describes measures to minimize and mitigate the impacts of any incidental takes of ESA-listed green and Kemp's ridley sea turtles.

The facility has experienced increased numbers of cold-stunned sea turtles in the intake canal during the winter months over the past several years. The facility currently coordinates with Texas Parks and Wildlife Department's Coastal Conservation Association Marine Development Center to collect and relocate sea turtles that have migrated into the intake canal.

To avoid and minimize take of sea turtles, facility personnel will visually monitor the area immediately surrounding the cribhouse, which includes the bulkhead, trash racks, and intake canal on a seasonal schedule. From December 1st through March 31st, monitoring will be conducted a minimum of four times per twelve hour shift, spaced at approximately three-hour intervals. From April 1st through November 30th, monitoring will be conducted one time per shift, or once approximately every twelve hours. Visual monitoring will last for approximately fifteen minutes during each monitoring event. Facility staff responsible for monitoring the intake canal will be trained upon hiring, and again annually, on the proper procedures required for the collection of turtles. Photos of potentially affected species are available to staff to assist them with species identification. Staff will be required to measure the length of the turtles collected.

Barney M. Davis Power Station is an existing facility. Continued monitoring related to the take of sea turtles will be ongoing and funding provided through the facility's annual operating budget.

National Environmental Policy Act

This notice is provided pursuant to section 10(c) of the ESA and the National Environmental Policy Act (NEPA) regulations (40 CFR 1506.6). The draft EA was prepared in accordance with NEPA (42 U.S.C. 4321, *et seq.*), 40 CFR 1500–1508 and NOAA policy and procedures (NAO 216–6A and the Companion Manual for the NAO 216–6A).

Alternatives Considered

In preparing the Draft EA, NMFS considered the following 2 alternatives for the action.

Alternative 1: No Action. In accordance with the NOAA Companion Manual for NAO 216–6A, Section 6.B.i, NMFS is defining the No Action alternative as not authorizing the incidental take of green (*Chelonia mydas* North Atlantic DPS) and Kemp's ridley (*Lepidochelys kempii*) sea turtles associated with the otherwise lawful operation of the Barney M. Davis Power Station. This is consistent with our statutory obligation under Section 10(a)(1)(B) of the ESA to either: (1) Deny the requested permit or (2) grant the requested permit and prescribe mitigation, monitoring, and reporting requirements. Under the No Action Alternative, NMFS would not issue the ITP, in which case we assume this applicant would proceed with their Power Station activities as described in the application without implementing the full suite of specific mitigation measures and monitoring and reporting included in the Conservation Plan and in the ITP as requirements.

Alternative 2: Issue Permit as Requested in Application (Proposed Action): Under Alternative 2, an ITP would be issued to exempt Barney M. Davis, L.P. from the ESA prohibition on taking of green (*Chelonia mydas* North Atlantic DPS) and Kemp's ridley (*Lepidochelys kempii*) sea turtles during the otherwise lawful operation of the Barney M. Davis Power Station. As required under Section 10(a)(1)(B), the ITP would require the Barney M. Davis Power Station to operate as described in the proposed conservation plan to avoid and minimize take of sea turtles.

The Draft EA presents a comparison of the direct, indirect, and cumulative effects of the alternatives. Regulations for implementing NEPA (42 U.S.C. 4331 *et seq.*) require considerations of both the context and intensity of a proposed action (40 CFR 1508.27). The issuance of the Permit as Requested in the Application (Alternative 2, Proposed Action) would allow Barney M. Davis, L.P. to continue to operate the Barney M. Davis Power Station and would require conservation measures to minimize risk to sea turtles. This would result in less socio-economic costs than the No Action alternative (Alternative 1). The final permit determinations will not be completed until after the end of the 30-day comment period and will fully consider all public comments received during the comment period. NMFS will publish a record of its final action in the **Federal Register**.

Dated: September 23, 2019.

Donna S. Wieting,

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

[FR Doc. 2019–20975 Filed 9–26–19; 8:45 am]

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XR032

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Marine Site Characterization Surveys Off of Delaware and Maryland

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

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

SUMMARY: NMFS has received a request from Skipjack Offshore Energy, LLC (Skipjack) for authorization to take marine mammals incidental to marine site characterization surveys offshore of Delaware in the area of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS–A 0519) and along potential submarine cable routes to a landfall location in Delaware or Maryland. 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 October 28, 2019.

ADDRESSES: Comments should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service. Physical comments should be sent to 1315 East-West Highway, Silver Spring, MD 20910 and electronic comments should be sent to *ITP.carduner@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 *www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable* 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: Jordan Carduner, Office of Protected Resources, NMFS, (301) 427–8401. Electronic copies of the applications and supporting documents, as well as a list of the references cited in this document, may be obtained by visiting the internet at: *www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable.* In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

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

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other ''means of effecting the least practicable adverse impact'' on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stocks for taking for certain subsistence uses (referred to in shorthand as ''mitigation''); and requirements pertaining to the mitigation, monitoring and reporting of such 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 evaluate our proposed action (*i.e.,* the promulgation of regulations and subsequent issuance of incidental take authorization) and alternatives with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in Categorical Exclusion B4 of the Companion Manual for NAO 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 proposed action qualifies to be categorically excluded from further NEPA review.

Information in Skipjack's application and this notice collectively provide the environmental information related to proposed issuance of these regulations and subsequent incidental take authorization for public review and comment. We will review all comments submitted in response to this notice prior to concluding our NEPA process or making a final decision on the request for incidental take authorization.

Summary of Request

On July 1, 2019, NMFS received a request from Skipjack for an IHA to take marine mammals incidental to marine site characterization surveys offshore of Delaware in the area of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS–A 0519) and along potential submarine cable routes to a landfall location in Delaware or Maryland. A revised application was received on August 15, 2019. NMFS deemed that request to be adequate and complete. Skipjack's request is for the take of 17 marine mammal species by Level B harassment that would occur over the course of 200 survey days. Neither Skipjack nor NMFS expects serious injury or mortality to result from this activity and the activity is expected to last no more than one year, therefore, an IHA is appropriate.

Description of the Proposed Activity

Overview

Skipjack proposes to conduct marine site characterization surveys, including high-resolution geophysical (HRG) and geotechnical surveys, in the area of Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf #OCS–A 0519 (Lease Area) and along potential submarine cable routes to landfall locations in either Delaware or Maryland.

The purpose of the marine site characterization surveys are to obtain a baseline assessment of seabed/sub-surface soil conditions in the Lease Area and cable route corridors to support the siting of potential future offshore wind projects. Underwater sound resulting from Skipjack's proposed site characterization surveys has the potential to result in incidental take of marine mammals in the form of behavioral harassment.

Dates and Duration

The estimated duration of the activity is expected to be up to 200 survey days between October 2019 through September 2020. This schedule is based on 24-hour operations and includes potential down time due to inclement weather.

Specific Geographic Region

Skipjack's survey activities would occur in the Northwest Atlantic Ocean within Federal waters. Surveys would occur in the Lease Area and along potential submarine cable routes to landfall locations in either Delaware or Maryland (see Figure 1 in the IHA application).

Detailed Description of the Specified Activities

Skipjack's proposed marine site characterization surveys include high-resolution geophysical (HRG) and geotechnical survey activities. The Lease Area is approximately 106.6 square kilometers (km) (26,341 acres) and is within the Delaware Wind Energy Area of the Bureau of Ocean Energy Management's Mid-Atlantic planning area. Water depths in the Lease Area range from 16 to 28 meters (m) (52 to 92 feet (ft)). Water depths along the submarine cable corridor in Federal waters range from 12 to 28 m (39 to 92 ft). The closest point to shore is approximately 18 km (11 miles (mi)) due east from Rehoboth Beach, Delaware (see Figure 1 in the IHA application). For the purpose of this IHA the Lease Area and submarine cable corridor are collectively termed the Project Area.

Geophysical and shallow geotechnical survey activities are anticipated to be supported by as many as five total vessels, with as many as three vessels operating concurrently. Survey vessels would maintain a speed of approximately 4 knots (kn) while transiting survey lines. The proposed HRG and geotechnical survey activities are described below. A maximum of 200 total survey days are expected to be required to complete the site characterization surveys.

Geotechnical Survey Activities

Geophysical and shallow geotechnical survey activities are anticipated to be supported by vessels which will maintain a speed of up to 4 knots (kn) while transiting survey lines. The proposed HRG and geotechnical survey activities are described below.

Geotechnical Survey Activities

Skipjack's proposed geotechnical survey activities would 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. Impact to the seafloor from this equipment will be limited to the minimal contact of the sampling equipment, and inserted boring and probes.

In considering whether marine mammal harassment is an expected outcome of exposure to a particular activity or sound source, NMFS considers the nature of the exposure itself (*e.g.,* the magnitude, frequency, or duration of exposure), characteristics of the marine mammals potentially exposed, and the conditions specific to the geographic area where the activity is expected to occur (*e.g.,* whether the activity is planned in a foraging area, breeding area, nursery or pupping area, or other biologically important area for the species). We then consider the expected response of the exposed animal and whether the nature and duration or intensity of that response is expected to cause disruption of behavioral patterns (*e.g.,* migration, breathing, nursing, breeding, feeding, or sheltering) or injury.

Geotechnical survey activities would be conducted from a drill ship equipped with DP thrusters. DP thrusters would be used to position the sampling vessel on station and maintain position at each sampling location during the sampling activity. 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.

