophysical and shallow geotechnical survey activities are anticipated to be supported by two vessels. Each vessel will transit an estimated 121.54 km of survey lines per day. The application was deemed adequate and complete on May 12, 2020. Dominion's request is for take of a small number of 11 species by Level B harassment only. Neither Dominion nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

Description of Proposed Activity

Overview

Dominion proposes to conduct high-resolution geophysical (HRG) and geotechnical surveys in support of offshore wind development projects in the areas of Commercial Lease of Submerged Lands for Renewable Energy Development on the OCS offshore Virginia (#OCS–A 0483) and along potential submarine cable routes to landfall locations in Virginia.

The purpose of the marine site characterization surveys is to support the site characterization, facilities siting, and engineering design of offshore Project facilities including wind turbine generators, offshore substation(s), and submarine cables within the Lease Area and proposed export cable corridor. Underwater sound generated by Dominion's HRG equipment has the potential to result in incidental take of marine mammals in the form of behavioral harassment.

Dates and Duration

HRG survey activities are anticipated to last approximately 161 days and are anticipated to commence as soon as possible. Of those days, surveys will be conducted for 149 days in the Lease Area and 12 days in the export cable corridor. This schedule is based on 24-hour operations and includes potential down time due to inclement weather. The survey days are based on total survey line kilometers (km) and represent a combined operational effort of two vessels operating concurrently. The actual allocation of survey effort between the two vessels will be dependent on weather, unforeseen down time, and other operational factors. These vessels will operate at least several kilometers apart, often operating with even greater distances of separation between the two vessels.

Specific Geographic Region

Dominion will conduct surveys within the marine environment of the approximately 122,799-acre Lease Area and along the export cable corridor between the Lease Area and the Virginia shoreline (see Figure 1). Water depths in the Lease Area range from about 22 meters (m) (72 feet [ft]) to 38 m (125 ft). The export cable corridor begins at the western side of the Lease Area and extends southwest toward the coast of

Virginia for approximately 50 kilometers (km) (27 nautical miles [nm]). The export cable corridor will range from 600 m (1,968 ft) to 900 m (2,953 ft) wide and terminate at a proposed cable landing location along the Virginia Beach coastline. The exact landing location (between Croatan Beach and Sandbridge) is yet to be determined.

For the purpose of this application, the Survey Area is defined as the Lease Area plus a 200-m buffer and export cable corridor that will be established in advance of conducting the survey activity. The Survey Area will include two distinct survey segments. The first survey segment will include full coverage HRG surveys conducted in a tartan-pattern survey grid within the Lease Area; for this survey, a 200-m buffer was also included for line turns, run in and out, etc. Then, a full coverage HRG survey of the export cable corridor will cover up to a 900-m-wide corridor.

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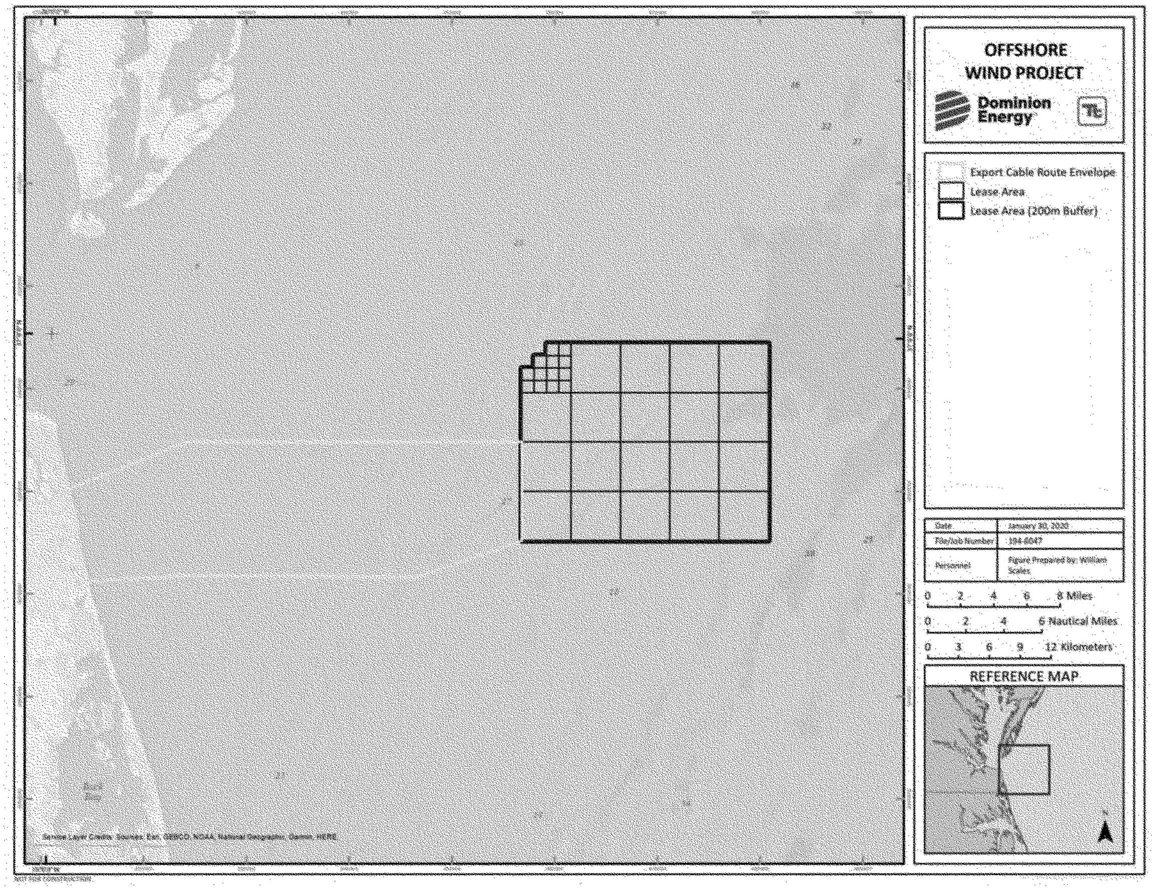

Figure 1 -- Survey Area

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Detailed Description of Specific Activity

The proposed HRG and geotechnical survey activities are described below.

Geophysical Survey Activities

Dominion has proposed that HRG survey operations would be conducted continuously 24 hours per day. The HRG survey activities proposed by Dominion would will include the following:

- Subsea positioning to calculate position by measuring the range and bearing from a vessel-mounted transceiver to an acoustic transponder;
- Depth sounding (multibeam depth sounder) to determine water depths and general bottom topography (currently estimated to range from approximately minimum vessel draft to 38 m [125 ft] in depth);
- 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; and
- Medium penetration sub-bottom profiler (chirps/parametric profilers/ sparkers) to map deeper subsurface stratigraphy as needed (soils down to 75 m [246 ft] to 100 m [328 ft] below seabed).

Table 1 identifies the representative survey equipment that may be used in support of proposed geophysical survey activities that operate below 180 kilohertz (kHz) and produce signals that marine mammals may hear. HRG surveys are expected to use several equipment types concurrently in order to collect multiple aspects of geophysical data along one transect. Selection of equipment combinations is based on specific survey objectives.

TABLE 1—SUMMARY OF GEOPHYSICAL SURVEY EQUIPMENT PROPOSED FOR USE BY DOMINION

HRG system	Representative HRG equipment	Operating frequencies (kHz)	RMS source level [1]	Peak source level [1]	Primary beam width (degrees)	Pulse duration (millisecond)
Subsea Positioning/USBL	Sonardyne Ranger 2 USBL	35–55	188	191	90	1
	EvoLogics S2CR	48–78	178	186	Omnidirectional.	500–600
	ixBlue Gaps	20–30	191	194	200	9–11
Multibeam Echosounder	R2Sonics 2026	170–450	191	221	0.45 × 0.45 − 1 × 1.	0.015–1.115
Synthetic Aperture Sonar (SAS), combined bathymetry/Sidescan [2].	Kraken Aquapix	337	210	213	>135 vertical, 1 horizontal.	1–10
Side Scan Sonar [2]	Edgetech 4200 dual frequency.	300 and 600	[3] 206	[3] 212	140	5–10
Parametric SBP	Innomar SES–2000 medium 100.	2–22	[4] 241	247	2	0.07–1
Non-Parametric SBP	Edgetech 216 Chirp	2–16	193	196	15–25	5–40
	Edgetech 512 Chirp	0.5–12	177	[5] 191	16–41	20
Medium Penetration Seismic	GeoMarine Dual 400 Sparker 800J.	0.25–4	200	[6] 210	Omnidirectional.	0.5–0.8
	Applied Acoustics S-Boom (Triple Plate Boomer 1000J).	0.5–3.5	[7] 203	[7] 213	[8] 60	10

[1] Source levels reported by manufacturer unless otherwise noted.
[2] Operating frequencies are above all relevant marine mammal hearing thresholds, so are not assessed in this IHA.
[3] The source levels are based on data from Crocker and Fratantonio (2016) for the EdgeTech 4200 for 100 percent power and 100 kHz.
[4] The equipment specification sheets indicates a peak source level of 247 dB re 1 μPA m. The average difference between the peak and SPLRMS source levels for sub-bottom profilers measured by Crocker and Fratantonio (2016) was 6 dB. Therefore, the estimated SPLRMS sound level is 241 dB re 1 μPA m.
[5] The source level are based on data from Crocker and Fratantonio (2016) for the EdgeTech 512i for 100 percent power.
[6] The source levels were provided by the manufacturer within the document titled "Noise Level Stacked 400—tuned".
[7] The source levels are based on data from Crocker and Fratantonio (2016) for the Applied Acoustics S-Boom with CSP–N Energy Source set at 1000 Joules.
[8] The beam width was based on data from Crocker and Fratantonio (2016) for the Applied Acoustics S-Boom. dB re 1 μPa m—decibels referenced to 1 microPascal at 1 meter.

The deployment of HRG survey equipment, including the equipment anticipated for use during Dominion's proposed activity, produces sound in the marine environment that has the potential to result in harassment of marine mammals. However, sound propagation in water is dependent on several factors including operating mode, frequency and beam direction of the HRG equipment; thus, potential impacts to marine mammals from HRG equipment are driven by the specification of individual HRG sources. The specifications of the potential equipment proposed for use during HRG survey activities (Table 1) were analyzed to determine which types of equipment would have the potential to result in harassment of marine mammals.

Geotechnical Equipment Use

Geotechnical survey activities will include the following:

- Sample boreholes to determine geological and geotechnical characteristics of sediments;
- Deep cone penetration tests (CPTs) to determine stratigraphy and in situ conditions of the deep surface sediments; and
- Shallow CPTs to determine stratigraphy and *in situ* conditions of the near surface sediments.

Geotechnical investigation activities are anticipated to be conducted from a drill ship equipped with dynamic positioning (DP) thrusters. Sound produced through use of DP thrusters is similar to that produced by transiting vessels and DP thrusters are typically operated either in a similarly predictable manner or used for short durations around stationary activities. NMFS does not believe acoustic impacts from DP thrusters are likely to result in take of marine mammals in the absence of activity- or location-specific circumstances that may otherwise represent specific concerns for marine mammals (*i.e.,* activities proposed in area known to be of particular importance for a particular species), or associated activities that may increase the potential to result in take when in concert with DP thrusters. In this case, we are not aware of any such circumstances. Therefore, NMFS believes the likelihood of DP thrusters used during the proposed geotechnical surveys resulting in harassment of marine mammals to be so low as to be discountable. As DP thrusters are not expected to result in take of marine mammals, these activities are not analyzed further in this document.

Field studies conducted off the coast of Virginia to determine the underwater noise produced by CPTs and borehole drilling found that these activities did not result in underwater noise levels that exceeded current thresholds for Level B harassment of marine mammals (Kalapinski 2015). Given the small size and energy footprint of CPTs and boring cores, NMFS believes the likelihood that noise from these activities would exceed the Level B harassment threshold at any appreciable distance is so low as to be discountable. Therefore, geotechnical survey activities, including CPTs and borehole drilling, are not expected to result in harassment of marine mammals and are not analyzed further in this document.

