E 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648-XD119]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to a Marine Geophysical Survey of the Blake Plateau in the Northwest Atlantic Ocean

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

ACTION: Notice; issuance of an Incidental Harassment Authorization.

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued an incidental harassment authorization (IHA) to Lamont-Doherty Earth Observatory (L-DEO) to incidentally harass marine mammals during a marine geophysical survey of the Blake Plateau in the northwest Atlantic Ocean.

DATES: This authorization is effective from July 10, 2023 through July 9, 2024.

ADDRESSES: Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *https://www.fisheries.noaa.gov/action/incidental-take-authorization-lamont-doherty-earth-observatorys-marine-geophysical-surveys*. In case of problems accessing these documents, please call the contact listed below.

FOR FURTHER INFORMATION CONTACT: Jenna Harlacher, Office of Protected Resources (OPR) NMFS, (301) 427-8401.

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 proposed or, if the taking is limited to harassment, a notice of a proposed IHA is provided to the public for review.

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

Summary of Request

On November 22, 2022, NMFS received a request from L-DEO for an IHA to take marine mammals incidental to a marine geophysical survey of the Blake Plateau in the northwest Atlantic Ocean. The application was deemed adequate and complete on February 1, 2023. L-DEO's request is for take of 29 marine mammal species by Level B harassment, and for 4 of these species, by Level A harassment. Neither L-DEO nor NMFS expect serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

Description of Activity

Overview

Researchers from the University of Texas Institute of Geophysics (UTIG) and L-DEO, with funding from the National Science Foundation (NSF), plan to conduct research, including high-energy seismic surveys using airguns as the acoustic source, from the research vessel (R/V) *Marcus G. Langseth* (Langseth). The surveys would occur in the Blake Plateau in the northwest Atlantic Ocean during summer or fall 2023. The planned multi-channel seismic (MCS) reflection and Ocean Bottom Seismometers (OBS) seismic refraction surveys would occur within the Exclusive Economic Zone (EEZ) of the United States and Bahamas and in international waters, in depths ranging from >100 to 5,200 meters (m).

To complete this survey, the R/V Langseth would tow a 36-airgun array consisting of a mixture of Bolt airguns ranging from 40 to 360 cubic inches (in^3) (1-9.1 m^3) each on four strings spaced 16 m apart, with a total discharge volume of 6,600 in^3 (167.6 m^3). The airgun array would be towed at 10-12 m deep along the survey lines, while the receiving systems for the different survey segments would consist of a 15 kilometer (km) long solid-state hydrophone streamer and approximately 40 OBS, respectively. The airguns would fire at a shot interval of 50 m (~24 seconds (s)) during multi-channel seismic (MCS) reflection surveys with the hydrophone streamer and at a 200-m (~78 s) interval during Ocean Bottom Seismometer (OBS) seismic refraction surveys. Approximately 6682 kilometers (km) of seismic acquisition are planned: 5730 km of 2D MCS seismic reflection data and 952 km of OBS refraction data.

The study would acquire two-dimensional (2-D) seismic reflection and seismic refraction data to examine the structure and evolution of the rifted margins of the southeastern United States, including the rift dynamics during the formation of the Carolina Trough and Blake Plateau. Additional data would be collected using a

multibeam echosounder (MBES), a sub-bottom profiler (SBP), and an Acoustic Doppler Current Profiler (ADCP), which would be operated from R/V Langseth continuously during the seismic surveys, including during transit. No take of marine mammals is expected to result from use of this equipment.

Dates and Duration

The survey is planned to last for approximately 61 days, spread between two operational legs, with 40 days of seismic operations. One leg would include 32 days of MCS seismic operations and 4 days of transit time, whereas the other leg would consist of 8 days of seismic operations with OBSs, 13 days of OBS deployment, and 4 days of transit. R/V Langseth would likely leave from and return to port in Jacksonville, Florida during summer or fall 2023.

Specific Geographic Region

The survey would occur within approximately 27.5–33.5° N, 74–80° W off the coasts of South Carolina to northern Florida in the northwest Atlantic Ocean. The distances to all state waters would be >80 km, and to the coast would be ~90 km off Georgia, ~98 km off Florida, and ~107 km off South Carolina. The region where the survey is planned to occur is depicted in Figure 1; the tracklines could occur anywhere within the polygon shown in Figure 1. Representative survey tracklines are shown, however, some deviation in actual tracklines, including the order of survey operations, could be necessary for reasons such as science drivers, poor data quality, inclement weather, or mechanical issues with the research vessel and/or equipment. The surveys are planned to occur within the EEZs of the United States and Bahamas and in international waters, in depths ranging from >100 to 5,200 m deep.