Geophysical Survey Activities

Skipjack has proposed that HRG survey operations would be conducted continuously 24 hours per day. Based on 24-hour operations, the estimated duration of the geophysical survey activities would be approximately 200 days (including estimated weather down time). As many as three survey vessels may be used concurrently during Skipjack's proposed surveys. The geophysical survey activities proposed by Skipjack would include the following:

- Shallow Penetration Sub-bottom Profilers (SBP; Chirps) to map the near-surface stratigraphy (top 0 to 5 m (0 to 16 ft) of sediment below seabed). A chirp system emits sonar pulses that increase in frequency over time. The pulse length frequency range can be adjusted to meet project variables. Typically mounted on the hull of the vessel or from a side pole.
- Medium Penetration SBPs (Boomers) to map deeper subsurface stratigraphy as needed. A boomer is a broad-band sound source operating in the 3.5 Hz to 10 kHz frequency range. This system is typically mounted on a sled and towed behind the vessel.
- Medium Penetration SBPs (Sparkers) to map deeper subsurface stratigraphy as needed. Sparkers create acoustic pulses from 50 Hz to 4 kHz omni-directionally from the source that can penetrate several hundred meters into the seafloor. Typically towed behind the vessel with adjacent hydrophone arrays to receive the return signals.
- Parametric SBPs, also called sediment echosounders, for providing high data density in sub-bottom profiles that are typically required for cable routes, very shallow water, and archaeological surveys. Typically mounted on the hull of the vessel or from a side pole.
- Acoustic Cores to provide multi-aspect acoustic intensity imaging to delineate sub-seabed stratigraphy and buried geohazards. Although acoustic cores are used for geotechnical investigations, they operate acoustic sources (chirps and a parametric sonar) to achieve the data collection. They are stationary sourced mounted on the seafloor approximately 3.5 m (11.5 ft) above the seabed.
- Ultra-Short Baseline (USBL) Positioning and Global Acoustic Positioning System (GAPS) to provide high accuracy ranges by measuring the time between the acoustic pulses transmitted by the vessel transceiver and the equipment transponder necessary to produce the acoustic profile. It is a two-component system with a hull or pole mounted transceiver and one to several transponders either on the seabed or on the equipment.
- Multibeam Echosounders (MBES) to determine water depths and general bottom topography. Multibeam echosounder sonar systems project sonar pulses in several angled beams from a transducer mounted to a ship's hull. The beams radiate out from the transducer in a fan-shaped pattern orthogonally to the ship's direction.
- Side-scan Sonar (SSS) for seabed sediment classification purposes and to

identify natural and man-made acoustic targets on the seafloor. The sonar device emits conical or fan-shaped pulses down toward the seafloor in multiple beams at a wide angle, perpendicular to the path of the sensor through the water. The acoustic return of the pulses is recorded in a series of cross-track slices, which can be joined to form an image of the sea bottom within the swath of the beam. They are typically towed beside or behind the vessel or from an autonomous vehicle.

Table 1 identifies the representative survey equipment that may be used in support of planned geophysical survey activities. 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 SKIPJACK

Equipment	Source type	Operating frequency (kHz)	Sound level (SL_{rms} dB re 1 µPa m)	Sound level (SL_{pk} dB re 1 µPa m)	Pulse duration (width) (millisecond)	Repetition rate (Hz)	Beamwidth (degrees)
Shallow Sub-Bottom Profilers (Chirps)							
Teledyne Benthos Chirp III—TTV 170.	Non-impulsive, mobile, intermittent.	2 to 7	197	-	5 to 60	15	100.
EdgeTech SB 216 (2000DS or 3200 top unit).	Non-impulsive, mobile, intermittent.	2 to 16, 2 to 8	195	-	20	6	24.
EdgeTech 424	Non-impulsive, mobile, intermittent.	4 to 24	176	-	3.4	2	71.
EdgeTech 512	Non-impulsive, mobile, intermittent.	0.7 to 12	179	-	9	8	80.
GeoPulse 5430A	Non-impulsive, mobile, intermittent.	2 to 17	196		50	10	55.
Parametric Sub-Bottom Profilers							
Innomar SES-2000 Medium 100 SBP.	Non-impulsive, mobile, intermittent.	85 to 115	247	-	0.07 to 2	40–100	1–3.5.
Innomar SES-2000 Standard & Plus.	Non-impulsive, mobile, intermittent.	85 to 115	236	-	0.07 to 2	60	1–3.5.
Innomar SES-2000 Medium 70.	Non-impulsive, mobile, intermittent.	60 to 80	241	-	0.1 to 2.5	40	1–3.5.
Innomar SES-2000 Quattro.	Non-impulsive, mobile, intermittent.	85 to 115	245	-	0.07 to 1	60	1–3.5.
Medium Sub-Bottom Profilers (Sparkers & Boomers)							
GeoMarine Geo-Source 800J Sparker.	Impulsive, Mobile	0.05 to 5	203	213	3.4	0.41	Omni.
GeoMarine Geo-Source 600J Sparker.	Impulsive, Mobile	0.2 to 5	201	212	5.0	0.41	Omni.
GeoMarine Geo-Source 400J Sparker.	Impulsive, Mobile	0.2 to 5	195	208	7.2	0.41	Omni.
GeoResource 800J Sparker System.	Impulsive, Mobile	0.05 to 5	203	213	3.4	0.41	Omni.
Applied Acoustics Duraspark 400.	Impulsive, Mobile	0.3 to 1.2	203	211	1.1	0.4	Omni.
Applied Acoustics triple plate S-Boom (700–1000 Joules) [1].	Impulsive, Mobile	0.1 to 5	205	211	0.6	3	80.
Acoustic Corers							
PanGeo (LF Chirp).	Non-impulsive, stationary, intermittent.	2 to 6.5	177.5	-	4.5	0.06	73.

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

Equipment	Source type	Operating frequency (kHz)	Sound level (SL_{rms} dB re 1 μPa m)	Sound level (SL_{pk} dB re 1 μPa m)	Pulse duration (width) (millisecond)	Repetition rate (Hz)	Beamwidth (degrees)
PanGeo (HF Chirp).	Non-impulsive, stationary, intermittent.	4.5 to 12.5	177.5	-	4.5	0.06	73.
Pangeo Parametric Sonar [5].	Non-impulsive, stationary, intermittent.	90 to 115	239	-	0.25	40	3.5.
Positioning Systems							
Sonardyne Ranger 2—Transponder.	Non-impulsive, mobile, intermittent.	19 to 34	194	-	5	1	Omni.
Sonardyne Ranger 2 USBL HPT 3000/5/7000 Transceiver.	Non-impulsive, mobile, intermittent.	19 to 34	194	-	5	1	Not Reported.
Sonardyne Scout Pro Transponder.	Non-impulsive, mobile, intermittent.	35 to 50	188	-	5	3	Not Reported.
IxSea GAPS Beacon System.	Non-impulsive, mobile, intermittent.	8–16	188		12	1	Omni.
Easytrak Nexus 2 USBL Transceiver.	Non-impulsive, mobile, intermittent.	18 to 32	192		5	2	Omni.
Kongsberg HiPAP 501/502 USBL Tranceiver.	Non-impulsive, mobile, intermittent.	27–30.5	190		2	1	15.
EdgeTech BATS II Transponder.	Non-impulsive, mobile, intermittent.	17 to 30	Not Reported		5	3	Not Reported.
Multi-beam Echosounders and Side Scan Sonar							
Reson SeaBat 7125 Multibeam Echosounder.	Non-impulsive, mobile, intermittent.	200 or 400	220	-	0.03 to 0.3	-	-
RESON 700	Non-impulsive, mobile, intermittent.	200 or 400	162	-	0.33	-	-
R2SONIC	Non-impulsive, mobile, intermittent.	200 or 400	162	-	0.11	-	-
Klein 3900 SSS	Non-impulsive, mobile, intermittent.	>445 kHz	242	-	0.025	-	-
EdgeTech 4000 & 4125 SSS.	Non-impulsive, mobile, intermittent.	410 kHz	225	-	10	-	-
EdgeTech 4200 SSS.	Non-impulsive, mobile, intermittent.	>300 kHz	215	-	0.025	-	-

- = not applicable or reportable; dB re 1 μPa m = decibel reference to 1 micropascal meter; GAPS = Global Acoustic Positioning System; HF = high-frequency; LF = low-frequency; omni = omnidirectional source; SL = source level; SL_{pk} = peak source level (expressed as dB re 1 μPa m); SL_{rms} = root-mean-square source level (expressed as dB re 1 μPa m); SSS = side scan sonar; USBL = ultra-short baseline.

[4] Crocker and Fratantonio (2016) provide S-boom measurements using two different power sources (CSP–D700 and CSP–N). The CSP–D700 power source was used in the 700J measurements but not in the 1000J measurements. The CSP–N source was measured for both 700J and 1000J operations but resulted in a lower source levels; therefore the single maximum source level value was used for both operational levels of the S-boom.

[5] The Pangeo acoustic corer parametric sonar was scanned out of further analysis due to high frequency content, operational beam width of less than eight degrees, and stationary operational position of less than 3.5 m above the seabed (Pangeo, 2018).

The deployment of HRG survey equipment, including the equipment planned for use during Skipjack's planned activity, produces sound in the marine environment that has the potential to result in harassment of marine mammals. However, sound propagation 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 planned 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. HRG equipment that would be operated either at frequency ranges that fall outside the functional hearing ranges of marine mammals (*e.g.,* above 180 kHz) or that operate within marine mammal functional hearing ranges but have low sound source levels (*e.g.,* a single pulse at less than 200 dB re re 1 μPa) were assumed to not have the potential to result in marine mammal harassment and were therefore eliminated from further analysis.