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 all species or stocks for which take is expected and proposed to be authorized for this action, 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 (2019). 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 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's U.S. Atlantic SARs (Hayes *et al.* 2019). All values presented in Table 2 are the most recent available at the time of publication and are available in the draft 2019 Atlantic and Gulf of Mexico Marine Mammal Stock Assessments available online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports.*

TABLE 2—MARINE MAMMALS KNOWN TO OCCUR IN THE SURVEY AREA THAT MAY BE AFFECTED BY DOMINION'S PROPOSED ACTIVITY

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N) [1]	Stock abundance (CV, N_{min}, most recent abundance survey) [2]	Predicted abundance (CV) [3]	PBR	Annual M/SI [4]
Order Cetartiodactyla—Cetacea—Superfamily Mysticeti (baleen whales)							
Family Balaenidae:							
North Atlantic Right whale.	*Eubalaena glacialis*	Western North Atlantic (WNA).	E/D; Y	428 (0; 418; n/a)	*535 (0.45)	0.8	5.55
Family Balaenopteridae (rorquals):							
Humpback whale.	*Megaptera novaeangliae.*	Gulf of Maine	-/-; N	1396 (0; 1380; n/a)	*1,637 (0.07)	22	12.5
Fin whale	*Balaenoptera physalus.*	WNA	E/D; Y	7,418 (0.25; 6,025; n/a).	4,633 (0.08)	12	2.35
Sei whale	*Balaenoptera borealis.*	Nova Scotia	E/D; Y	6,292 (1.015; 3,098; n/a).	*717 (0.30)	6.2	1
Minke whale	*Balaenoptera acutorostrata.*	Canadian East Coast.	-/-; N	24,202 (0.3; 18,902; n/a).	*2,112 (0.05)	1,189	8
Superfamily Odontoceti (toothed whales, dolphins, and porpoises)							
Family Physeteridae:							
Sperm whale	*Physeter macrocephalus.*	NA	E, D,Y	4,349 (0.28, 3,451; n/a).	5,353 (0.12)	6.9	0
Family Delphinidae:							
Short-finned pilot whale.	*Globicephala macrorhynchus.*	WNA	-/-; Y	28,924 (0.24; 23,637; 2011).	[5] 18,977 (0.11)	236	160
Long-finned pilot whale.	*Globicephala melas*	WNA	-/-; Y	39,215 (0.3; 30,627; n/a).		306	21
Bottlenose dolphin.	*Tursiops truncatus*	WNA Offshore	-/-; N	62,851 (0.23; 15,914; 2011).	[5] 97,476 (0.06)	519	28
		WNA Southern Migratory Coastal.	-/-; Y	3,751 (0.06; 2,353; n/a).		23	0–14.3
Common dolphin.	*Delphinus delphis*	WNA	-/-; N	172,825 (0.21; 145,216;2011).	86,098 (0.12)	1,452	419
Atlantic white-sided dolphin.	*Lagenorhynchus acutus.*	WNA	-/-; N	92,233 (0.71; 54,443; n/a).	37,180 (0.07)	544	26
Atlantic spotted dolphin.	*Stenella frontalis*	WNA	-/-: N	39,921 (0.27; 32,032; 2012).	55,436 (0.32)	303	54.3
Risso's dolphin	*Grampus griseus*	WNA	-/-; N	35,493 (0.19; 30,289; 2011).	7,732 (0.09)	126	49.7
Family Phocoenidae (porpoises):							
Harbor porpoise	*Phocoena phocoena*	Gulf of Maine/Bay of Fundy.	-/-; N	95,543 (0.31; 74,034; 2011).	45,089 (0.12)	851	2175
Order Carnivora—Superfamily Pinnipedia							
Family Phocidae:							
Harbor seal	*Phoca vitulina*	WNA	-/-; N	75,834 (0.15, 66,884; 2012).		2,006	350

TABLE 2—MARINE MAMMALS KNOWN TO OCCUR IN THE SURVEY AREA THAT MAY BE AFFECTED BY DOMINION'S PROPOSED ACTIVITY—Continued

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N) [1]	Stock abundance (CV, N_{min}, most recent abundance survey) [2]	Predicted abundance (CV) [3]	PBR	Annual M/SI [4]
Gray seal [6]	*Halichoerus grypus*	WNA	-/-; N	27,131 (0.19, 23,158, n/a).		1,389	5,410

[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] This information represents species- or guild-specific abundance predicted by recent habitat-based cetacean density models (Roberts *et al.* 2016, 2017, 2018). These models provide the best available scientific information regarding predicted density patterns of cetaceans in the U.S. Atlantic Ocean, and we provide the corresponding abundance predictions as a point of reference. Total abundance estimates were produced by computing the mean density of all pixels in the modeled area and multiplying by its area. For those species marked with an asterisk, the available information supported development of either two or four seasonal models; each model has an associated abundance prediction. Here, we report the maximum predicted abundance.

[4] 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.

[5] Abundance estimates are in some cases reported for a guild or group of species when those species are difficult to differentiate at sea. Similarly, the habitat-based cetacean density models produced by Roberts *et al.* (2016, 2017, 2018) are based in part on available observational data which, in some cases, is limited to genus or guild in terms of taxonomic definition. Roberts *et al.* (2016, 2017, 2018) produced density models to genus level for *Globicephala* spp. and produced a density model for bottlenose dolphins that does not differentiate between offshore and coastal stocks.

[6] NMFS stock abundance estimate applies to U.S. population only, actual stock abundance including Canada is approximately 505,000. The referenced PBR value applies only to the U.S. population and is therefore an underestimate for the stock as a whole.

As indicated above, all 16 species (with 17 managed stocks) in Table 2 temporally and spatially co-occur with the activity to the degree that take is reasonably likely to occur in the absence of mitigation measures.

North Atlantic Right Whale

The North Atlantic right whale (*Eubalaena glacialis*) is considered one of the most critically endangered populations of large whales in the world and is listed as federally endangered under the ESA. The North Atlantic right whale ranges from calving grounds in the southeastern United States to feeding grounds in New England waters and into Canadian waters (Hayes *et al.* 2019). In the late fall months (*e.g.,* October), right whales are generally thought to depart from the feeding grounds in the North Atlantic and move south to their calving grounds off Georgia and Florida. North Atlantic right whales may be found in feeding grounds within New England waters between February and May, with peak abundance in late March (Hayes *et al.* 2019). The offshore waters of Virginia, including waters of the Survey Area, are used as a migration corridor for right whales. Right whales occur during seasonal movements north or south between important feeding and breeding grounds (Knowlton *et al.* 2002; Firestone *et al.* 2008). Right whales are known to have extensive movements both within and between their winter and summer habitats, and their calving grounds are thought to extend as far north as Cape Fear, North Carolina (Hayes *et al.* 2019). Right whales have been observed in coastal Atlantic waters year-round seasons. They have been acoustically detected off Georgia and North Carolina in 7 of 11 months monitored (Hodge *et al.* 2015). Other recent passive acoustic studies of right whales off the Virginia coast demonstrate their year-round presence in Virginia (Salisbury *et al.* 2016), with increased detections in fall and late winter/early spring. They are typically most common in the spring (late March) when they are migrating north and in the fall (*i.e.,* October and November) during their southbound migration (Kenney and Vigness-Raposa 2010). There were sightings of up to eight right whales on two separate days in coastal Virginia in April of 2018 (April 9 and 11, 2018; Cotter 2019).

However, recent research indicates our understanding of their movement patterns remains incomplete (Davis *et al.* 2017). A review of passive acoustic monitoring data from 2004 to 2014 throughout the western North Atlantic demonstrated nearly continuous year-round right whale presence across their entire habitat range (for at least some individuals), including in locations previously thought of as migratory corridors, suggesting that not all of the population undergoes a consistent annual migration (Davis *et al.* 2017). Movements within and between habitats are extensive, and the area offshore from the Mid-Atlantic states is an important migratory corridor (Waring *et al.* 2016). The Survey Area is not a known feeding area for right whales and right whales are not expected to be foraging there. Therefore, any right whales in the vicinity of the Survey Area are expected to be transient, most likely migrating through the area.

Elevated North Atlantic right whale mortalities have occurred since June 7, 2017 along the U.S. and Canadian coast. A total of 30 confirmed dead stranded whales (21 in Canada; 9 in the United States) have been documented. This event has been declared an Unusual Mortality Event (UME), with human interactions, including entanglement in fixed fishing gear and vessel strikes, implicated in at least 13 of the mortalities thus far. More information is available online at: *https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2020-north-atlantic-right-whale-unusual-mortality-event.*

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. NMFS' regulations at 50 CFR part 224.105 designated nearshore waters of the Mid-Atlantic Bight as Mid-Atlantic U.S. Seasonal Management Areas (SMA) for right whales in 2008. SMAs were developed to reduce the threat of collisions between ships and right whales around their migratory route and calving grounds. Portions of the Survey Area are located within the right whale mid-Atlantic SMA near Norfolk and the mouth of the Chesapeake Bay. The SMA is in effect from November 1 through April 30.

Humpback Whale

Humpback whales are found worldwide in all oceans. Humpback whales were listed as endangered under the Endangered Species Conservation Act (ESCA) in June 1970. In 1973, the ESA replaced the ESCA, and humpbacks continued to be listed 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.

While migrating, humpback whales utilize the mid-Atlantic as a pathway between calving/mating grounds in the south to their feeding grounds in the north (Hayes *et al.* 2019). Not all humpback whales migrate to the Caribbean during winter, and some individuals of this species are sighted in mid- to high-latitude areas during winter (Swingle *et al.* 1993). The mid-Atlantic area may also serve as important habitat for juvenile humpback whales, as evidenced by increased levels of juvenile strandings along the Virginia and North Carolina coasts (Wiley *et al.* 1995). Similarly, Barco *et al.* (2002) suggested that the mid-Atlantic region primarily represents a supplemental winter feeding ground used by humpbacks.

Since January 2016, elevated humpback whale mortalities have occurred along the Atlantic coast from Maine to Florida. This resulted in the declaration of a UME for this species. Partial or full necropsy examinations have been conducted on approximately half of the 123 known cases. Of the whales examined, about 50 percent had evidence of human interaction, either ship strike or entanglement. While a portion of the whales have shown evidence of pre-mortem vessel strike, this finding is not consistent across all whales examined and 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. Three previous UMEs involving humpback whales have occurred since 2000, in 2003, 2005, and 2006. More information is available at*: www.fisheries.noaa.gov/national/marine-life-distress/2016-2020-humpback-whale-unusual-mortality-event-along-atlantic-coast.*

Fin Whale

Fin whales are common in waters of the U.S. Atlantic Exclusive Economic Zone (EEZ), principally from Cape Hatteras northward (Waring *et al.* 2016). Fin whales are present in the Mid-Atlantic region during all four seasons, although sighting data indicate that they are more prevalent during winter, spring, and summer (Hayes *et al.* 2019). While fall is the season of lowest overall abundance off Virginia, they do not depart the area entirely. Fin whales, much like humpback whales, seem to exhibit habitat fidelity to feeding areas (Kenney and Vigness-Raposa 2010; Hayes *et al.* 2019). While fin whales typically feed in the Gulf of Maine and the waters surrounding New England, mating and calving (and general wintering) areas are largely unknown (Hayes *et al.* 2019).

Sei Whale

The Nova Scotia stock of sei whales can be found in deeper waters of the continental shelf edge waters of the eastern United States and northeastward to south of Newfoundland. The southern portion of the stock's range during spring and summer includes the Gulf of Maine and Georges Bank. Spring is the period of greatest abundance in U.S. waters, with sightings concentrated along the eastern margin of Georges Bank and into the Northeast Channel area, and along the southwestern edge of Georges Bank in the area of Hydrographer Canyon (Waring *et al.* 2015). In the waters off of Virginia, sei whales are uncommon; however, a 2018 aerial survey conducted by the U.S. Navy recorded sei whales in the area surrounding Norfolk Canyon (U.S. Navy n.d.).

Minke Whale

Minke whales can be found in temperate, tropical, and high-latitude waters. The Canadian East Coast stock can be found in the area from the western half of the Davis Strait (45° W) to the Gulf of Mexico (Waring *et al.* 2016). This species generally occupies waters less than 100 m deep on the continental shelf. Little is known about minke whales' specific movements through the mid-Atlantic region; however, there appears to be a strong seasonal component to minke whale distribution, with acoustic detections indicating that they migrate south in mid-October to early November, and return from wintering grounds starting in March through early April (Risch *et al.* 2014). Northward migration appears to track the warmer waters of the Gulf Stream along the continental shelf, while southward migration is made farther offshore (Risch *et al.* 2014).

Since January 2017, elevated minke whale mortalities have occurred along the Atlantic coast from Maine through South Carolina, with a total of 83 strandings at the time of publication of this notice. There have been eight recorded strandings in Virginia and two in North Carolina. This event has been declared a UME. Full or partial necropsy examinations were conducted on more than 60 percent of the whales. Preliminary findings in several of the whales have shown evidence of human interactions or infectious disease, but these findings are not consistent across all of the whales examined, so more research is needed. More information is available at: *www.fisheries.noaa.gov/national/marine-life-distress/2017-2020-minke-whale-unusual-mortality-event-along-atlantic-coast.*

Sperm Whale

The distribution of the sperm whale in the U.S. EEZ occurs on the continental shelf edge, over the continental slope, and into mid-ocean regions (Waring *et al.* 2019). The basic social unit of the sperm whale appears to be the mixed school of adult females plus their calves and some juveniles of both sexes, normally numbering 20–40 animals in all. There is evidence that some social bonds persist for many years (Christal *et al.* 1998). This species forms stable social groups, site fidelity, and latitudinal range limitations in groups of females and juveniles (Whitehead, 2002). In winter, sperm whales concentrate east and northeast of Cape Hatteras. In spring, distribution shifts northward to east of Delaware and Virginia, and is widespread throughout the central Mid-Atlantic Bight and the southern part of Georges Bank. In the fall, sperm whale occurrence on the continental shelf south of New England reaches peak levels, and there remains a continental shelf edge occurrence in the Mid-Atlantic Bight (Waring *et al.* 2015). Off the coast of Virginia, sperm whales have recently been observed spending a significant amount of time near Norfolk Canyon and in waters over 1,800 m deep (6,000 ft; U.S. Navy n.d. 2017).

Pilot Whale

The two species of pilot whales in the Western Atlantic include the long-finned and short-finned pilot whale. Both species of pilot whale are more generally found along the edge of the continental shelf at depths of 100 to 1,000 m (330 to 3,300 ft), choosing areas of high relief or submerged banks. Long-finned pilot whales, in the western

North Atlantic, are more pelagic occurring in especially high densities in winter and early spring over the continental slope, then moving inshore and onto the shelf in summer and autumn following squid and mackerel populations (Reeves *et al.* 2002). They frequently travel into the central and northern Georges Bank, Great South Channel, and northward into the Gulf of Maine areas during the late spring through late fall (Hayes *et al.* 2019). Short-finned pilot whales prefer tropical, subtropical, and warm temperate waters (Jefferson *et al.* 2015). The short-finned pilot whale mostly ranges from New Jersey south through Florida, the northern Gulf of Mexico, and the Caribbean without any seasonal movements or concentrations (Hayes *et al.* 2019). Populations for both of these species overlap spatially along the mid-Atlantic shelf break between New Jersey and the southern flank of Georges Bank (Hayes *et al.* 2019). 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.* 2019).

Bottlenose Dolphin

The population of bottlenose dolphins in the North Atlantic consists of a complex mosaic of dolphin stocks (Waring *et al.* 2016). There are two stocks that may be found in the vicinity of the Survey Area—the western North Atlantic Offshore Stock (WNAOS) and the Southern Coastal Migratory Stock (SCMS). There are two distinct bottlenose dolphin morphotypes: migratory coastal and offshore. The migratory coastal morphotype resides in waters typically less than 20 m (65.6 ft) deep, along the inner continental shelf (within 7.5 km [4.6 miles] of shore; Hayes *et al.* 2018). This migratory coastal population was further subdivided into seven stocks based largely upon spatial distribution (Waring *et al.* 2016). The SCMS is the coastal stock found south of Assateague, Virginia, to northern Florida and is the stock most likely to be encountered in the vicinity of the export cable portion of the Survey Area. Seasonally, SCMS movements indicate they are mostly found in southern North Carolina (Cape Lookout) from October to December; they continue to move farther south from January to March to as far south as northern Florida and move back north to coastal North Carolina from April to June. SCMS bottlenose dolphins occupy waters north of Cape Lookout, North Carolina, to as far north as Chesapeake Bay from July to August. An observed shift in spatial distribution during a summer 2004 survey indicated that the northern boundary for the SCMS may vary from year to year (Hayes *et al.* 2018). The offshore population consists of one stock (WNAOS) in the western North Atlantic Ocean distributed primarily along the outer continental shelf and continental slope, and distributed widely during the spring and summer from Georges Bank to the Florida Keys with late summer and fall incursions as far north the Gulf of Maine depending on water temperatures (Kenney 1990; Hayes *et al.* 2017). The WNAOS is found seaward of 34 km (21 miles) and in deeper waters).

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 SMCS 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).

Common Dolphin

The common dolphin is found world-wide in temperate to subtropical seas. In the North Atlantic, common dolphins are commonly found over the continental shelf between the 200-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 seasonally found in abundance between Cape Hatteras and Georges Bank from mid-January to May. Between mid-summer and fall they migrate onto Georges Bank and the Scotian Shelf, and large aggregations occur on Georges Bank in fall (Reeves *et al.* 2002; Hayes *et al.* 2019). 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.* 2019).

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.* 2019).

Atlantic Spotted Dolphin

Atlantic spotted dolphins are found in tropical and warm temperate waters along the continental shelf from 10 to 200 m (33 to 650 ft) deep to slope waters greater than 500 m (1,640 ft). Their range extends from southern New England, south to Gulf of Mexico and the Caribbean to Venezuela (Waring *et al.* 2014). This stock regularly occurs in continental shelf waters south of Cape Hatteras and in continental shelf edge and continental slope waters north of this region (Waring *et al.* 2014). There are two forms of this species, with the larger ecotype inhabiting the continental shelf and is usually found inside or near the 200-m isobaths (Waring *et al.* 2014).

Risso's Dolphin

Risso's dolphins are distributed worldwide in tropical and temperate seas and in the Northwest Atlantic occur from Florida to eastern Newfoundland. The species has an apparent preference for steep, shelf-edge habitats between about 400 to 1,000 m (1,312 to 3,280 ft) deep (Baird 2009). Risso's dolphin of the western North Atlantic stock prefers temperate to tropical waters typically from 15 to 20 °C (59 to 68 °F) and are rarely found in waters below 10 °C (50 °F). 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.* 2019).

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 (>1,800 m) although the majority of the population is found over the continental shelf. The harbor porpoise is likely to occur in the waters of the mid-Atlantic during winter months, as this species prefers cold temperate and subarctic waters (Hayes *et al.* 2019). Harbor porpoise generally move out of the Mid-Atlantic during spring, migrating north to the Gulf of Maine. There does not appear to be a temporally coordinated migration or a specific migratory route to and from the Bay of Fundy region (Hayes *et al.* 2018).

Harbor Seal

Harbor seals are the most abundant seals in the waters of the eastern United States and are commonly found in all nearshore waters of the Atlantic Ocean from Newfoundland, Canada southward to northern Florida (Hayes *et al.* 2019). While harbor seals occur year-round north of Cape Cod, they only occur south of Cape Cod (southern New England to New Jersey) during winter migration, typically September through May (Kenney and Vigness-Raposa 2010; Hayes *et al.* 2019). During the summer, most harbor seals can be found north of Massachusetts within the coastal waters of central and northern Maine as well as the Bay of Fundy (Hayes *et al.* 2019).

Since July 2018, elevated numbers of harbor seal and gray seal mortalities have occurred across Maine, New Hampshire and Massachusetts. This event has been declared a UME. Additionally, stranded seals have shown clinical signs as far south as Virginia, although not in elevated numbers. Therefore the UME investigation now encompasses all seal strandings from Maine to Virginia. As of March, 2020 there a total of 3,152 reported strandings (of all species), though only 10 occurred in Virginia while 8 were recorded in Maryland. Full or partial necropsy examinations have been conducted on some of the seals and samples have been collected for testing. Based on tests conducted thus far, the main pathogen found in the seals is phocine distemper virus. NMFS is performing additional testing to identify any other factors that may be involved in this UME. Information on this UME is available online at: *www.fisheries.noaa.gov/new-england-mid-atlantic/marine-life-distress/2018-2020-pinniped-unusual-mortality-event-along.*

Gray Seal

The gray seal occurs on both coasts of the Northern Atlantic Ocean and are divided into three major populations (Hayes *et al.* 2019). The western north Atlantic stock occurs in eastern Canada and the northeastern United States, occasionally as far south as North Carolina. Gray seals inhabit rocky coasts and islands, sandbars, ice shelves and icebergs (Hayes *et al.* 2019). In the United States, gray seals congregate in the summer to give birth at four established colonies in Massachusetts and Maine (Hayes *et al.* 2019). From September through May, they disperse and can be abundant as far south as New Jersey. The range of gray seals appears to be shifting as they are regularly being reported further south than they were historically (Rees *et al.* 2016).

Gray seals are uncommon in Virginia and the Chesapeake Bay. Only 15 gray seal strandings were documented in Virginia from 1988 through 2013 (Barco and Swingle 2014). They are rarely found resting on the rocks around the portal islands of the Chesapeake Bay Bridge Tunnel (CBBT) from December through April alongside harbor seals. Seal observation surveys conducted at the CBBT recorded one gray seal in each of the 2014/2015 and 2015/2016 seasons while no gray seals were reported during the 2016/2017 and 2017/2018 seasons (Rees *et al.* 2016, Jones *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 decibel (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. Marine mammal hearing groups and their associated hearing ranges are provided in Table 3.

TABLE 3—MARINE MAMMAL HEARING GROUPS (NMFS, 2018)

Hearing group	Generalized hearing range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz.

TABLE 3—MARINE MAMMAL HEARING GROUPS (NMFS, 2018)—Continued

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

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

The pinniped functional hearing group was modified from Southall *et al.* (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al.* 2006; Kastelein *et al.* 2009; Reichmuth and Holt, 2013).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. Sixteen marine mammal species (14 cetacean and 2 pinniped (phocid) species) have the reasonable potential to co-occur with the proposed survey activities. Please refer to Table 2. Of the cetacean species that may be present, five are classified as low-frequency cetaceans (*i.e.,* all mysticete species), eight are classified as mid-frequency cetaceans (*i.e.,* all delphinid species and the sperm whale), and one 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 by Incidental Harassment 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.

Description of Sound Sources

This section contains a brief technical background on sound, on the characteristics of certain sound types, and on metrics used in this proposal inasmuch as the information is relevant to the specified activity and to a discussion of the potential effects of the specified activity on marine mammals found later in this document. For general information on sound and its interaction with the marine environment, please see, *e.g.,* Au and Hastings (2008); Richardson *et al.* (1995).

Sound travels in waves, the basic components of which are frequency, wavelength, velocity, and amplitude. Frequency is the number of pressure waves that pass by a reference point per unit of time and is measured in hertz (Hz) or cycles per second. Wavelength is the distance between two peaks or corresponding points of a sound wave (length of one cycle). Higher frequency sounds have shorter wavelengths than lower frequency sounds, and typically attenuate (decrease) more rapidly, except in certain cases in shallower water. Amplitude is the height of the sound pressure wave or the ''loudness'' of a sound and is typically described using the relative unit of the decibel (dB). A sound pressure level (SPL) in dB is described as the ratio between a measured pressure and a reference pressure (for underwater sound, this is 1 microPascal (μPa)), and is a logarithmic unit that accounts for large variations in amplitude; therefore, a relatively small change in dB corresponds to large changes in sound pressure. The source level (SL) represents the SPL referenced at a distance of 1 m from the source (referenced to 1 μPa), while the received level is the SPL at the listener's position (referenced to 1 μPa).