Of the potential HRG survey equipment planned for use, NMFS determined the following equipment does not have the potential to result in harassment of marine mammals:

- Multibeam echosounders and side-scan sonars: All of the multibeam echosounders and side-scan sonars proposed for use by Skipjack have operating frequencies above 180 kHz. Because these sources operate at frequencies that are outside the functional hearing ranges of all marine mammals, NMFS considers the potential for this equipment to result in the take of marine mammals is to be so unlikely as to be discountable; and
- Unlike the other HRG sources which are mobile sources, acoustic corers are stationary and made up of three distinct sound sources comprised of high frequency parametric sonar, a high frequency chirp sonar, and a low frequency chirp sonar; with each source having its own transducer. The corer is seabed-mounted while the parametric sonar is operated roughly 3.5 m (11.5 ft) above the seabed with the transducer pointed directly downwards toward the seafloor. The beam width of the parametric sonar is very narrow (3.5°–8°), resulting in nominal horizontal propagation. Due to the fact that these sources are stationary, are operated very close to the seafloor, and have very narrow beam widths, NMFS considers the potential for this equipment to result in the take of marine mammals is to be so unlikely as to be discountable.

As the HRG survey equipment listed above was determined to not have the potential to result in the harassment of marine mammals, these equipment types are therefore not analyzed further in this document. All other HRG equipment types planned for use by Skipjack as shown in Table 1 are expected to have the potential to result in the harassment of marine mammals and are therefore carried forward in the analysis.

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 Activity

Sections 3 and 4 of the IHA 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' Stock Assessment Reports (SARs; *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' website (*www.fisheries.noaa.gov/find-species*). All species that could potentially occur in the proposed survey areas are included in Table 6 of the IHA application. However, the temporal and/or spatial occurrence of several species listed in Table 6 of the IHA application is such that take of these species is not expected to occur because they have very low densities in the project area and/or are expected to occur further offshore than the proposed survey area. These are: The blue whale (*Balaenoptera musculus*), Bryde's whale (*Balaenoptera edeni*), Cuvier's beaked whale (*Ziphius cavirostris*), four species of Mesoplodont beaked whale (*Mesoplodon* spp.), dwarf and pygmy sperm whale (*Kogia sima* and *Kogia breviceps*), northern bottlenose whale (*Hyperoodon ampullatus*), pygmy killer whale (*Feresa attenuata*), false killer whale (*Pseudorca crassidens*), melon-headed whale (*Peponocephala electra*), striped dolphin (*Stenella coeruleoalba*), white-beaked dolphin (*Lagenorhynchus albirostris*), pantropical spotted dolphin (*Stenella attenuata*), Fraser's dolphin (*Lagenodelphis hosei*), rough-toothed dolphin (*Steno bredanensis*), Clymene dolphin (*Stenella clymene*), spinner dolphin (*Stenella longirostris*), hooded seal (*Cystophora cristata*), and harp seal (*Pagophilus groenlandicus*). As take of these species is not anticipated as a result of the proposed activities, these species are not analyzed further in this document.

Table 2 summarizes information related to the population or stock, including regulatory status under the MMPA and ESA and potential biological removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2018). PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS' SARs). While no mortality is anticipated or authorized here, PBR is included here as a gross indicator 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' stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS' U.S. Atlantic SARs. All values presented in Table 2 are the most recent available at the time of publication and are available in the 2018 Atlantic SARs (Hayes *et al.,* 2019), available online at: *www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.*

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

Common name (scientific name)	Stock	MMPA and ESA status; strategic (Y/N) [1]	Stock abundance (CV, N_{min}, most recent abundance survey) [2]	Predicted abundance (CV) [3]	PBR [4]	Annual M/SI [4]	Expected occurrence in survey area
Toothed whales (Odontoceti)							
Sperm whale (*Physeter macrocephalus*).	North Atlantic	E; Y	2,288 (0.28; 1,815; n/a).	5,353 (0.12)	3.6	0.8	Rare.
Killer whale (*Orcinus orca*)	W. North Atlantic	-; N	Unknown (n/a; n/a; n/a).	11 (0.82)	Undet.	0	Rare.

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

Common name (scientific name)	Stock	MMPA and ESA status; strategic (Y/N) [1]	Stock abundance (CV, N_{min}, most recent abundance survey) [2]	Predicted abundance (CV) [3]	PBR [4]	Annual M/SI [4]	Expected occurrence in survey area
Long-finned pilot whale (*Globicephala melas*).	W. North Atlantic	-; N	5,636 (0.63; 3,464; n/a).	18,977 (0.11) [5].	35	27	Uncommon.
Short-finned pilot whale (*Globicephala macrorhynchus*).	W. North Atlantic	-; N	28,924 (0.24; 23,637; n/a).	18,977 (0.11) [5].	236	168	Rare.
Atlantic white-sided dolphin (*Lagenorhynchus acutus*).	W. North Atlantic	-; N	48,819 (0.61; 30,403; n/a).	37,180 (0.07)	304	30	Common.
Atlantic spotted dolphin (*Stenella frontalis*).	W. North Atlantic	-; N	44,715 (0.43; 31,610;	55,436 (0.32)	316	0	Common.
Bottlenose dolphin (*Tursiops truncatus*).	W. North Atlantic Coastal Migratory.	-; N	6,639 (0.41; 4,759; 2015).	97,476 (0.06) [5].	48	unknown	Common.
Common dolphin [6] (*Delphinus delphis*).	W. North Atlantic	-; N	173,486 (0.55; 55,690; 2011).	86,098 (0.12)	557	406	Common.
Risso's dolphin (*Grampus griseus*)	W. North Atlantic	-; N	18,250 (0.46; 12,619; 2011).	7,732 (0.09)	126	49.9	Rare.
Harbor porpoise (*Phocoena phocoena*).	Gulf of Maine/Bay of Fundy.	-; N	79,833 (0.32; 61,415; 2011).	45,089 (0.12) *.	706	255	Common.
Baleen whales (Mysticeti)							
North Atlantic right whale (*Eubalaena glacialis*).	W. North Atlantic	E; Y	451 (0; 455; n/a)	411 (n/a) [7]	0.9	56	Year round in continental shelf and slope waters, occur seasonally.
Humpback whale [8] (*Megaptera novaeangliae*).	Gulf of Maine	-; N	896 (0.42; 239; n/a)	1,637 (0.07) *	14.6	9.8	Common year round.
Fin whale [6] (*Balaenoptera physalus*)	W. North Atlantic	E; Y	3,522 (0.27; 1,234; n/a).	4,633 (0.08)	2.5	2.5	Year round in continental shelf and slope waters, occur seasonally.
Sei whale (*Balaenoptera borealis*)	Nova Scotia	E; Y	357 (0.52; 236; n/a)	717 (0.30) *	0.5	0.6	Year round in continental shelf and slope waters, occur seasonally.
Minke whale [6] (*Balaenoptera acutorostrata*).	Canadian East Coast	-; N	20,741 (0.3; 1,425; n/a).	2,112 (0.05) *	14	7.5	Year round in continental shelf and slope waters, occur seasonally.
Earless seals (Phocidae)							
Gray seal [8] (*Halichoerus grypus*)	W. North Atlantic	-; N	27,131 (0.10; 25,908; n/a).	505,000 (n/a)	1,389	5,688	Uncommon.
Harbor seal (*Phoca vitulina*)	W. North Atlantic	-; N	75,834 (0.15; 66,884; 2012).	75,834 (0.15)	2,006	345	Uncommon.

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

[2] Stock abundance as reported in NMFS marine mammal stock assessment reports (SAR) except where otherwise noted. SARs available online at: *www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments.* CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance. In some cases, CV is not applicable. For certain stocks, abundance estimates are actual counts of animals and there is no associated CV. The most recent abundance survey that is reflected in the abundance estimate is presented; there may be more recent surveys that have not yet been incorporated into the estimate. All values presented here are from the 2018 draft Atlantic SARs.

[3] This information represents species- or guild-specific abundance predicted by recent habitat-based cetacean density models (Roberts *et al.,* 2016, 2017, 2018) (with the exception of North Atlantic right whales and pinnipeds—see footnotes 7 and 9 below). 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] Potential biological removal, defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population size (OSP). Annual M/SI, found in NMFS' SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.,* commercial fisheries, subsistence hunting, ship strike). Annual M/SI values often cannot be determined precisely and is in some cases presented as a minimum value. All M/SI values are as presented in the draft 2018 SARs.

[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. produced density models for bottlenose dolphins that do not differentiate between offshore and coastal stocks, and produced density models for all seals.

[6] Abundance as reported in the 2007 Canadian Trans-North Atlantic Sighting Survey (TNASS), which provided full coverage of the Atlantic Canadian coast (Lawson and Gosselin, 2009). Abundance estimates from TNASS were corrected for perception and availability bias, when possible. In general, where the TNASS survey effort provided superior coverage of a stock's range (as compared with NOAA shipboard survey effort), the resulting abundance estimate is considered more accurate than the current NMFS abundance estimate (derived from survey effort with inferior coverage of the stock range). NMFS SAR reports the stock abundance estimate for the common dolphin as 70,184; NMFS SAR reports the stock abundance estimate for the fin whale as 1,618; NMFS SAR reports the stock abundance estimate for the minke whale as 2,591.