Root mean square (rms) is the quadratic mean sound pressure over the duration of an impulse. Root mean square is calculated by squaring all of the sound amplitudes, averaging the squares, and then taking the square root of the average. Root mean square 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 (Hastings and Popper, 2005). 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 than by peak pressures.

Sound exposure level (SEL; represented as dB re 1 μPa^2–s) represents the total energy in a stated frequency band over a stated time interval or event, and considers both intensity and duration of exposure. The per-pulse SEL is calculated over the time window containing the entire pulse (*i.e.,* 100 percent of the acoustic energy). SEL is a cumulative metric; it can be accumulated over a single pulse, or calculated over periods containing multiple pulses. Cumulative SEL represents the total energy accumulated by a receiver over a defined time window or during an event. Peak sound pressure (also referred to as zero-to-peak sound pressure or 0–pk) is the maximum instantaneous sound pressure measurable in the water at a specified distance from the source, and is represented in the same units as the rms sound pressure.

When underwater objects vibrate or activity occurs, sound-pressure waves are created. These waves alternately compress and decompress the water as the sound wave travels. Underwater sound waves radiate in a manner similar to ripples on the surface of a pond and may be either directed in a beam or beams or may radiate in all directions (omnidirectional sources). The compressions and decompressions associated with sound waves are detected as changes in pressure by aquatic life and man-made sound receptors such as hydrophones.

Even in the absence of sound from the specified activity, the underwater environment is typically loud due to ambient sound, which is defined as environmental background sound levels lacking a single source or point (Richardson *et al.* 1995). The sound level of a region is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g.,* wind and waves, earthquakes, ice, atmospheric sound), biological (*e.g.,* sounds produced by marine mammals, fish, and invertebrates), and anthropogenic (*e.g.,* vessels, dredging, construction) sound. A number of sources contribute to ambient sound, including wind and waves, which are a main source of naturally occurring ambient sound for frequencies between 200 hertz (Hz) and 50 kilohertz (kHz) (Mitson, 1995). In general, ambient sound levels tend to increase with increasing wind speed and wave height. Precipitation can become an important component of total sound at frequencies above 500 Hz, and possibly down to 100 Hz during quiet times. Marine mammals can contribute significantly to ambient sound levels, as can some fish and snapping shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz. Sources of ambient sound related to human activity include transportation (surface vessels), dredging and construction, oil and gas drilling and production, geophysical surveys, sonar, and explosions. Vessel noise typically dominates the total ambient sound for frequencies between 20 and 300 Hz. In general, the frequencies of anthropogenic sounds are below 1 kHz and, if higher frequency sound levels are created, they attenuate rapidly.

The sum of the various natural and anthropogenic sound sources that comprise ambient sound at any given location and time depends not only on the source levels (as determined by current weather conditions and levels of biological and human activity) but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor, and is frequency-dependent. As a result of the dependence on a large number of varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Sound levels at a given frequency and location can vary by 10–20 decibels (dB) from day to day (Richardson *et al.* 1995). The result is that, depending on the source type and its intensity, sound from the specified activity may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals.

Sounds are often considered to fall into one of two general types: Pulsed and non-pulsed. The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g.,* Ward, 1997 in Southall *et al.* 2007). Please see Southall *et al.* (2007) for an in-depth discussion of these concepts. The distinction between these two sound types is not always obvious, as certain signals share properties of both pulsed and non-pulsed sounds. A signal near a source could be categorized as a pulse, but due to propagation effects as it moves farther from the source, the signal duration becomes longer (*e.g.,* Greene and Richardson, 1988).

Pulsed sound sources (*e.g.,* airguns, explosions, gunshots, sonic booms, impact pile driving) produce signals that are brief (typically considered to be less than one second), broadband, atonal transients (ANSI, 1986, 2005; Harris, 1998; NIOSH, 1998; ISO, 2003) and occur either as isolated events or repeated in some succession. Pulsed sounds are all characterized by a relatively rapid rise from ambient pressure to a maximal pressure value followed by a rapid decay period that may include a period of diminishing, oscillating maximal and minimal pressures, and generally have an increased capacity to induce physical injury as compared with sounds that lack these features.

Non-pulsed sounds can be tonal, narrowband, or broadband, brief or prolonged, and may be either continuous or intermittent (ANSI, 1995; NIOSH, 1998). Some of these non-pulsed sounds can be transient signals of short duration but without the essential properties of pulses (*e.g.,* rapid rise time). Examples of non-pulsed sounds include those produced by vessels, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems. The duration of such sounds, as received at a distance, can be greatly extended in a highly reverberant environment.

Potential Effects of Underwater Sound

For study-specific citations, please see that work. Anthropogenic sounds cover a broad range of frequencies and sound levels and can have a range of highly variable impacts on marine life, from none or minor to potentially severe responses, depending on received levels, duration of exposure, behavioral context, and various other factors. The potential effects of underwater sound from active acoustic sources can potentially result in one or more of the following: temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, stress, and masking (Richardson *et al.* 1995; Gordon *et al.* 2004; Nowacek *et al.* 2007; Southall *et al.* 2007; Götz *et al.* 2009). The degree of effect is intrinsically related to the signal characteristics, received level, distance from the source, and duration of the sound exposure. In general, sudden, high level sounds can cause hearing loss, as can longer exposures to lower level sounds. Temporary or permanent loss of hearing will occur almost exclusively for noise within an animal's hearing range.

Richardson *et al.* (1995) described zones of increasing intensity of effect that might be expected to occur, in relation to distance from a source and assuming that the signal is within an animal's hearing range. First is the area within which the acoustic signal would be audible (potentially perceived) to the animal but not strong enough to elicit any overt behavioral or physiological response. The next zone corresponds with the area where the signal is audible to the animal and of sufficient intensity to elicit behavioral or physiological responsiveness. Third is a zone within which, for signals of high intensity, the received level is sufficient to potentially cause discomfort or tissue damage to auditory or other systems. Overlaying these zones to a certain extent is the area within which masking (*i.e.,* when a sound interferes with or masks the ability of an animal to detect a signal of interest that is above the absolute hearing threshold) may occur; the masking zone may be highly variable in size.

We describe the more severe effects (*i.e.,* certain non-auditory physical or physiological effects) only briefly as we do not expect that there is a reasonable likelihood that HRG surveys may result in such effects (see below for further discussion). Potential effects from impulsive sound sources can range in severity from effects such as behavioral disturbance or tactile perception to physical discomfort, slight injury of the internal organs and the auditory system, or mortality (Yelverton *et al.* 1973). Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to high level underwater sound or as a secondary effect of extreme behavioral reactions (*e.g.,* change in dive profile as a result of an avoidance reaction) caused by exposure to sound include neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage (Cox *et al.* 2006; Southall *et al.* 2007; Zimmer and Tyack, 2007; Tal *et al.* 2015). The activities considered here do not involve the use of devices such as explosives or mid-frequency tactical sonar that are associated with these types of effects.

Threshold Shift—Note that, in the following discussion, we refer in many cases to a review article concerning studies of noise-induced hearing loss conducted from 1996–2015 (*i.e.,* Finneran, 2015). Marine mammals exposed to high-intensity sound, or to lower-intensity sound for prolonged periods, can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Finneran, 2015). TS can be permanent (PTS), in which case the loss of hearing sensitivity is not fully recoverable, or temporary (TTS), in which case the animal's hearing threshold would recover over time (Southall *et al.* 2007). Repeated sound exposure that leads to TTS could cause PTS. In severe cases of PTS, there can be total or partial deafness, while in most cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter, 1985).

When PTS occurs, there is physical damage to the sound receptors in the ear (*i.e.,* tissue damage), whereas TTS represents primarily tissue fatigue and is reversible (Southall *et al.* 2007). In addition, other investigators have suggested that TTS is within the normal bounds of physiological variability and tolerance and does not represent physical injury (*e.g.,* Ward, 1997). Therefore, NMFS does not consider TTS to constitute auditory injury.

Relationships between TTS and PTS thresholds have not been studied in marine mammals, and there is no PTS data for cetaceans, but such relationships are assumed to be similar to those in humans and other terrestrial mammals. PTS typically occurs at exposure levels at least several decibels above (a 40-dB threshold shift approximates PTS onset; *e.g.,* Kryter *et al.* 1966; Miller, 1974) that inducing mild TTS (a 6-dB threshold shift approximates TTS onset; *e.g.,* Southall *et al.* 2007). Based on data from terrestrial mammals, a precautionary assumption is that the PTS thresholds for impulse sounds (such as impact pile driving pulses as received close to the source) are at least 6 dB higher than the TTS threshold on a peak-pressure basis and PTS cumulative sound exposure level thresholds are 15 to 20 dB higher than TTS cumulative sound exposure level thresholds (Southall *et al.* 2007). Given the higher level of sound or longer exposure duration necessary to cause PTS as compared with TTS, it is considerably less likely that PTS could occur.

TTS is the mildest form of hearing impairment that can occur during exposure to sound (Kryter, 1985). While experiencing TTS, the hearing threshold rises, and a sound must be at a higher level in order to be heard. In terrestrial and marine mammals, TTS can last from minutes or hours to days (in cases of strong TTS). In many cases, hearing sensitivity recovers rapidly after exposure to the sound ends. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals.

Marine mammal hearing plays a critical role in communication with conspecifics, and 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 occurs during a time 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 time when communication is critical for successful mother/calf interactions could have more serious impacts.

Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin, beluga whale (*Delphinapterus leucas*), harbor porpoise, and Yangtze finless porpoise (*Neophocoena asiaeorientalis*)) and three species of pinnipeds (northern elephant seal (*Mirounga angustirostris*), harbor seal, and California sea lion (*Zalophus californianus*)) exposed to a limited number of sound sources (*i.e.,* mostly tones and octave-band noise) in laboratory settings (Finneran, 2015). TTS was not observed in trained spotted (*Phoca largha*) and ringed (*Pusa hispida*) seals exposed to impulsive noise at levels matching previous predictions of TTS onset (Reichmuth *et al.* 2016). In general, harbor seals and harbor porpoises have a lower TTS onset than other measured pinniped or cetacean species (Finneran, 2015). 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 Southall *et al.* (2007), Finneran and Jenkins (2012), Finneran (2015), and NMFS (2018).

Animals in the Survey Area during the proposed survey are unlikely to incur TTS due to the characteristics of the sound sources, which include relatively low source levels and generally very short pulses and duration of the sound. Even for high-frequency cetacean species (*e.g.,* harbor porpoises), which may have increased sensitivity to TTS (Lucke *et al.* 2009; Kastelein *et al.* 2012b), individuals would have to make a very close approach and also remain very close to vessels operating these sources in order to receive multiple exposures at relatively high levels, as would be necessary to cause TTS. Intermittent exposures—as would occur due to the brief, transient signals produced by these sources—require a higher cumulative SEL to induce TTS than would continuous exposures of the same duration (*i.e.,* intermittent exposure results in lower levels of TTS) (Mooney *et al.* 2009a; Finneran *et al.* 2010). Moreover, most marine mammals would more likely avoid a loud sound source rather than swim in such close proximity as to result in TTS. Kremser *et al.* (2005) noted that the probability of a cetacean swimming through the area of exposure when a sub-bottom profiler emits a pulse is small—because if the animal was in the area, it would have to pass the transducer at close range in order to be subjected to sound levels that could cause TTS 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 majority of the geophysical survey equipment proposed for use makes it unlikely that an animal would be exposed more than briefly during the passage of the vessel.

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

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al.* 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. It is important to note that habituation is appropriately considered as a ''progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial,'' rather than as, more generally, moderation in response to human disturbance (Bejder *et al.* 2009). The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. As noted, behavioral state may affect the type of response. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al.* 1995; NRC, 2003; Wartzok *et al.* 2003). Controlled experiments with captive marine mammals have showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al.* 1997; Finneran *et al.* 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically airguns or acoustic harassment devices) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds, 2002; see also Richardson *et al.* 1995; Nowacek *et al.* 2007). However, many delphinids approach low-frequency airgun source vessels with no apparent discomfort or obvious behavioral change (*e.g.,* Barkaszi *et al.* 2012), indicating the importance of frequency output in relation to the species' hearing sensitivity.