[7] For the North Atlantic right whale the best available abundance estimate is derived from the 2018 North Atlantic Right Whale Consortium 2018 Annual Report Card (Pettis *et al.,* 2018).

[8] 2018 U.S. Atlantic draft SAR for the Gulf of Maine feeding population lists a current abundance estimate of 896 individuals. However, we note that the estimate is defined on the basis of feeding location alone (*i.e.,* Gulf of Maine) and is therefore likely an underestimate.

[9] The NMFS stock abundance estimate applies to U.S. population only, however the actual stock abundance is approximately 505,000.

Four marine mammal species that are listed under the Endangered Species Act (ESA) may be present in the survey area and are included in the take request: The North Atlantic right whale, fin whale, sei whale, and sperm whale.

Below is a description of the species that are both common in the survey area offshore of Delaware and Maryland that have the highest likelihood of occurring, at least seasonally, in the survey area and are thus are expected to potentially be taken by the proposed activities. For the majority of species potentially present in the specific geographic region, NMFS has designated only a single generic stock (*e.g.,* ''western North Atlantic'') for management purposes. This includes the ''Canadian east coast'' stock of minke whales, which includes all minke whales found in U.S. waters. For humpback and sei whales, NMFS defines stocks on the basis of feeding locations, *i.e.,* Gulf of Maine and Nova Scotia, respectively. However, our reference to humpback whales and sei whales in this document refers to any individuals of the species that are found in the specific geographic region.

North Atlantic Right Whale

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.,* 2018). Surveys have demonstrated the existence of seven areas where North Atlantic right whales congregate seasonally, including north and east of the proposed project area in Georges Bank, off Cape Cod, and in Massachusetts Bay (Hayes *et al.,* 2018). 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. 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 project 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 project area are expected to be transient, most likely migrating through the area.

The western North Atlantic population demonstrated overall growth of 2.8 percent per year between 1990 to 2010, despite a decline in 1993 and no growth between 1997 and 2000 (Pace *et al.* 2017). However, since 2010 the population has been in decline, with a 99.99 percent probability of a decline of just under 1 percent per year (Pace *et al.* 2017). Between 1990 and 2015, calving rates varied substantially, with low calving rates coinciding with all three periods of decline or no growth (Pace *et al.* 2017). On average, North Atlantic right whale calving rates are estimated to be roughly half that of southern right whales (*Eubalaena australis*) (Pace *et al.* 2017), which are increasing in abundance (NMFS 2015). In 2018, no new North Atlantic right whale calves were documented in their calving grounds; this represented the first time since annual NOAA aerial surveys began in 1989 that no new right whale calves were observed. Seven right whale calves were documented in 2019. The current best estimate of population abundance for the species is 411 individuals (Pettis *et al.,* 2018).

Elevated North Atlantic right whale mortalities have occurred since June 7, 2017 along the U.S. and Canadian coast. A total of 29 confirmed dead stranded whales (20 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: *www.fisheries.noaa.gov/national/marine-life-distress/2017-2019-north-atlantic-right-whale-unusual-mortality-event.*

The proposed survey area is part of an important migratory area 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. A portion of one SMA, which occurs off the mouth of Delaware Bay, overlaps spatially with a section of the proposed survey area. The SMA which occurs off the mouth of Delaware Bay is active from November 1 through April 30 of each year.

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 project area.

A key question with regard to humpback whales off the mid-Atlantic states is their stock identity. Using fluke photographs of living and dead whales observed in the region, Barco *et al.* (2002) reported that 43 percent of 21 live whales matched to the Gulf of Maine, 19 percent to Newfoundland, and 4.8 percent to the Gulf of St. Lawrence, while 31.6 percent of 19 dead humpbacks were known Gulf of Maine whales. Although the population composition of the mid-Atlantic is apparently dominated by Gulf of Maine whales, lack of photographic effort in Newfoundland makes it likely that the observed match rates under-represent the true presence of Canadian whales in the region (Waring *et al.,* 2016). 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. Partial or full necropsy examinations have been conducted on approximately half of the 103 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/2016-2019-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 north of 35-degree latitude in every season and are broadly distributed throughout the western North Atlantic for most of the year, though densities vary seasonally (Waring *et al.,* 2016). Fin whales are found in small groups of up to five individuals (Brueggeman *et al.,* 1987). The main threats to fin whales are fishery interactions and vessel collisions (Waring *et al.,* 2016).

Sei Whale

The Nova Scotia stock of sei whales can be found in deeper waters of the continental shelf edge waters of the northeastern 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). Sei whales occur in shallower waters to feed. Sei whales are listed as engendered under the ESA, and the Nova Scotia stock is considered strategic and depleted under the MMPA. The main threats to this stock are interactions with fisheries and vessel collisions.

Minke Whale

Minke whales can be found in temperate, tropical, and high-latitude waters. The Canadian East Coast stock can be found in the area from the western half of the Davis Strait (45° W) to the Gulf of Mexico (Waring *et al.,* 2016). This species generally occupies waters less than 100 m deep on the continental shelf. 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 66 strandings recorded through August 30, 2019. 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/2017-2019-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.,* 2014). The basic social unit of the sperm whale appears to be the mixed school of adult females plus their calves and some juveniles of both sexes, normally numbering 20–40 animals in all. There is evidence that some social bonds persist for many years (Christal *et al.,* 1998). This species forms stable social groups, site fidelity, and latitudinal range limitations in groups of females and juveniles (Whitehead, 2002). In 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).

Long-Finned Pilot Whale

Long-finned pilot whales are found from North Carolina and north to Iceland, Greenland and the Barents Sea (Waring *et al.,* 2016). In U.S. Atlantic waters the species is distributed principally along the continental shelf edge off the northeastern U.S. coast in winter and early spring and in late spring, pilot whales move onto Georges Bank and into the Gulf of Maine and more northern waters and remain in these areas through late autumn (Waring *et al.,* 2016). Long-finned and short-finned pilot whales overlap spatially along the mid-Atlantic shelf break between New Jersey and the southern flank of Georges Bank (Payne and Heinemann 1993; Rone and Pace 2012). Long-finned pilot whales have occasionally been observed stranded as far south as South Carolina, but sightings of long-finned pilot whales south of Cape Hatteras would be considered unusual (Hayes *et al.,* 2019). The main threats to this species include interactions with fisheries and habitat issues including exposure to high levels of polychlorinated biphenyls and chlorinated pesticides, and toxic metals including mercury, lead, cadmium, and selenium (Waring *et al.,* 2016).

Short-Finned Pilot Whale

As described above, long-finned and short-finned pilot whales overlap spatially along the mid-Atlantic shelf break between New Jersey and the southern flank of Georges Bank (Payne and Heinemann 1993; Rone and Pace 2012). Short-finned pilot whales have occasionally been observed stranded as far north as Massachusetts but north of ~42° N short-finned pilot whale sightings would be considered unusual while south of Cape Hatteras most pilot whales would be expected to be short-finned pilot whales (Hayes *et al.,* 2019). In addition, short-finned pilot whales are documented along the continental shelf and continental slope in the northern Gulf of Mexico (Hansen *et al.* 1996; Mullin and Hoggard 2000; Mullin and Fulling 2003), and they are also known from the wider Caribbean. As with long-finned pilot whales, the main threats to this species include interactions with fisheries and habitat issues including exposure to high levels of polychlorinated biphenyls and chlorinated pesticides, and toxic metals including mercury, lead, cadmium, and selenium (Waring *et al.,* 2016).

Killer Whale

Killer whale distribution in the Atlantic extends from the Arctic ice edge to the West Indies. They are normally found in small groups, although 40 animals were reported from the southern Gulf of Maine in September 1979, and 29 animals in Massachusetts Bay in August 1986 (Katona *et al.,* 1988). In the U.S. Atlantic EEZ, while their occurrence is unpredictable, they do occur in fishing areas, perhaps coincident with tuna, in warm seasons (Katona *et al.,* 1988; NMFS unpublished data). Killer whales are characterized as uncommon or rare in waters of the U.S. Atlantic EEZ (Katona *et al.* 1988). Sightings within the survey area would be considered very rare; however, due to their wide-ranging habits and a uniform habitat density within the entire U.S. Atlantic coast, there is the potential for killer whales to be present during the proposed surveys.

Atlantic White-Sided Dolphin

White-sided dolphins are found in temperate and sub-polar waters of the North Atlantic, primarily in continental shelf waters to the 100-m depth contour from central West Greenland to North Carolina (Waring *et al.,* 2016). 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. The Virginia and North Carolina observations appear to represent the southern extent of the species range. From June through September, large numbers of white-sided dolphins are found from Georges Bank to the lower Bay of Fundy. From October to December, white-sided dolphins occur at intermediate densities from southern Georges Bank to southern Gulf of Maine (Payne and Heinemann 1990). Sightings south of Georges Bank, particularly around Hudson Canyon, occur year round but at low densities.

Atlantic Spotted Dolphin

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

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 100-m and 2,000-m isobaths and over prominent underwater topography and east to the mid-Atlantic Ridge (Waring *et al.,* 2016). Common dolphins are distributed in waters off the eastern U.S. coast from Cape Hatteras northeast to Georges Bank (35° to 42° N) during mid-January to May and move as far north as the Scotian Shelf from mid-summer to autumn (CETAP, 1982; Hayes *et al.,* 2019; Hamazaki, 2002; Selzer and Payne, 1988).