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

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

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

Variations in respiration naturally vary with different behaviors and alterations to breathing rate as a function of acoustic exposure can be expected to co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may be representative of annoyance or an acute stress response. Various studies have shown that respiration rates may either be unaffected or could increase, depending on the species and signal characteristics, again highlighting the importance in understanding species differences in the tolerance of underwater noise when determining the potential for impacts resulting from anthropogenic sound exposure (*e.g.,* Kastelein *et al.* 2001, 2005, 2006; Gailey *et al.* 2007; Gailey *et al.* 2016).

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

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

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

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

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

We expect that some marine mammals may exhibit behavioral responses to the HRG survey activities in the form of avoidance of the area during the activity, especially the naturally shy harbor porpoise, while others such as delphinids might be attracted to the survey activities out of curiosity. However, because the HRG survey equipment operates from a moving vessel, and the maximum radius to the Level B harassment threshold is relatively small, 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, thereby reducing the likelihood of repeated 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 Dominion's use of HRG survey equipment. Previous commenters have referenced a 2008 mass stranding of approximately 100 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 is likely 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.

Stress Responses—An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (*e.g.,* Seyle, 1950; Moberg, 2000). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

Neuroendocrine stress responses often involve the hypothalamus-pituitary-adrenal system. Virtually all neuroendocrine 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, altered metabolism, reduced immune competence, and behavioral disturbance (*e.g.,* Moberg, 1987; Blecha, 2000). Increases in the circulation of glucocorticoids are also equated with stress (Romano *et al.* 2004).

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and ''distress'' is the 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 serious fitness consequences. 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 functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well studied through controlled experiments and for both laboratory and free-ranging animals (*e.g.,* Holberton *et al.* 1996; Hood *et al.* 1998; Jessop *et al.* 2003; Krausman *et al.* 2004; Lankford *et al.* 2005). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker, 2000; Romano *et al.* 2002b) and, more rarely, studied in wild populations (*e.g.,* Romano *et al.* 2002a). 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. These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as ''distress.'' In addition, any animal experiencing TTS would likely also experience stress responses (NRC, 2003).

NMFS does not expect that the generally short-term, intermittent, and transitory HRG activities would create conditions of long-term, continuous noise and chronic acoustic exposure leading to long-term physiological stress responses in marine mammals.

Auditory Masking—Sound can disrupt behavior through masking, or interfering with, an animal's ability to detect, recognize, or discriminate between acoustic signals of interest (*e.g.,* those used for intraspecific communication and social interactions, prey detection, predator avoidance, navigation) (Richardson *et al.* 1995; Erbe *et al.* 2016). Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher intensity, and may occur whether the sound is natural (*e.g.,* snapping shrimp, wind, waves, precipitation) or anthropogenic (*e.g.,* shipping, sonar, seismic exploration) in origin. The ability of a noise source to mask biologically important sounds depends on the characteristics of both the noise source and the signal of interest (*e.g.,* signal-to-noise ratio, temporal variability, direction), in relation to each other and to an animal's hearing abilities (*e.g.,* sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age or TTS hearing loss), and existing ambient noise and propagation conditions.

Under certain circumstances, marine mammals experiencing significant masking could also be impaired from maximizing their performance fitness in survival and reproduction. Therefore, when the coincident (masking) sound is man-made, it may be considered harassment if disrupting behavioral patterns. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

The frequency range of the potentially masking sound is important in determining any potential behavioral impacts. For example, low-frequency signals may have less effect on high-frequency echolocation sounds produced by odontocetes but are more likely to affect detection of mysticete communication calls and other potentially important natural sounds such as those produced by surf and some prey species. The masking of communication signals by anthropogenic noise may be considered as a reduction in the communication space of animals (*e.g.,* Clark *et al.* 2009) and may result in energetic or other costs as animals change their vocalization behavior (*e.g.,* Miller *et al.* 2000; Foote *et al.* 2004; Parks *et al.* 2007; Di Iorio and Clark, 2009; Holt *et al.* 2009). Masking can be reduced in situations where the signal and noise come from different directions (Richardson *et al.* 1995), through amplitude modulation of the signal, or through other compensatory behaviors (Houser and Moore, 2014). Masking can be tested directly in captive species (*e.g.,* Erbe, 2008), but in wild populations it must be either modeled or inferred from evidence of masking compensation. There are few studies addressing real-world masking sounds likely to be experienced by marine mammals in the wild (*e.g.,* Branstetter *et al.* 2013).

Masking affects both senders and receivers of acoustic signals and can potentially have long-term chronic effects on marine mammals at the population level as well as at the individual level. Low-frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of SPL) in the world's ocean from pre-industrial periods, with most of the increase from distant commercial shipping (Hildebrand, 2009). All anthropogenic sound sources, but especially chronic and lower-frequency signals (*e.g.,* from vessel traffic), contribute to elevated ambient sound levels, thus intensifying masking.

Marine mammal communications would not likely be masked appreciably by the HRG equipment given the directionality of the signals (for most geophysical survey equipment types proposed for use (Table 1)) and the brief period when an individual mammal is likely to be within its beam.

Vessel Strike

Vessel strikes of marine mammals can cause significant 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 kn). 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 the survey vessel due to the slow vessel speed. Further, Dominion would implement measures (*e.g.,* protected species monitoring, vessel speed restrictions and separation distances; see *Proposed Mitigation*) set forth in the BOEM lease to reduce the risk of a vessel strike to marine mammal species in the Survey Area.

Anticipated Effects on Marine Mammal Habitat

The proposed activities would not result in permanent impacts to habitats used directly by marine mammals, but may have potential minor and short-term impacts to food sources such as forage fish. The proposed activities could affect acoustic habitat (see masking discussion above), but meaningful impacts are unlikely. There are no feeding areas, rookeries, or mating grounds known to be biologically important to marine mammals within the proposed Survey Area with the exception of migratory BIA for right whales which was described previously. The HRG survey equipment will not contact the substrate and does not represent a source of pollution. Impacts to substrate or from pollution are therefore not discussed further.

Effects to Prey—Sound may affect marine mammals through impacts on the abundance, behavior, or distribution of prey species (*e.g.,* crustaceans, cephalopods, fish, zooplankton). Marine mammal prey varies by species, season, and location and, for some, is not well documented. Here, we describe studies regarding the effects of noise on known marine mammal prey.

Fish utilize the soundscape and components of sound in their environment to perform important functions such as foraging, predator avoidance, mating, and spawning (*e.g.,* Zelick *et al.* 1999; Fay, 2009). Depending on their hearing anatomy and peripheral sensory structures, which vary among species, fishes hear sounds using pressure and particle motion sensitivity capabilities and detect the motion of surrounding water (Fay *et al.* 2008). The potential effects of noise on fishes depends on the overlapping frequency range, distance from the sound source, water depth of exposure, and species-specific hearing sensitivity, anatomy, and physiology. Key impacts to fishes may include behavioral responses, hearing damage, barotrauma (pressure-related injuries), and mortality.

Fish react to sounds which are especially strong and/or intermittent low-frequency sounds, and behavioral responses such as flight or avoidance are the most likely effects. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. The reaction of fish to noise depends on the physiological state of the fish, past exposures, motivation (*e.g.,* feeding, spawning, migration), and other environmental factors. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Several studies have demonstrated that impulse sounds might affect the distribution and behavior of some fishes, potentially impacting foraging opportunities or increasing energetic costs (*e.g.,* Fewtrell and McCauley, 2012; Pearson *et al.* 1992; Skalski *et al.* 1992; Santulli *et al.* 1999; Paxton *et al.* 2017). However, some studies have shown no or slight reaction to impulse sounds (*e.g.,* Pena *et al.* 2013; Wardle *et al.* 2001; Jorgenson and Gyselman, 2009; Cott *et al.* 2012). More commonly, though, the impacts of noise on fish are temporary.

We are not aware of any available literature on impacts to marine mammal prey from sound produced by HRG survey equipment. However, as the HRG survey equipment introduces noise to the marine environment, there is the potential for it to result in avoidance of the area around the HRG survey activities on the part of marine mammal prey. The duration of fish avoidance of an area after HRG surveys depart the area is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. In general, impacts to marine mammal prey species are expected to be minor and temporary due to the expected short daily duration of the proposed HRG survey, the fact that the proposed survey is mobile rather than stationary, and the relatively small areas potentially affected. The areas likely impacted by the proposed activities are relatively small compared to the available habitat in the Atlantic Ocean. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. Based on the information discussed herein, we conclude that impacts of the specified activity are not likely to have more than short-term adverse effects on any prey habitat or populations of prey species. Because of the temporary nature of the disturbance, and the availability of similar habitat and resources (*e.g.,* prey species) in the surrounding area, any impacts to marine mammal habitat are not expected to result in significant or long-term consequences for individual marine mammals, or to contribute to adverse impacts on their populations. Effects to habitat will not be discussed further in this document.

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).

Authorized takes would be by Level B harassment only, in the form of disruption of behavioral patterns for individual marine mammals resulting from exposure to HRG sources. Based on the nature of the activity and the anticipated effectiveness of the mitigation measures (*i.e.,* exclusion zones and shutdown measures), discussed in detail below in *Proposed Mitigation* section, Level A harassment is neither anticipated nor proposed to be authorized.

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 basic 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

NMFS recommends the use of 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 120 dB re 1 μPa (rms) for continuous (*e.g.,* vibratory pile-driving) and above 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.,* seismic airguns) or intermittent (*e.g.,* scientific sonar) sources.

Dominion's proposed activity includes the use of intermittent (geophysical survey equipment) sources, and therefore the 160 dB re 1 μPa (rms) threshold 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). The components of Dominion's proposed activity that may result in the take of marine mammals include the use of both impulsive and non-impulsive sources (geophysical survey equipment).

These thresholds are provided in Table 4 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 4—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 (MF) 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:* $L_{E,OW,24h}$: 219 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.

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.

When the NMFS Technical Guidance (2016) was published, 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, and NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For mobile sources such as survey vessels operating HRG 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. Inputs used in the User Spreadsheet are shown in Table 5 and the resulting Level A harassment isopleths are reported below in Table 6.

Note that NMFS considers the data provided by Crocker and Fratantonio (2016) to represent the best available information on source levels associated with HRG equipment and therefore recommends that source levels provided by Crocker and Fratantonio (2016) be incorporated in the method described above to estimate isopleth distances to the Level B harassment threshold. In cases when the source level for a specific type of HRG equipment is not provided in Crocker and Fratantonio (2016), NMFS recommends that either the source levels provided by the manufacturer be used, or, in instances where source levels provided by the manufacturer are unavailable or unreliable, a proxy from Crocker and Fratantonio (2016) be used instead. Table 1 shows the HRG equipment types that may be used during the proposed surveys, the sound levels associated with those HRG equipment types, and the literature sources for the sound source levels contained in Table 5.

TABLE 5—USER SPREADSHEET INPUTS

HRG system	Subsea positioning/USBL			Multibeam echosounder	Side scan sonar	Parametric SBP	Non-parametric SBP		Medium-penetration seismic	
HRG Equipment	Sonardyne Ranger 2	Evologics 82CR	IxBlue GAPS	R2 Sonics 2026	Edgetech 4200 dual frequency	Innomar SES–2000	Edgetech 216 Chirp	Edgetech 512 Chirp	Geo Marine Dual 400 GeoSource Sparker 800j	Applied Acoustics S-Boom (Triple Plate Boomer)
Spreadsheet Tab Used.	D.1: MOBILE SOURCE: Non-Impulsive, Intermittent								F.1: MOBILE SOURCE: Impulsive, Intermittent.	
Source Level	188 RMS	178 RMS	191 RMS	191 RMS	206 RMS	241 RMS	193 RMS	177 RMS	200 RMS/210 PK.	203RMS/ 213 PK.
Weighting Factor Adjustment (kHz).	35/55	48/78	20/30	170	100	2/22	2/16	0.5/12	0.25/4	0.5.
Source Velocity (m/sec).	2.045	2.045	2.045	2.045	2.045	2.045	2.045	2.045	2.045	2.045.
Pulse Duration (seconds).	0.001	0.6	0.011	0.01115	0.01	0.001	0.001	0.02	0.0008	0.01.
1/repetition rate^ (seconds.	0.33	1	1	0.016667	0.125	2	0.25	0.25	0.55	0.25.
Propagation (xLogR)	20	20	20	20	20	20	20	20	20	20.

TABLE 6 — DISTANCES (METERS) TO LEVEL A HARASSMENT REGULATORY THRESHOLDS BY EQUIPMENT CATEGORY[1]

HRG system	Representative HRG equipment	Marine Mammal Group PTS Onset				
		LF cetaceans	MF cetaceans	HF cetaceans	Phocid pinnipeds	Otariid pinnipeds
		199 dB SEL_{cum}	198 dB SEL_{cum}	173 dB SEL_{cum}	201 dB SEL_{cum}	219 dB SEL_{cum}
Multibeam Echosounder	R2Sonics 2026	0	0	14.4	0	0.
Synthetic Aperture Sonar, combined bathymetry/sidescan.	Kraken Aquapix[2]	N/A	N/A	N/A	N/A	N/A.
Sidescan Sonar	Edgetech 4200 dual Frequency[2].	N/A	N/A	N/A	N/A	N/A.
Parametric SBP	Innomar SES–2000 Medium 100.	12.1	14.7	3,950	4.8	0.1.
Non-Parametric SBP	Edgetech 216 Chirp	0	0	0.4	0	0.
	Edgetech 512 Chirp	0	0	0.1	0	0.
Medium Penetration Seismic.	Geo Marine Dual 400 Sparker 800J.	0.1	0	1.5	0.1	0.
	Applied Acoustics S-Boom (Triple Plate Boomer 1000J).	5.9	0.2	54.2	3.5	0.1.

[1] Distances to the Level A harassment threshold based on the larger of the dual criteria (peak SPL and SEL_{cum}) are shown.
[2] Operating frequency above 180 kHz exceeding upper range of marine mammal hearing.

Note that take of marine mammals through use of the non-impulsive, intermittent sources shown in Table 5, such as the Innomar SES–2000 Medium 100 device, is highly unlikely. See estimated Level B harassment isopleth distances in Table 7. The estimated Level A harassment isopleths (Table 6) are based on the best currently available tools and information, but given aspects of these sources' output (*e.g.,* beam width) that cannot readily be accounted for in the user guidance spreadsheet, these calculated zones should not be interpreted literally. These isopleths are provided only as a reference, interpreted in context of our qualitative understanding of the risk posed through use of these sources when evaluating potential for Level A harassment. In consideration of the foregoing, and in consideration of the proposed mitigation measures (see the Proposed Mitigation section for more detail), the likelihood of the proposed survey resulting in take in the form of Level A harassment is considered so low as to be discountable; therefore, NMFS does not propose to authorize take of any marine mammals by Level A harassment.

NMFS has developed an interim methodology for determining the rms sound pressure level (SPLrms) at the 160-dB isopleth for the purposes of estimating take by Level B harassment resulting from exposure to HRG survey equipment that takes into account source level, beamwidth, water depth, absorption, and operating frequency

(NMFS 2019). Distances to the behavioral threshold are shown in Table 7.

TABLE 7—HRG EQUIPMENT—DISTANCES TO REGULATORY LEVEL B HARASSMENT THRESHOLDS

HRG survey equipment	Source level (SL_{RMS}) (dB re 1μPa)	Lateral distance (m) to level B thresholds used in take analysis
R2Sonics 2026	191	0.3.
Kraken Aquapix[1]	N/A	N/A.
Edgetech 4200 dual frequency[1]	N/A	N/A.
Innomar SES–2000 Medium 100	241	0.7.
Edgetech 216 Chirp	193	10.2.
Edgetech 512 Chirp	177	2.4.
Geo Marine Dual 400 Sparker 800J	200	100.0.
Triple Plate Boomer 1000J	203	21.9.

[1] Operating frequency above 180 kHz, above upper range of marine mammal hearing.

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 is then calculated, based on areas predicted to be ensonified around the HRG survey equipment and the estimated trackline distance traveled per day by the survey vessel.

The predominant source is the Geo Marine Dual 400 Sparker 800J (see Table 7), which results in the furthest distance to the Level B harassment criteria (160 $dB_{RMS90\%}$ re 1 μPa) at 100.0 m (328 ft). This source will be employed on an estimated 152 vessel days. During an additional 9 vessel days, the Triple Plate Boomer 1000J would be the predominant source used, with an estimated Level B harassment threshold of 22 m (72 ft) as the basis for determining potential take.

The basis for the take estimate is the number of times that marine mammals are predicted to be exposed to sound levels in excess of Level B harassment criteria. Typically, this is determined by multiplying the ZOI out to the Level B harassment criteria isopleth by local marine mammal density estimates and then correcting for seasonal use by marine mammals, seasonal duration of project-specific noise-generating activities, and estimated duration of individual activities when the maximum noise-generating activities are intermittent or occasional. In the absence of any part of this information, it becomes prudent to take a conservative approach to ensure the potential number of takes is not greatly underestimated. The estimated distance of the daily vessel trackline was determined using the estimated average speed of the vessel and the 24-hour operational period within each of the corresponding survey segments. Using the distance of 100.0 m (328 ft) and 22 m (72 ft) to the 160 dB Level B harassment isopleths for when HRG equipment is in use, the estimated daily vessel track of approximately 121.54 km (75.5 mi) for 24-hour operations, inclusive of an additional circular area to account for radial distance at the start and end of a 24-hour cycle, gives estimates of incidental take by HRG survey equipment based on the ensonified area around the survey equipment as depicted in Table 7.

Based on the maximum estimated distance to the Level B harassment threshold of 100 m (Table 7) and the maximum estimated daily track line distance of 121.54 km, an area of 24.34 km² would be ensonified to the Level B harassment threshold per day during the 152 vessel days that the Geo Marine Dual 400 Sparker 800J is in use. The estimated Level B harassment threshold of 22 m (72 ft) associated with the Triple Plate Boomer 1000J would ensonify 5.35 km² for 9 vessel days.

TABLE 8—SURVEY SEGMENT DISTANCES AND ZOIS AT LEVEL B HARASSMENT DISTANCES

Survey segment	Number of active survey vessel days	Estimated distances per day (km)	Calculated ZOI per day (km²)
Lease Area Survey (Sparker In Use)	149	121.54	24.34
Export Cable Corridor Survey (Sparker In Use)	3		
Export Cable Corridor Survey (No Sparker In Use)	9	5.35	

The number of marine mammals expected to be incidentally taken per day is then calculated by estimating the number of each species predicted to occur within the daily ensonified area (animals/km²) by incorporating the estimated marine mammal densities.

A summary of this method is illustrated in the following formula:

$$\text{Estimated Take} = D \times ZOI \times \#\text{ of days}$$

Where:

D = average species density (per km²) and ZOI = maximum daily ensonified area to relevant thresholds.

The habitat-based density models produced by the Duke University Marine Geospatial Ecology Laboratory (Roberts *et al.* 2016, 2017, 2018) represent the best available information regarding marine mammal densities in the proposed Survey Area. The density data presented by Roberts *et al.* (2016, 2017, 2018) incorporates aerial and shipboard line-transect survey data from NMFS and other organizations and incorporates data from 8 physiographic and 16 dynamic oceanographic and biological covariates, and controls for the influence of sea state, group size, availability bias, and perception bias on the probability of making a sighting. These density models were originally developed for all cetacean taxa in the U.S. Atlantic (Roberts *et al.* 2016). In subsequent years, certain models have been updated on the basis of additional data as well as certain methodological improvements. More information is available online at *seamap.env.duke.edu/models/Duke-EC–GOM–2015/.* Marine mammal density estimates in the Survey Area (animals/km^2) were obtained using these model results (Roberts *et al.* 2016, 2017, 2018).

For the purposes of exposure analysis density data from Roberts *et al.* (2016, 2017, and 2018) were mapped within the boundary of the Survey Area for each segment using geographic information systems. For each survey segment, the maximum densities as reported by Roberts *et al.* (2016, 2017, and 2018), were averaged by season over the survey duration (for spring, summer, fall and winter) for the entire HRG Survey Area based on the proposed HRG survey schedule. The maximum average seasonal density within the HRG survey schedule was then selected for inclusion in the take calculations. Note that recently, these data have been updated with new modeling results and have included density estimates for pinnipeds (Roberts *et al.* 2016; 2017; 2018). For pinnipeds, because the seasonality of, and habitat use by, gray seals roughly overlaps with harbor seals, the same estimated abundance has been applied to both gray and harbor seals.

TABLE 9—TOTAL NUMBERS OF POTENTIAL INCIDENTAL TAKE OF MARINE MAMMALS PROPOSED FOR AUTHORIZATION AND PROPOSED TAKES AS A PERCENTAGE OF POPULATION

	Lease area		Cable route corridor (sparker in use)		Cable route corridor (no sparker in use)		Adjusted totals	
	Average seasonal density [1] (No./100 km^2)	Calc. take (No.)	Average seasonal density [1] (No./100 km^2)	Calc. take (No.)	Average seasonal density [1] (No./100 km^2)	Calc. take (No.)	Take authorization (No.)	Percentage of population [5]
North Atlantic right whale	0.078	2.816	0.049	0.036	0.049	0.023	[4] 2	0.37
Humpback whale	0.085	3.087	0.066	0.048	0.066	0.032	[4] 3	0.18
Fin whale	0.261	9.448	0.122	0.089	0.122	0.059	[4] 10	0.21
Sei whale	0.002	0.089	0.001	0.000	0.001	0.000	[4] 1	0.15
Sperm whale	0.007	0.238	0.002	0.002	0.002	0.001	[4] 1	0.02
Minke whale	0.114	4.151	0.041	0.030	0.041	0.020	[4] 4	0.19
Long-finned pilot whale [7]; Short-finned pilot whale [7]	0.029	1.038	0.010	0.007	0.010	0.005	[6] 12	0.06
Bottlenose dolphin (Offshore)	18.53	[2] 504.234	50.93	[2] 3.719	50.932	[2] 2.452	511	0.81
Bottlenose dolphin (Southern Migratory Coastal)	18.53	[2] 168.078	50.93	[2] 33.470	50.932	[2] 22.068	224	6.5
Common dolphin	1.84	66.797	0.613	0.447	0.613	0.295	68	0.08
Atlantic white-sided dolphin	1.18	42.992	0.386	0.282	0.386	0.186	44	0.12
Spotted dolphin	0.729	26.425	0.219	0.160	0.219	0.106	27	0.05
Risso's dolphin	0.017	0.605	0.004	0.003	0.004	0.002	6 [6]	0.08
Harbor porpoise	1.059	38.396	0.375	0.274	0.375	0.181	39	0.09
Harbor seal [3]; Gray Seal [3]	0.916	33.210	0.806	0.588	0.806	0.388	35	0.02 0.06

Notes:

[1] Cetacean density values from Duke University (Roberts *et al.* 2016, 2017, 2018).

[2] Density model for bottlenose dolphins (Roberts *et al.* 2016, 2017, 2018) does not differentiate between offshore and coastal stocks. Take estimates split based on bottlenose dolphin stock preferred water depths (Reeves *et al.* 2002; Hayes *et al.* 2018).

[3] Pinniped density values reported as "seals" and not species-specific.

[4] Take adjusted to 0 given mitigation to prevent take.

[5] Calculations of percentage of stock taken are based on the best available abundance estimate as shown in Table 2. In most cases the best available abundance estimate is provided by Roberts *et al.* (2016, 2017, 2018), when available, to maintain consistency with density estimates derived from Roberts *et al.* (2016, 2017, 2018). For North Atlantic right whales the best available abundance estimate is derived from the North Atlantic Right Whale Consortium 2019 Annual Report Card (Pettis *et al.* 2019). For bottlenose dolphins, Roberts *et al.* (2016, 2017, 2018) provides only a single abundance estimate and does not provide abundance estimates at the stock or species level (respectively), so abundance estimates used to estimate percentage of stock taken for bottlenose dolphins are derived from NMFS SARs (Hayes *et al.* 2019).