Bottlenose Dolphin

There are two distinct bottlenose dolphin morphotypes in the western North Atlantic: The coastal and offshore forms (Waring *et al.,* 2016). The offshore form is distributed primarily along the outer continental shelf and continental slope in the Northwest Atlantic Ocean from Georges Bank to the Florida Keys. The coastal morphotype is morphologically and genetically distinct from the larger, more robust morphotype that occupies habitats further offshore. Spatial distribution data, tag-telemetry studies, photo-ID studies and genetic studies demonstrate the existence of a distinct Northern Migratory coastal stock of coastal bottlenose dolphins (Waring *et al.,* 2014). During summer months (July–August), this stock occupies coastal waters from the shoreline to approximately the 25-m isobath between the mouth of the Chesapeake Bay and Long Island, New York; during winter months (January–March), the stock occupies coastal waters from Cape Lookout, North Carolina, to the North Carolina/Virginia border (Waring *et al.,* 2014). As the offshore stock is primarily found in waters greater than 40 m, while the migratory stock is primarily found in waters less than 25 m, we expect that any bottlenose dolphins encountered by the proposed survey would be from the Western North Atlantic northern migratory coastal stock, as the mean water depth of the wind farm lease area is 28 m and maximum water depth in the cable route corridor survey areas is 28 m.

Harbor Porpoise

In the Lease Area, only the Gulf of Maine/Bay of Fundy stock may be present. This stock is found in U.S. and Canadian Atlantic waters and is concentrated in the northern Gulf of Maine and southern Bay of Fundy region, generally in waters less than 150 m deep (Waring *et al.,* 2016). They are seen from the coastline to deep waters (>1800 m; Westgate *et al.* 1998), although the majority of the population is found over the continental shelf (Waring *et al.,* 2016). The main threat to the species is interactions with fisheries, with documented take in the U.S. northeast sink gillnet, mid-Atlantic gillnet, and northeast bottom trawl fisheries and in the Canadian herring weir fisheries (Waring *et al.,* 2016).

Harbor Seal

The harbor seal is found in all nearshore waters of the North Atlantic and North Pacific Oceans and adjoining seas above about 30° N (Burns, 2009). In the western North Atlantic, harbor seals are distributed from the eastern Canadian Arctic and Greenland south to southern New England and New York, and occasionally to the Carolinas (Hayes *et al.,* 2018). The harbor seals within the Project Area are part of the single Western North Atlantic stock. 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. A total of 1,593 reported strandings (of all species) had occurred as of the writing of this document. 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/2018-2019-pinniped-unusual-mortality-event-along.*

Gray Seal

There are three major populations of gray seals found in the world; eastern Canada (western North Atlantic stock), northwestern Europe and the Baltic Sea. Gray seals in the survey area belong to the western North Atlantic stock. The range for this stock is thought to be from New Jersey to Labrador. Though gray seals are not regularly sighted offshore of Delaware their range has been expanding southward in recent years, and they have been observed recently as far south as the barrier islands of Virginia. Current population trends show that gray seal abundance is likely increasing in the U.S. Atlantic EEZ (Waring *et al.,* 2016). Although the rate of increase is unknown, surveys conducted since their arrival in the 1980s indicate a steady increase in abundance in both Maine and Massachusetts (Waring *et al.,* 2016). It is believed that recolonization by Canadian gray seals is the source of the U.S. population (Waring *et al.,* 2016). As described above, elevated seal mortalities, including gray seals, have occurred from Maine to Virginia since July 2018. This event has been declared a UME, with phocine distemper virus identified as the main pathogen found in the seals. 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/2018-2019-pinniped-unusual-mortality-event-along.*

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, 2019) 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.
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. Seventeen marine mammal species (15 cetacean and 2 pinniped (both phocid species)) have the reasonable potential to co-occur with the proposed 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), nine are classified as mid-frequency cetaceans (*i.e.,* sperm whale and all delphinid species), 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* 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); Urick (1983).

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 (Urick, 1983). 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—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). 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—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 planned 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, l*et al*one 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 Skipjack'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 and geotechnical activities would create conditions of long-term, continuous noise and chronic acoustic exposure leading to long-term physiological stress responses in marine mammals.

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 planned 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 knots (kn)). Given the slow vessel speeds and predictable course necessary for data acquisition, ship strike is unlikely to occur during the geophysical and geotechnical surveys. Marine mammals would be able to easily avoid the survey vessel due to the slow vessel speed. Further, Skipjack 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 known foraging hotspots, or other ocean bottom structures of significant biological importance to marine mammals present in the project area. Therefore, the main impact issue associated with the proposed activity would be temporarily elevated sound levels and the associated direct effects on marine mammals, as discussed 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

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

Level B Harassment—Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.,* frequency, predictability, duty cycle), the environment (*e.g.,* bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.,* 2007, Ellison *et al.,* 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 160 dB re 1 μPa (rms) for impulsive and/or intermittent sources (*e.g.,* impact pile driving) and 120 dB rms for continuous sources (*e.g.,* vibratory driving). Skipjack's proposed activity includes the use of impulsive sources (geophysical survey equipment) therefore use of the 120 and 160 dB re 1 μPa (rms) threshold is applicable.

Level A harassment—NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Technical Guidance, 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 Skipjack's proposed activity that may result in the take of marine mammals include the use of impulsive sources.

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: *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.

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

Ensonified Area

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

The proposed survey would entail the use of HRG equipment. The distance to the isopleth corresponding to the threshold for Level B harassment was calculated for all HRG equipment with the potential to result in harassment of marine mammals. NMFS has developed an interim methodology for determining the rms sound pressure level (SPL_{rms}) at the 160-dB isopleth for the purposes of estimating take by Level B harassment resulting from exposure to HRG survey equipment. This methodology incorporates frequency and some directionality to refine estimated ensonified zones and is described below:

If only peak source sound pressure level (SPL_{pk}) is given, the SPL_{rms} can be roughly approximated by

$$(1)\ SPL_{rms} = SPL_{pk} + 10\log_{10}\tau$$

where τ is the pulse duration in second. If the pulse duration varies, the longest duration should be used, unless there is certainty regarding the portion of time a shorter duration will be used, in which case the result can be calculated/parsed appropriately.

In order to account for the greater absorption of higher frequency sources, we recommend applying 20 log(r) with an absorption term α·r/1000 to calculate transmission loss (*TL*), as described in Eq.s (2) and (3) below.

$$(2)\ TL = 20\log_{10}(r) + \alpha \cdot r/1000\ (\text{dB})$$

where *r* is the distance in meters, and α is absorption coefficient in dB/km.

While the calculation of absorption coefficient varies with frequency, temperature, salinity, and pH, the largest factor driving the absorption coefficient is frequency. A simple formula to approximate the absorption coefficient (neglecting temperature, salinity, and pH) is provided by Richardson *et al.* (1995):

$$(3)\ \alpha \approx 0.036 f^{1.5}\ (\text{dB/km})$$

where *f* is frequency in kHz. When a range of frequencies, is being used, the lower bound of the range should be used for this calculation, unless there is certainty regarding the portion of time a higher frequency will be used, in which case the result can be calculated/parsed appropriately.

Further, if the beamwidth is less than 180° and the angle of beam axis in respect to sea surface is known, the horizontal impact distance *R* should be calculated using

$$(4)\ R = r\cos\left(\varphi - \frac{\theta}{2}\right)\ (\text{m})$$

where *SL* is the SPL_{rms} at the source (1 m), θ is the beamwidth (in radian), and φ is the angle of beam axis in respect to sea surface (in radian) (Figure 1(a)).

Finally, if the beam is pointed at a normal downward direction, Eq. (4) can be simplified as

$$(5)\ R = r\cos\left(\frac{\pi}{2} - \frac{\theta}{2}\right) = r\sin\frac{\theta}{2}\ (\text{m})$$

The interim methodology described above was used to estimate isopleth distances to the Level B harassment threshold for the proposed HRG survey. 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 and the sound levels associated with those HRG equipment types. Table 4 in the IHA application shows the literature sources for the sound source levels that are shown in Table 1 and that were incorporated into the modeling of Level B isopleth distances to the Level B harassment threshold.

Results of modeling using the methodology described above indicated that, of the HRG survey equipment planned for use by Skipjack that has the potential to result in harassment of marine mammals, sound produced by the AA Dura-Spark 400 sparker and the GeoSource 800 J sparker would propagate furthest to the Level B harassment threshold (Table 5); therefore, for the purposes of the exposure analysis, it was assumed the AA Dura-Spark or the GeoSource 800 J would be active during the entirety of the survey. Thus the distance to the isopleth corresponding to the threshold for Level B harassment for the AA Dura-Spark 400 and the GeoSource 800 J (estimated at 141 m; Table 5) was used as the basis of the take calculation for all marine mammals. Note that this is conservative as Skipjack has stated that for approximately 120 of the 200 total survey days, neither the AA Dura-Spark nor the GeoSource 800 J would be operated, and the source with the greatest potential isopleth distance to the Level B harassment threshold that would be operated during those 120 days would likely be a USBL, which has a smaller associated isopleth distance to the Level B harassment threshold (Table 5).