[6] The number of authorized takes (Level B harassment only) for these species has been increased from the estimated take number to mean group size. Sources for mean group size estimates are as follows: Risso's dolphin, pilot whales (NOAA Fisheries Northeast and Southeast Fisheries Science Centers, 2019, 2018, 2017, 2016, 2015, 2014, 2013, 2012, 2011).

[7] Density values reported as a guild for pilot whales at the genus level.

Take authorization is not proposed for six marine mammal species for which potential takes by Level B harassment were estimated based on the modeling approach described above: North Atlantic right, humpback, fin, sei, sperm, and minke whale. Though the modeling resulted in estimates of take for these species as shown in Table 9, take of these species are expected to be avoided due to mitigation.

Note that the number of proposed takes (Level B harassment only) for Risso's dolphin and pilot whales has been increased from the estimated take number to mean group size. (NOAA Fisheries Northeast and Southeast Fisheries Science Centers, 2019, 2018, 2017, 2016, 2015, 2014, 2013, 2012, 2011).

For bottlenose dolphin densities, Roberts *et al.* (2016, 2017, and 2018) does not differentiate by individual stock. Given the southern coastal migratory stock propensity to be found shallower than the 25-m (82-ft) depth isobath north of Cape Hatteras (Reeves *et al.* 2002; Hayes *et al.* 2018) and only during the summer, the export cable corridor segment was roughly divided along the 25-m (82-ft) depth isobath. Roughly 90 percent of the cable corridor is 25 m (82 ft) or less in depth. The Lease Area is mostly located within depths exceeding 25 m (82 ft), where the southern coastal migratory stock would be unlikely. Roughly 25 percent of the Lease Area survey segment is 25 m (82 ft) or less in depth. Therefore, to account for the potential for mixed stocks within the export cable corridor, 90 percent of the estimated take calculation is applied to the southern coastal migratory stock and the remaining applied to the offshore migratory stock within the export cable corridor survey area. Within the Lease Area, 25 percent of the estimated take calculation is applied to the southern coastal migratory stock and the remaining applied to the offshore migratory stock.

Roberts *et al.* (2018) produced density models for all seals and did not differentiate by seal species. The take calculation methodology as described above resulted in an estimate of 35 total seal takes. An even split between harbor and gray seals (*i.e.,* 18 harbor seal takes and 17 gray seal takes) is proposed, based on an assumption that the likelihood of take of either species is equal.

In the instance of the North Atlantic right whale, Dominion proposed a 500-m (1,640-ft) exclusion zone that exceeds the distance to the Level B harassment isopleth. Given that the proposed mitigation effectively prevents Level B harassment, take has been adjusted to zero individuals. In addition, Dominion proposed a 100-m (328-ft) exclusion zone to be implemented for all non-delphinid large cetaceans, which is expected to preclude potential interactions with humpback, fin, sei, sperm, and minke whales. Therefore, the low calculated take estimates for these whales was adjusted to zero individuals for these species and NMFS is not proposing to authorize take of these whale 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 the activity, and other means of effecting the least practicable impact on the species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the 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 the 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.

Marine mammal exclusion zones (EZ) would be established around the HRG survey equipment and monitored by protected species observers (PSO) during HRG surveys as follows:

- 500-m EZ would be required for North Atlantic right whales;
- 100-m EZ would be required for large whale species;
- 25-m (82-ft) EZ when only the Triple Plate Boomer 1000J is in use; and
- 200-m (656-ft) buffer zone for all marine mammals except those species otherwise excluded (*i.e.,* right whale).

If a marine mammal is detected approaching or entering the EZs during the proposed survey, the vessel operator would adhere to the shutdown procedures described below. In addition to the EZs described above, PSOs would visually monitor a 200-m buffer zone. During use of acoustic sources with the potential to result in marine mammal harassment (*i.e.,* anytime the acoustic source is active, including ramp-up), occurrences of marine mammals within the monitoring zone (but outside the EZs) would be communicated to the vessel operator to prepare for potential shutdown of the acoustic source. The buffer zone is not applicable when the EZ is greater than 100 meters. PSOs would also be required to observe a 500-m monitoring zone and record the presence of all marine mammals within this zone. The zones described above would be based upon the radial distance from the active equipment (rather than being based on distance from the vessel itself).

Visual Monitoring

NMFS only requires a single PSO to be on duty during daylight hours. Dominion will have one PSO on duty during the day and has voluntarily proposed that a minimum of two NMFS-approved PSOs must be on duty and conducting visual observations when HRG equipment is in use at night. Visual monitoring would begin no less than 30 minutes prior to ramp-up of HRG equipment and would continue until 30 minutes after use of the acoustic source. PSOs would establish and monitor the applicable EZs, Buffer Zone and Monitoring Zone as described above. Visual PSOs would coordinate to ensure 360° visual coverage around the vessel from the most appropriate observation posts, and would conduct visual observations using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner. PSOs would estimate distances to observed marine mammals. It would be the responsibility of the Lead PSO on duty to communicate the presence of marine mammals as well as to communicate action(s) that are necessary to ensure mitigation and monitoring requirements are implemented as appropriate. Position data would be recorded using hand-held or vessel global positioning system (GPS) units for each confirmed marine mammal sighting.

Pre-Clearance of the Exclusion Zones

Prior to initiating HRG survey activities, Dominion would implement a 30-minute pre-clearance period. During pre-clearance monitoring (*i.e.,* before ramp-up of HRG equipment begins), the Buffer Zone would also act as an extension of the 100-m EZ in that observations of marine mammals within the 200-m Buffer Zone would also preclude HRG operations from beginning. During this period, PSOs would ensure that no marine mammals are observed within 200 m of the survey equipment (500 m in the case of North Atlantic right whales). HRG equipment would not start up until this 200-m zone (or, 500-m zone in the case of North Atlantic right whales) is clear of marine mammals for at least 30 minutes. The vessel operator would notify a designated PSO of the proposed start of HRG survey equipment as agreed upon with the lead PSO; the notification time should not be less than 30 minutes prior to the planned initiation of HRG equipment order to allow the PSOs time to monitor the EZs and Buffer Zone for the 30 minutes of pre-clearance. A PSO conducting pre-clearance observations would be notified again immediately prior to initiating active HRG sources.

If a marine mammal were observed within the relevant EZs or Buffer Zone during the pre-clearance period, initiation of HRG survey equipment would not begin until the animal(s) has been observed exiting the respective EZ or Buffer Zone, or, until an additional time period has elapsed with no further sighting (*i.e.,* minimum 15 minutes for small odontocetes and seals, and 30 minutes for all other species). The pre-clearance requirement would include small delphinoids. PSOs would also continue to monitor the zone for 30 minutes after survey equipment is shut down or survey activity has concluded.

Ramp-Up of Survey Equipment

When technically feasible, a ramp-up procedure would be used for geophysical survey equipment capable of adjusting energy levels at the start or re-start of survey activities. The ramp-up procedure would be used at the beginning of HRG survey activities in order to provide additional protection to marine mammals near the Survey Area by allowing them to detect the presence of the survey and vacate the area prior to the commencement of survey equipment operation at full power. Ramp-up of the survey equipment would not begin until the relevant EZs and Buffer Zone has been cleared by the PSOs, as described above. HRG equipment would be initiated at their lowest power output and would be incrementally increased to full power. If any marine mammals are detected within the EZs or Buffer Zone prior to or during ramp-up, the HRG equipment would be shut down (as described below).

Shutdown Procedures

If an HRG source is active and a marine mammal is observed within or entering a relevant EZ (as described above) an immediate shutdown of the HRG survey equipment would be required. When shutdown is called for by a PSO, the acoustic source would be immediately deactivated and any dispute resolved only following deactivation. Any PSO on duty would have the authority to delay the start of survey operations or to call for shutdown of the acoustic source if a marine mammal is detected within the applicable EZ. The vessel operator would establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the HRG source(s) to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch. Subsequent restart of the HRG equipment would only occur after the marine mammal has either been observed exiting the relevant EZ, or, until an additional time period has elapsed with no further sighting of the animal within the relevant EZ (*i.e.,* 15 minutes for small odontocetes and seals, and 30 minutes for large whales).

Upon implementation of shutdown, the HRG source may be reactivated after the marine mammal that triggered the shutdown has been observed exiting the applicable EZ (*i.e.,* the animal is not required to fully exit the Buffer Zone where applicable) or, following a clearance period of 15 minutes for small odontocetes and seals and 30 minutes for all other species with no further observation of the marine mammal(s) within the relevant EZ. If the HRG equipment shuts down for brief periods (*i.e.,* less than 30 minutes) for reasons other than mitigation (*e.g.,* mechanical or electronic failure) the equipment may be re-activated as soon as is practicable at full operational level, without 30 minutes of pre-clearance, only if PSOs have maintained constant visual observation during the shutdown and no visual detections of marine mammals occurred within the applicable EZs and Buffer Zone during that time. For a shutdown of 30 minutes or longer, or if visual observation was not continued diligently during the pause, pre-clearance observation is required, as described above.

The shutdown requirement would be waived for certain genera of small delphinids (*i.e., Delphinus, Lagenorhynchus, Stenella,* or *Tursiops)* under certain circumstances. If a delphinid(s) from these genera is visually detected within the exclusion zone shutdown would not be required. If there is 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), PSOs would 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 area encompassing the Level B harassment isopleth (100 m or 25 m), shutdown would occur.

Vessel Strike Avoidance

Vessel strike avoidance measures would include, but would not be limited to, the following, except under circumstances when complying with these requirements would put the safety of the vessel or crew at risk:

- Vessel operators and crews must maintain a vigilant watch for all protected species and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any protected species. 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 (1) distinguish protected species from other phenomena and (2) 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.
- All 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 (DMAs) when in effect, the Norfolk Seasonal Management Area (SMA) (from November 1 through April 30). See *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 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 sperm whales and all other baleen whales.
- All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all other protected species, with an understanding that at times this may not be possible (*e.g.,* for animals that approach the vessel).
- When protected species 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 protected species 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.

Project-specific training will be conducted for all vessel crew prior to the start of survey activities. Confirmation of the training and understanding of the requirements will be documented on a training course log sheet. Signing the log sheet will certify that the crew members understand and will comply with the necessary requirements throughout the survey activities.

Seasonal Operating Requirements

Dominion will conduct HRG survey activities in the vicinity of the right whale Mid-Atlantic seasonal management area (SMA) near Norfolk and the mouth of the Chesapeake Bay. Activities conducted prior to May 1 will need to comply with the seasonal mandatory speed restriction period for this SMA (November 1 through April 30) for any survey work or transit within this area.

Throughout all phases of the survey activities, Dominion will monitor NOAA Fisheries North Atlantic right whale reporting systems for the establishment of a dynamic management area (DMA). If NOAA Fisheries should establish a DMA in the Lease Area or cable route corridor being surveyed, within 24 hours of the establishment of the DMA Dominion will work with NOAA Fisheries to shut down and/or alter activities to avoid the DMA.

Based on our evaluation of the applicant's proposed measures, 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).
- Mitigation and monitoring effectiveness.

Proposed Monitoring Measures

As described above, visual monitoring would be performed by qualified and NMFS-approved PSOs. Dominion would 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), and must have successfully completed an approved PSO training course appropriate for their designated task. Dominion would provide resumes of all proposed PSOs (including alternates) to NMFS for review and approval prior to the start of survey operations.

During survey operations (*e.g.,* any day on which use of an HRG source is planned to occur), a single PSO must be on duty and conducting visual observations during the day on all active survey vessels when HRG equipment is operating. Additionally, Dominion has stated their intention to deploy two PSOs on duty during night operations. Visual monitoring would begin no less than 30 minutes prior to initiation of HRG survey equipment and would continue until one hour after use of the acoustic source ceases. PSOs would coordinate to ensure 360° visual coverage around the vessel from the most appropriate observation posts, and would conduct visual observations using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner. PSOs may be on watch for a maximum of four consecutive hours followed by a break of at least two hours between watches and may conduct a maximum of 12 hours of observation per 24-hour period. In cases where multiple vessels are surveying concurrently, any observations of marine mammals would be communicated to PSOs on all survey vessels.

PSOs would be equipped with binoculars and have the ability to estimate distances to marine mammals located in proximity to the vessel and/or exclusion zone. Reticulated binoculars will be available to PSOs for use as appropriate based on conditions and visibility to support the monitoring of marine mammals. Position data would be recorded using hand-held or vessel GPS units for each sighting. Observations would take place from the highest available vantage point on the survey vessel. General 360-degree scanning would occur during the monitoring periods, and target scanning by the PSO would occur when alerted of a marine mammal presence.

During good conditions (*e.g.,* daylight hours; Beaufort sea state (BSS) 3 or less), to the maximum extent practicable, PSOs would conduct observations when the acoustic source is not operating for comparison of sighting rates and behavior with and without use of the acoustic source and between acquisition periods. Any observations of marine mammals by crew members aboard any vessel associated with the survey would be relayed to the PSO team.

Data on all PSO observations would be recorded based on standard PSO collection requirements. This would include dates, times, and locations of survey operations; dates and times of observations, location and weather; details of marine mammal sightings (*e.g.,* species, numbers, behavior); and details of any observed marine mammal take that occurs (*e.g.,* noted behavioral disturbances).

Proposed Reporting Measures

Within 90 days after completion of survey activities, a final technical report will be provided to NMFS that fully documents the methods and monitoring protocols, summarizes the data recorded during monitoring, summarizes the number of marine mammals observed during survey activities (by species, when known), summarizes the mitigation actions taken during surveys (including what type of mitigation and the species and number of animals that prompted the mitigation action, when known), and provides an interpretation of the results and effectiveness of all mitigation and monitoring. Any recommendations made by NMFS must be addressed in the final report prior to acceptance by NMFS.

In the event that Dominion personnel discover an injured or dead marine mammal, Dominion shall report the incident to the Office of Protected Resources (OPR), NMFS and to the New England/Mid-Atlantic Regional Stranding Coordinator as soon as feasible. The report must include the following information:

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

In the event of a ship strike of a marine mammal by any vessel involved in the activities covered by the authorization, the IHA-holder shall report the incident to OPR, NMFS and to the New England/Mid-Atlantic Regional Stranding Coordinator as soon as feasible. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Species identification (if known) or description of the animal(s) involved;
- Vessel's speed during and leading up to the incident;
- Vessel's course/heading and what operations were being conducted (if applicable);
- Status of all sound sources in use;
- Description of avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike;
- Environmental conditions (*e.g.,* wind speed and direction, Beaufort sea state, cloud cover, visibility) immediately preceding the strike;
- Estimated size and length of animal that was struck;
- Description of the behavior of the marine mammal immediately preceding and following the strike;
- If available, description of the presence and behavior of any other marine mammals immediately preceding the strike;
- Estimated fate of the animal (*e.g.,* dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and
- To the extent practicable, photographs or video footage of the animal(s).

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, our analysis applies to all the species listed in Table 9, given that NMFS expects the anticipated effects of the proposed survey to be similar in nature. As discussed in the Potential Effects of the Specified Activities on Marine Mammals and Their Habitat section, PTS, masking, non-auditory physical effects, and vessel strike are not expected to occur.

The majority of impacts to marine mammals are expected to be short-term disruption of behavioral patterns, primarily in the form of avoidance or potential interruption of foraging. Marine mammal feeding behavior is not likely to be significantly impacted.

Regarding impacts to marine mammal habitat, prey species are mobile, and are broadly distributed throughout the Survey Area and the footprint of the activity is small; 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 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. The HRG survey equipment itself will not result in physical habitat disturbance. Avoidance of the area around the HRG survey activities by marine mammal prey species is possible. However, any avoidance by prey species would be expected to be short term and temporary.

The status of the North Atlantic right whale population is of heightened concern and, therefore, merits additional analysis. 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 for authorization, and HRG survey operations will be required to shut down at 500 m to further minimize any potential effects to this species. This is highly precautionary considering the Level B harassment isopleth for the largest source utilized (*i.e.* Geo Marine Dual 400 Sparker 800J is estimated to be 100 m). 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. Additionally, a UME for right whales was declared in June 2017, primarily due to mortality events in the Gulf of St. Lawrence region of Canada and around the Cape Cod area of Massachusetts. Overall, preliminary findings support human interactions, specifically vessel strikes or rope entanglements, as the cause of death for the majority of the right whales. Furthermore, these locations are found far to the north of the proposed Survey Area.

No take has been proposed for authorization for ESA-listed species including right, fin, sei, and sperm whales and NMFS does not anticipate that serious injury or mortality would occur to any species, even in the absence of mitigation. The planned survey is not anticipated to affect the fitness or reproductive success of individual animals. Since impacts to individual survivorship and fecundity are unlikely, the planned survey is not expected to result in population-level effects for any ESA-listed species or alter current population trends of any ESA-listed species.

As noted previously, elevated humpback whale mortalities have occurred along the Atlantic coast from Maine through Florida since January 2016. Of the cases examined, approximately half had evidence of human interaction (ship strike or entanglement). The UME does not yet provide cause for concern regarding population-level impacts. Despite the UME, the relevant population of humpback whales (the West Indies breeding population, or distinct population segment (DPS)) remains healthy.

Beginning in 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. This event does not provide cause for concern regarding population level impacts, as the likely population abundance is greater than 20,000 whales. Additionally, elevated numbers of harbor seal and gray seal mortalities were first observed in July 2018 and have occurred across Maine, New Hampshire and Massachusetts. Based on tests conducted so far, the main pathogen found in the seals is phocine distemper virus although additional testing to identify other factors that may be involved in this UME are underway. The UME does not yet provide cause for concern regarding population-level impacts to any of these stocks. For harbor seals, the population abundance is over 75,000 and annual M/SI (350) is well below PBR (2,006) (Hayes *et al.* 2018). The population abundance of gray seals in the United States is in excess of 27,000 and likely increasing (Wood *et al.* 2019). The estimated abundance increases to 505,000 when seals from Canada are included. Given that any Level B harassment of gray and harbor seals will be minor, short term, and temporary the proposed authorized takes of gray and harbor seals would not exacerbate or compound the ongoing UMEs in any way.

Direct physical interactions (ship strikes and entanglements) appear to be responsible for many of the UME humpback and right whale mortalities recorded. The proposed HRG survey will require ship strike avoidance measures which would minimize the risk of ship strikes while fishing gear and in-water lines will not be employed as part of the survey. Furthermore, the proposed activities are not expected to promote the transmission of infectious disease among marine mammals. The survey is not expected to result in the deaths of any marine mammals or combine with the effects of the ongoing UMEs to result in any additional impacts not analyzed here. NMFS is not proposing to authorize take of large whales and is not proposing to authorize take of any marine mammal species by serious injury, or mortality.

The required mitigation measures are expected to reduce the number and/or severity of takes by giving animals the opportunity to move away from the sound source before HRG survey equipment reaches full energy and preventing animals from being exposed to sound levels that have the potential to result in more severe Level B harassment during HRG survey activities. Due to the small size of PTS zones no Level A harassment is anticipated or proposed for authorization.

NMFS expects that most takes would primarily be in the form of short-term Level B behavioral harassment in the form of brief startling reaction and/or temporary vacating of the area, or decreased foraging (if such activity were occurring)—reactions that (at the scale and intensity anticipated here) are considered to be of low severity and with no lasting biological consequences. Since both the source and the marine mammals are mobile, only a smaller area would be ensonified by sound levels that could result in take for only a short period.

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 is anticipated or authorized;
- No Level A harassment (PTS) is anticipated;
- Any foraging interruptions are expected to be short term and unlikely to be cause significantly impacts;
- Impacts on marine mammal habitat and species that serve as prey species for marine mammals are expected to be minimal and the alternate areas of similar habitat value for marine mammals are readily available;
- Take is anticipated to be by Level B behavioral harassment only consisting of brief startling reactions and/or temporary avoidance of the Survey Area;
- Survey activities would occur in such a comparatively small portion of the biologically important areas for north Atlantic right whale migration, that any avoidance of the Survey Area due to activities would not affect migration. In addition, mitigation measures to shut down at 500 m to minimize potential for Level B behavioral harassment would limit both the number and severity of take of the species; and
- Proposed mitigation measures, including visual monitoring and shutdowns, are expected to minimize the intensity of potential impacts to marine mammals.

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. When the predicted number of individuals to be taken is fewer than one third of the species or stock abundance, the take is considered to be of small numbers. For this IHA, take of all species or stocks is below one third of the estimated stock abundance (in fact, take of individuals is less than 7 percent of the abundance for all affected stocks). Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

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

Unmitigable Adverse Impact Analysis and Determination

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

Endangered Species Act (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. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally whenever we propose to authorize take or propose mitigation measures that would avoid incidental take of endangered or threatened species, in this case with the Greater Atlantic Regional Field Office (GARFO). In the absence of proposed mitigation measures take of North Atlantic right whale, fin whale, sei whale, and sperm whale could potentially occur.

The Permits and Conservation Division has requested initiation of Section 7 consultation with GARFO for the issuance of this IHA. NMFS will conclude the ESA consultation prior to reaching a determination regarding the proposed issuance of the authorization.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to Dominion for conducting HRG surveys off the coast of Virginia for a period of one year after the issuance of the IHA, 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 surveys. We also request at this time comment on the potential 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 decisions on the request for this IHA or a subsequent Renewal IHA.

On a case-by-case basis, NMFS may issue a one-time one-year Renewal IHA following notice to the public providing an additional 15 days for public comments when (1) up to another year of identical or nearly identical, or nearly identical, activities as described in the Specified Activities section of this notice is planned or (2) the activities as described in the Specified Activities section of this notice would not be completed by the time the IHA expires and a Renewal would allow for completion of the activities beyond that described in the *Dates and Duration* section of this notice, provided all of the following conditions are met:

- A request for renewal is received no later than 60 days prior to the needed Renewal IHA effective date (recognizing that the Renewal IHA expiration date cannot extend beyond one year from expiration of the initial IHA).
- The request for renewal must include the following:

(1) An explanation that the activities to be conducted under the requested Renewal IHA 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); 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: June 11, 2020.

Donna S. Wieting,

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

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648–XW033]

General Advisory Committee to the U.S. Section to the Inter-American Tropical Tuna Commission and Scientific Advisory Subcommittee to the General Advisory Committee; Meeting Announcements

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

ACTION: Notice of public meeting; consolidation of two meetings.

SUMMARY: NMFS announces a consolidation of the public meeting of the Scientific Advisory Subcommittee (SAS) to the General Advisory Committee (GAC) scheduled on June 17, 2020, with the public meeting of the GAC to the U.S. Section to the Inter-American Tropical Tuna Commission (IATTC) scheduled on June 18, 2020. This newly consolidated SAS and GAC meeting will be held on June 18, 2020, via webinar. The meeting topics are described under the **SUPPLEMENTARY INFORMATION** section of this notice.

DATES: The consolidated meeting of the SAS and GAC will be held on June 18, 2020, from 8:30 a.m. to 3:30 p.m. PDT (or until business is concluded).

ADDRESSES: Please notify William Stahnke (see **FOR FURTHER INFORMATION CONTACT**) if you plan to attend the webinar. Instructions will be emailed to meeting participants before the meeting occurs.

FOR FURTHER INFORMATION CONTACT: William Stahnke, West Coast Region, NMFS, at *william.stahnke@noaa.gov,* or at (562) 980–4088.

SUPPLEMENTARY INFORMATION: On March 5, 2020, NMFS announced that it scheduled a public meeting of the SAS to the GAC on June 17, 2020, and a public meeting of the GAC to the U.S. Section to the IATTC on June 18, 2020 (85 FR 12907). On May 19, 2020, NMFS announced a revision to the format of the public meetings of the SAS and the GAC, which would be held solely by webinar instead of in-person; additionally NMFS announced that the