TABLE 5—MODELED RADIAL DISTANCES FROM HRG SURVEY EQUIPMENT TO ISOPLETHS CORRESPONDING TO LEVEL A HARASSMENT AND LEVEL B HARASSMENT THRESHOLDS

Sound source	Radial distance to Level A harassment threshold (m) *				Radial distance to Level B harassment threshold (m)
	Low frequency cetaceans (peak SPL/ SEL_{cum})	Mid frequency cetaceans (peak SPL/ SEL_{cum})	High frequency cetaceans (peak SPL/ SEL_{cum})	Phocid pinnipeds (underwater) (peak SPL/ SEL_{cum})	All marine mammals
Shallow Sub-Bottom Profilers					
TB Chirp III	-/<1	0	-/<1	-/<1	48
ET 216 Chirp	-/<1	-/0	-/<1	-/0	9

TABLE 5—MODELED RADIAL DISTANCES FROM HRG SURVEY EQUIPMENT TO ISOPLETHS CORRESPONDING TO LEVEL A HARASSMENT AND LEVEL B HARASSMENT THRESHOLDS—Continued

Sound source	Radial distance to Level A harassment threshold (m) *				Radial distance to Level B harassment threshold (m)
	Low frequency cetaceans (peak SPL/ SEL_{cum})	Mid frequency cetaceans (peak SPL/ SEL_{cum})	High frequency cetaceans (peak SPL/ SEL_{cum})	Phocid pinnipeds (underwater) (peak SPL/ SEL_{cum})	All marine mammals
ET 424 Chirp	-/0	-/0	-/0	-/0	4
ET 512i Chirp	-/0	-/0	-/0	-/0	6
GeoPulse 5430	-/<1	-/0	-/<1	-/0	21
Parametric Sub-Bottom Profilers					
Innomar Parametric SBPs	-/<1	-/<1	-/1.2	-/<1	1
Medium Sub-Bottom Profilers					
AA Triple plate S-Boom (700/1000J)	-/<1	-/0	2.8/0	-/0	34
AA Dura-Spark 400	-/<1	-/0	2.8/0	-/0	141
GeoSource 400 J Sparker	-/<1	-/0	2.0/0	-/0	56
GeoSource 600 J Sparker	-/<1	-/0	3.2/<1	-/<1	112
GeoSource 800 J Sparker	-/<1	-/0	3.5/<1	-/<1	141
Acoustic Corers					
Pangeo Acoustic Corer (LF Chirp)	-/<1	-/0	-/<1	-/0	4
Pangeo Acoustic Corer (HF Chirp)	-/<1	-/0	-/<1	-/0	4
Acoustic Positioning					
USBL and GAPS (all models)	-/0	-/0	-/<1	-/0	50

* Distances to Level A harassment isopleths were calculated to determine the potential for Level A harassment to occur. Skipjack has not requested, and NMFS does not propose to authorize, the take by Level A harassment of any marine mammals.

- = not applicable; AA = Applied Acoustics; CF = Crocker and Fratantonio (2016); ET = EdgeTech; GAPS = Global Acoustic Positioning System; HF = high-frequency; J = joules; LF= low-frequency; m = meter; MF = mid-frequency; PW = Phocids in water; SBP = Sub-bottom profilers; SEL_{cum} = cumulative sound exposure level; SL = source level; SPL_{pk} = zero to peak sound pressure level in decibel referenced to 1 micropascal (dB re 1 μPa); TB = teledyne benthos; USBL = ultra-short baseline.

Predicted distances to Level A harassment isopleths, which vary based on marine mammal functional hearing groups (Table 3), were also calculated. The updated acoustic thresholds for impulsive sounds (such as HRG survey equipment) contained in the Technical Guidance (NMFS, 2018) were presented as dual metric acoustic thresholds using both cumulative sound exposure level (SEL_{cum}) and peak sound pressure level metrics. As dual metrics, NMFS considers onset of PTS (Level A harassment) to have occurred when either one of the two metrics is exceeded (*i.e.,* the metric resulting in the largest isopleth). The SEL_{cum} metric considers both level and duration of exposure, as well as auditory weighting functions by marine mammal hearing group.

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 HRG surveys), the User Spreadsheet predicts the closest distance at which a stationary animal would incur PTS if the sound source traveled by the animal in a straight line at a constant speed.

Skipjack used the NMFS optional User Spreadsheet to calculate distances to Level A harassment isopleths based on SEL and used the spherical spreading loss model to calculate distances to Level A harassment isopleths based on peak SPL. Modeling of distances to isopleths corresponding to Level A harassment was performed for all types of HRG equipment proposed for use with the potential to result in harassment of marine mammals. Isopleth distances to Level A harassment thresholds for all types of HRG equipment and all marine mammal functional hearing groups are shown in Table 5. To be conservative, the largest isopleth distances for each functional hearing group were used to model potential exposures above the Level A harassment threshold for all species within that functional hearing group. Inputs to the NMFS optional User Spreadsheet for the GeoSource 800 J Sparker, which resulted in the greatest potential isopleth distance to the Level A harassment threshold for any of the functional hearing groups, are shown in Table 6.

TABLE 6—INPUTS TO THE NMFS OPTIONAL USER SPREADSHEET FOR THE GEOSOURCE 800 J SPARKER

Source Level (RMS SPL)	203 dB re 1µPa.
Source Level (peak)	213 dB re 1µPa.
Weighting Factor Adjustment (kHz).	0.05.
Source Velocity (meters/second)	2.06.
Pulse Duration (seconds)	0.0034.
1/Repetition rate (seconds)	2.43.
Duty Cycle	0.00.

Due to the small estimated distances to Level A harassment thresholds for all marine mammal functional hearing groups, based on both SEL_{cum} and peak SPL (Table 5), and in consideration of the proposed mitigation measures (see the *Proposed Mitigation* section for more detail), NMFS has determined that the likelihood of take of marine mammals in the form of Level A harassment occurring as a result of the proposed survey is so low as to be discountable, and we therefore do not propose to authorize the take by Level A harassment of any marine mammals.

Marine Mammal Occurrence

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations.

The 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. Although these updated models (and a newly developed seal density model) are not currently publicly available, our evaluation of the changes leads to a conclusion that these represent the best scientific evidence available. More information, including the model results and supplementary information for each model, is available online at *seamap.env.duke.edu/models/Duke-EC-GOM-2015/.* Marine mammal density estimates in the project area (animals/km²) were obtained using these model results (Roberts *et al.,* 2016, 2017, 2018). The updated models incorporate additional sighting data, including sightings from the NOAA Atlantic Marine Assessment Program for Protected Species (AMAPPS) surveys from 2010–2014 (NEFSC & SEFSC, 2011, 2012, 2014a, 2014b, 2015, 2016).

For purposes of the exposure analysis, density data from Roberts *et al.* (2016, 2017, 2018) were mapped using a geographic information system (GIS). The density coverages that included any portion of the proposed project area were selected for all survey months (see Figure 4 in the IHA application for an example of density blocks used to determine monthly marine mammal densities within the project area). Monthly density data for each species were then averaged over the year to come up with a mean annual density value for each species. Estimated monthly and average annual density (animals per km²) of all marine mammal species that may be taken by the proposed survey are shown in Table 8 of the IHA application. The mean annual density values used to estimate take numbers are also shown in Table 7 below.

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. Skipjack estimates that proposed surveys will achieve a maximum daily track line distance of 110 km per day during proposed HRG surveys. This distance accounts for the vessel traveling at roughly 4 knots and accounts for non-active survey periods. Based on the maximum estimated distance to the Level B harassment threshold of 141 m (Table 5) and the maximum estimated daily track line distance of 110 km, an area of 31.1 km² would be ensonified to the Level B harassment threshold per day during Skipjack's proposed HRG surveys. As described above, this is a conservative estimate as it assumes the HRG sources that result in the greatest isopleth distances to the Level B harassment threshold would be operated at all times during the 200 day survey.

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), incorporating the estimated marine mammal densities as described above. Estimated numbers of each species taken per day are then multiplied by the total number of survey days (*i.e.,* 200). The product is then rounded, to generate an estimate of the total number of instances of harassment expected for each species over the duration of the survey. A summary of this method is illustrated in the following formula:

Estimated Take = D × ZOI × # of days

Where:

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

Using this method to calculate take, Skipjack estimated a total of 2 takes by Level A harassment of 1 species (harbor porpoise) would occur, in the absence of mitigation (see Table 9 in the IHA application for the estimated number of Level A takes for all potential HRG equipment types). However, as described above, due to the very small estimated distances to Level A harassment thresholds (Table 5), and in consideration of the proposed mitigation measures, 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, we do not propose to authorize take of any marine mammals by Level A harassment. Proposed take numbers are shown in Table 7.

TABLE 7—TOTAL NUMBERS OF POTENTIAL INCIDENTAL TAKE OF MARINE MAMMALS PROPOSED FOR AUTHORIZATION AND PROPOSED TAKES AS A PERCENTAGE OF POPULATION

Species	Density (animals/ 100 km2)	Proposed takes by Level A harassment	Estimated takes by Level B harassment	Proposed takes by Level B harassment	Total takes proposed for authorization	Total proposed takes as a percentage of population [1]
Fin whale	0.00124	0	8	8	8	0.2
Sei whale [2]	0.00001	0	0	1	1	0.1
Minke whale	0.00034	0	2	2	2	0.1
Humpback whale	0.00053	0	3	3	3	0.2
North Atlantic right whale	0.00043	0	3	3	3	0.7
Sperm Whale [2]	0.00004	0	0	3	3	0.1
Atlantic white-sided dolphin [2]	0.00229	0	14	40	40	0.1
Atlantic spotted dolphin [2]	0.00124	0	8	100	100	0.2
Bottlenose dolphin (W. N. Atlantic Coastal Migratory)	0.2355	0	1,465	1,465	1,465	22.1
Killer whale [2]	0.00001	0	0	3	3	27.3
Short-finned pilot whale [2]	0.00031	0	2	20	20	0.1
Long-finned pilot whale [2]	0.00031	0	2	20	20	0.1
Risso's dolphin [2]	0	0	0	30	30	0.4
Common dolphin	0.01328	0	83	83	83	0.1
Harbor porpoise	0.01277	0	79	79	79	0.2
Gray seal	0.00072	0	4	4	4	0.0
Harbor seal	0.00072	0	4	4	4	0.0

[1] 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 2018 North Atlantic Right Whale Consortium 2018 Annual Report Card (Pettis *et al.,* 2018).

[2] The proposed number of authorized takes (Level B harassment only) for these species has been increased from the estimated take number to mean group size. Source for group size estimates are as follows: Sei whale: Kenney and Vigness-Raposa (2010); sperm whale: Barkaszi and Kelly (2019); killer whale: De Bruyn *et al.* (2013); Risso's dolphin: Kenney and Vigness-Raposa (2010); long-finned and short-finned pilot whale: Olson (2018); Atlantic spotted dolphin: Herzing and Perrin (2018); Atlantic white-sided dolphin: Cipriano (2018).

Skipjack requested take authorization for three marine mammal species for which no takes were calculated based on the modeling approach described above: Killer whale, sei whale and Risso's dolphin. Though the modeling resulted in estimates of less than 1 take for these species, Skipjack determined that take of these species is possible due to low densities in some density blocks and general variability in the movements of these species. NMFS believes this is reasonable and we therefore propose to authorize take of these species.

As described above, Roberts *et al.* (2016, 2017, 2018) produced density models to genus level for *Globicephala* spp. and did not differentiate between long-finned and shortfinned pilot whales. Similarly, 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 two pilot whale takes and four seal takes. Based on this estimate, Skipjack requested two takes each of short-finned and long-finned pilot whales, and four takes each of harbor and gray seals, based on an assumption that the modeled takes could occur to either of the respective species. We think this is a reasonable approach and therefore propose to authorize the take of four harbor seals, four gray seals, two short-finned pilot whales and two long-finned pilot whales.

Using the take methodology approach described above, the take estimates for the sei whale, sperm whale, killer whale, Risso's dolphin, Atlantic white-sided dolphin, spotted dolphin, long-finned and short-finned pilot whale were less than the average group sizes estimated for these species (Table 7). However, information on the social structures of these species indicates these species are likely to be encountered in groups. Therefore it is reasonable to conservatively assume that one group of each of these species will be taken during the proposed survey. We therefore propose to authorize the take of the average group size for these species to account for the possibility that the proposed survey encounters a group of any of these species or stocks (Table 7).

Proposed Mitigation

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

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

(1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned), the likelihood of effective implementation

(probability implemented as planned), and;

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

Proposed Mitigation Measures

NMFS proposes the following mitigation measures be implemented during Skipjack's proposed marine site characterization surveys.

Marine Mammal Exclusion Zones, Buffer Zone and Monitoring Zone

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:

- A 500-m EZ would be required for North Atlantic right whales;
- A 200 m EZ would be required for all other ESA-listed marine mammals (*i.e.,* fin, sei and sperm whales); and
- A 100-m EZ would be required for all other marine mammals.

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 Buffer 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. In addition, any marine mammals observed within 141 m of the HRG equipment would be documented by PSOs as taken by Level B harassment. 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

A minimum of one NMFS-approved PSO must be on duty and conducting visual observations at all times during daylight hours (*i.e.,* from 30 minutes prior to sunrise through 30 minutes following sunset) and 30 minutes prior to and during nighttime ramp-ups of HRG equipment. 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 ceases or until 30 minutes past sunset. 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 marine mammals located in proximity to the vessel and/or relevant using range finders. It would be the responsibility of the Lead PSO on duty to communicate the presence of marine mammals as well as to communicate and enforce the action(s) that are necessary to ensure mitigation and monitoring requirements are implemented as appropriate. 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, Skipjack 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 planned 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 that approach the vessel (*e.g.,* bow ride). 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. HEG 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, and Tursiops)* under certain circumstances. If a delphinid(s) from these genera is visually detected approaching the vessel (*i.e.,* to bow ride) or towed survey equipment, 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 (141 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:

- All vessel operators and crew will maintain vigilant watch for cetaceans and pinnipeds, and slow down or stop their vessel to avoid striking these protected species;
- All vessel operators will comply with 10 knot (18.5 km/hr) or less speed restrictions in any SMA and DMA per NOAA guidance;
- All vessel operators will reduce vessel speed to 10 knots (18.5 km/hr) or less when any large whale, any mother/calf pairs, large assemblages of non-delphinoid cetaceans are observed near (within 100 m (330 ft)) an underway vessel;
- All survey vessels will maintain a separation distance of 500 m (1640 ft) or greater from any sighted North Atlantic right whale;
- If underway, vessels must steer a course away from any sighted North Atlantic right whale at 10 knots (18.5 km/hr) or less until the 500 m (1640 ft) minimum separation distance has been established. If a North Atlantic right whale is sighted in a vessel's path, or within 100 m (330 ft) to an underway vessel, the underway vessel must reduce speed and shift the engine to neutral. Engines will not be engaged until the North Atlantic right whale has moved outside of the vessel's path and beyond 100 m. If stationary, the vessel must not engage engines until the North Atlantic right whale has moved beyond 100 m;
- All vessels will maintain a separation distance of 100 m (330 ft) or greater from any sighted non-delphinoid cetacean. If sighted, the vessel underway must reduce speed and shift the engine to neutral, and must not engage the engines until the non-delphinoid cetacean has moved outside of the vessel's path and beyond 100 m. If a survey vessel is stationary, the vessel will not engage engines until the non-delphinoid cetacean has moved out of the vessel's path and beyond 100 m;
- All vessels will maintain a separation distance of 50 m (164 ft) or greater from any sighted delphinoid cetacean. Any vessel underway remain parallel to a sighted delphinoid cetacean's course whenever possible, and avoid excessive speed or abrupt changes in direction. Any vessel underway reduces vessel speed to 10 knots (18.5 km/hr) or less when pods (including mother/calf pairs) or large assemblages of delphinoid cetaceans are observed. Vessels may not adjust course and speed until the delphinoid cetaceans have moved beyond 50 m and/or the abeam of the underway vessel;
- All vessels will maintain a separation distance of 50 m (164 ft) or greater from any sighted pinniped; and
- All vessels underway will not divert or alter course in order to approach any whale, delphinoid cetacean, or pinniped. Any vessel underway will avoid excessive speed or abrupt changes in direction to avoid injury to the sighted cetacean or pinniped.

Skipjack will ensure that vessel operators and crew maintain a vigilant watch for marine mammals by slowing down or stopping the vessel to avoid striking marine mammals. 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

As described above, the section of the proposed survey area partially overlaps with a portion of a North Atlantic right whale SMA off the mouth of Delaware Bay. This SMA is active from November 1 through April 30 of each year. Any survey vessels that are >65 ft in length would be required to adhere to the mandatory vessel speed restrictions (<10 kn) when operating within the SMA during times when the SMA is active. In addition, between watch shifts, members of the monitoring team would consult NMFS' North Atlantic right whale reporting systems for the presence of North Atlantic right whales throughout survey operations. Members of the monitoring team would also monitor the NMFS North Atlantic right whale reporting systems for the establishment of Dynamic Management Areas (DMA). If NMFS should establish a DMA in the survey area while surveys are underway, Skipjack would contact NMFS within 24 hours of the establishment of the DMA to determine whether alteration of survey activities was warranted to avoid right whales to the extent possible.

The proposed mitigation measures are designed to avoid the already low potential for injury in addition to some instances of Level B harassment, and to minimize the potential for vessel strikes. Further, we believe the proposed mitigation measures are practicable for the applicant to implement. Skipjack has proposed additional mitigation measures in addition to the measures described above; for information on the measures proposed by Skipjack, see Section 11 of the IHA application.

There are no known marine mammal rookeries or mating or calving grounds in the survey area that would otherwise potentially warrant increased mitigation measures for marine mammals or their habitat (or both). The proposed survey would occur in an area that has been identified as a biologically important area for migration for North Atlantic right whales. However, given the small spatial extent of the survey area relative to the substantially larger spatial extent of the right whale migratory area, the survey is not expected to appreciably reduce migratory habitat nor to negatively impact the migration of North Atlantic right whales, thus mitigation to address the proposed survey's occurrence in North Atlantic right whale migratory habitat is not warranted.

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

Proposed Monitoring and Reporting

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

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

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

Proposed Monitoring Measures

As described above, visual monitoring would be performed by qualified and NMFS-approved PSOs. Skipjack 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. Skipjack would provide resumes of all proposed PSOs (including alternates) to NMFS for review and approval at least 45 days 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 minimum of one PSO must be on duty and conducting visual observations at all times on all active survey vessels during daylight hours (*i.e.,* from 30 minutes prior to sunrise through 30 minutes following sunset) and nighttime ramp-ups of HRG equipment. 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 or until 30 minutes past sunset. 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 using range finders. Reticulated binoculars will also 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 estimated to have been taken 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 addition to the final technical report, Skipjack will provide the reports described below as necessary during survey activities. In the unanticipated event that Skipjack's survey activities lead to an injury (Level A harassment) or mortality (*e.g.,* ship-strike, gear interaction, and/or entanglement) of a marine mammal, Skipjack would immediately cease the specified activities and report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources and the NMFS New England/Mid-Atlantic Stranding Coordinator. The report would include the following information:

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

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

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

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

Negligible Impact Analysis and Determination

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

To avoid repetition, our analysis applies to all the species listed in Table 2, given that NMFS expects the anticipated effects of the proposed survey to be similar in nature.

NMFS does not anticipate that serious injury or mortality would occur as a result of Skipjack's proposed survey, even in the absence of proposed mitigation. Thus the proposed authorization does not authorize any serious injury or mortality. As discussed in the *Potential Effects* section, non-auditory physical effects and vessel strike are not expected to occur. Additionally and as discussed previously, given the nature of activity and sounds sources used and especially in consideration of the required mitigation, Level A harassment is neither anticipated nor authorized. We expect that all potential takes would be in the form of short-term Level B behavioral harassment in the form of temporary avoidance of the area, reactions that are considered to be of low severity and with no lasting biological consequences (*e.g.,* Southall *et al.,* 2007).

Effects on individuals that are taken by Level B harassment, on the basis of reports in the literature as well as monitoring from other similar activities, will likely be limited to reactions such as increased swimming speeds, increased surfacing time, or decreased foraging (if such activity were occurring) (*e.g.,* Thorson and Reyff, 2006; HDR, Inc., 2012; Lerma, 2014). Most likely, individuals will simply move away from the sound source and temporarily avoid the area where the survey is occurring. We expect that any avoidance of the survey area by marine mammals would be temporary in nature and that any marine mammals that avoid the survey area during the survey activities would not be permanently displaced. Even repeated Level B harassment of some small subset of an overall stock is unlikely to result in any significant realized decrease in viability for the affected individuals, and thus would not result in any adverse impact to the stock as a whole. Instances of more severe behavioral harassment are expected to be minimized by proposed mitigation and monitoring measures.

In addition to being temporary and short in overall duration, the acoustic footprint of the proposed survey is small relative to the overall distribution of the animals in the area and their use of the area. Feeding behavior is not likely to be significantly impacted. Prey species are mobile and are broadly distributed throughout the project area; therefore, marine mammals that may be temporarily displaced during survey activities are expected to be able to resume foraging once they have moved away from areas with disturbing levels of underwater noise. Because of the temporary nature of the disturbance and the availability of similar habitat and resources in the surrounding area, the impacts to marine mammals and the food sources that they utilize are not expected to cause significant or long-term consequences for individual marine mammals or their populations.

There are no rookeries, mating or calving grounds known to be biologically important to marine mammals within the proposed survey area and there are no feeding areas known to be biologically important to marine mammals within the proposed survey area. There is no designated critical habitat for any ESA-listed marine mammals in the proposed survey area. The proposed survey area overlaps a portion of 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). Off the coasts of Delaware and Maryland, this biologically important migratory area extends from the coast to beyond the shelf break. Due to the fact that that the proposed survey is temporary and the spatial extent of sound produced by the survey would very small relative to the spatial extent of the available migratory habitat in the area, right whale migration is not expected to be impacted by the proposed survey.

Potential impacts to marine mammal habitat were discussed previously in this document (see *Potential Effects of the Specified Activity on Marine Mammals and their Habitat*). Marine mammal habitat may be impacted by elevated sound levels, but these impacts would be temporary. Repeated exposures of individuals to relatively low levels of sound outside of preferred habitat areas are unlikely to significantly disrupt critical behaviors. We expect that animals disturbed by sound associated with the proposed survey would simply avoid the area during the survey in favor of other, similar habitats.

As described above, North Atlantic right, humpback, and minke whales, and gray and harbor seals are experiencing ongoing UMEs. For North Atlantic right whales, as described above, no injury as a result of the proposed project is expected or proposed for authorization, and Level B harassment takes of right whales are expected to be in the form of avoidance of the immediate area of the proposed survey. In addition, the number of takes proposed for authorization above the Level B harassment threshold are minimal (*i.e.,* 3). As no injury or mortality is expected or proposed for authorization, and Level B harassment of North Atlantic right whales will be reduced to the level of least practicable adverse impact through use of proposed mitigation measures, the proposed authorized takes of right whales would not exacerbate or compound the ongoing UME in any way.

Similarly, no injury or mortality is expected or proposed for authorization for any of the other species with UMEs, Level B harassment will be reduced to the level of least practicable adverse impact through use of proposed mitigation measures, and the proposed authorized takes would not exacerbate or compound the ongoing UMEs. For minke whales, although the ongoing UME is under investigation (as occurs for all UMEs), this event does not provide cause for concern regarding population level impacts, as the likely population abundance is greater than 20,000 whales. Even though the PBR value is based on an abundance for U.S. waters that is negatively biased and a small fraction of the true population abundance, annual M/SI does not exceed the calculated PBR value for minke whales. With regard to humpback whales, 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. The West Indies DPS, which consists of the whales whose breeding range includes the Atlantic margin of the Antilles from Cuba to northern Venezuela, and whose feeding range primarily includes the Gulf of Maine, eastern Canada, and western Greenland, was delisted. The status review identified harmful algal blooms, vessel collisions, and fishing gear entanglements as relevant threats for this DPS, but noted that all other threats are considered likely to have no or minor impact on population size or the growth rate of this DPS (Bettridge *et al.,* 2015). As described in Bettridge *et al.* (2015), the West Indies DPS has a substantial population size (*i.e.,* approximately 10,000; Stevick *et al.,* 2003; Smith *et al.,* 1999; Bettridge *et al.,* 2015), and appears to be experiencing consistent growth. With regard to gray and harbor seals, although the ongoing UME is under investigation, 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 (345) is well below PBR (2,006) (Hayes *et al.,* 2018). For gray seals, the population abundance in the United States is over 27,000, with an estimated abundance including seals in Canada of approximately 505,000, and abundance is likely increasing in the U.S. Atlantic EEZ as well as in Canada (Hayes *et al.,* 2018).

The proposed mitigation measures are expected to reduce the number and/or severity of takes by (1) giving animals the opportunity to move away from the sound source before HRG survey equipment reaches full energy; (2) preventing animals from being exposed to sound levels that may otherwise result in injury or more severe behavioral responses. Additional vessel strike avoidance requirements will further mitigate potential impacts to marine mammals during vessel transit to and within the survey area.

NMFS concludes that exposures to marine mammal species and stocks due to Skipjack's proposed survey would result in only short-term (temporary and short in duration) effects to individuals exposed. Marine mammals may temporarily avoid the immediate area, but are not expected to permanently abandon the area. Major shifts in habitat use, distribution, or foraging success are not expected. NMFS does not anticipate the proposed take estimates to impact annual rates of recruitment or survival.

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, serious injury, or Level A harassment is anticipated or authorized;
- The anticipated impacts of the proposed activity on marine mammals would primarily be in the form of temporary behavioral changes due to avoidance of the area around the survey vessel;
- The availability of alternate areas of similar habitat value (for foraging, etc.) for marine mammals that may temporarily vacate the survey area during the proposed survey to avoid exposure to sounds from the activity;
- The proposed project area does not contain known areas of significance for mating or calving;
- Effects on species that serve as prey species for marine mammals from the proposed survey would be minor and temporary and would not be expected to reduce the availability of prey or to affect marine mammal feeding;
- The proposed mitigation measures, including visual and acoustic monitoring, exclusion zones, and shutdown measures, are expected to minimize 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. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

The numbers of marine mammals that we propose for authorization to be taken, for all species and stocks, would be considered small relative to the relevant stocks or populations (less than 28 percent for two of seventeen species and stocks, and less than 1 percent for all remaining species and stocks). See Table 7. 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

Section 7(a)(2) of the Endangered Species Act of 1973 (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, in this case with the NMFS Greater Atlantic Regional Fisheries Office (GARFO), whenever we propose to authorize take for endangered or threatened species.

The NMFS Office of Protected Resources Permits and Conservation Division is proposing to authorize the incidental take of four species of marine mammals which are listed under the ESA: The North Atlantic right, fin, sei, and sperm whale. The Permits and Conservation Division has requested initiation of Section 7 consultation with NMFS GARFO for the issuance of this IHA. NMFS will conclude the ESA section 7 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 Skipjack for conducting marine site characterization surveys offshore of Delaware and along potential submarine cable routes to a landfall location in Delaware or Maryland, from the date of issuance for a period of one year, 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 [action]. 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.

On a case-by-case basis, NMFS may issue a one-year IHA renewal with an additional 15 days for public comments when (1) another year of 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 expiration of the current IHA;
- The request for renewal must include the following:

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

(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: September 24, 2019.

Donna S. Wieting,

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

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COMMISSION OF FINE ARTS

Notice of Meeting

The next meeting of the U.S. Commission of Fine Arts is scheduled for 17 October 2019, at 9 a.m. in the Commission offices at the National Building Museum, Suite 312, Judiciary Square, 401 F Street NW, Washington, DC 20001–2728. Items of discussion may include buildings, parks and memorials.

Draft agendas and additional information regarding the Commission are available on our website: *www.cfa.gov.* Inquiries regarding the agenda and requests to submit written or oral statements should be addressed to Thomas Luebke, Secretary, U.S. Commission of Fine Arts, at the above address; by emailing *cfastaff@cfa.gov;* or by calling 202–504–2200. Individuals requiring sign language interpretation for the hearing impaired should contact the Secretary at least 10 days before the meeting date.