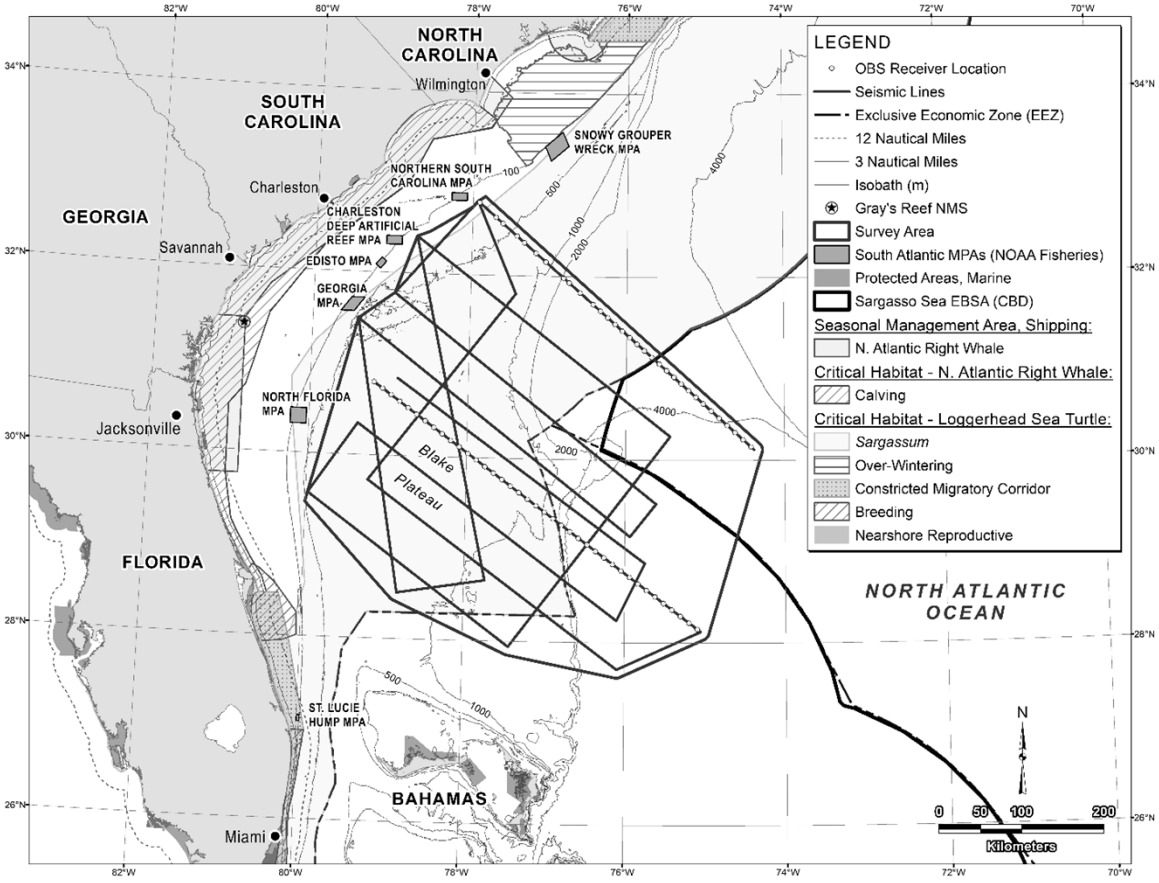

Figure 1 -- Location of the Blake Plateau Seismic Surveys in the Northwest Atlantic Ocean

Representative survey tracklines are included in the figure; however, the tracklines could occur anywhere within the survey area. MPA = marine protected area; NMS = National Marine Sanctuary. EBSA = Ecologically or Biologically Significant Marine Areas. CBD = Convention on Biological Diversity. N = North.

A detailed description of the planned geophysical survey was provided in the **Federal Register** notice of the proposed IHA (88 FR 37390; June 7, 2023). Since that time, no changes have been made to the planned survey activities. Therefore, a detailed description is not provided here. Please refer to that **Federal Register** notice for the description of the specified activity.

Comments and Responses

A notice of NMFS' proposal to issue an IHA to L-DEO was published in the **Federal Register** on June 7, 2023 (88 FR 37390), beginning a 30-day comment period. That notice described, in detail, L-DEO's activities, the marine mammal species that may be affected by the activities, and the anticipated effects on marine mammals. In that notice, we requested public input on the request for authorization described therein, our analyses, the proposed authorization, and any other aspect of the notice of proposed IHA, and requested that interested persons submit relevant information, suggestions, and comments. NMFS received no relevant or substantive public comments.

Changes from the Proposed IHA to Final IHA

Changes were made between publication of the notice of proposed IHA and this notice of final IHA, including correction of typographical errors in the draft IHA and the Federal Register notice of proposed IHA. Additionally, language has been added to the reporting requirement clarifying that if no comments are received from NMFS within 30 days of receiving the draft that the report is considered final. Finally, the FRN was updated to note the correct period of time that airgun operations can continue while there is a PAM malfunction (10 hours), as was stated in the draft IHA provided for public review.

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of L-DEO's application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life

history of the potentially affected species. NMFS fully considered all of this information, and we refer the reader to these descriptions, instead of reprinting the information. 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 (*https://www.fisheries.noaa.gov/find-species*). NMFS refers the reader to the application and to the aforementioned sources for general information regarding the species listed in Table 1.

Table 1 lists all species or stocks for which take is expected and authorized for this activity, and summarizes information related to the population or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) and potential biological removal (PBR), where known. 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 serious injury or mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species or stocks 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 stocks managed under the MMPA in this region are assessed in NMFS' U.S. Atlantic and Gulf of Mexico SARs (*e.g.,* Hayes *et al.*, 2019, 2020, 2022). All values

presented in Table 1 are the most recent available (including the draft 2022 SARs) at the time of publication and are available online at: *www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments.*

Table 1 -- Species Likely Impacted by the Specified Activities

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N)[1]	Stock abundance (CV, N_{min}, most recent abundance survey)[2]	Modeled Abundance[5]	PBR	Annual M/SI[3]
Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)							
Family Balaenopteridae (rorquals)							
Humpback whale	*Megaptera novaeangliae*	Gulf of Maine	-/-; N	1,396 (0; 1,380; 2016)	2,259[7]	22	12.15
Fin whale	*Balaenoptera physalus*	Western North Atlantic	E/D; Y	6,802 (0.24; 5,573; 2016)	3,587[6]	11	1.8
Sei whale	*Balaenoptera borealis*	Nova Scotia	E/D; Y	6,292 (1.02; 3,098; 2016)	1,043[6]	6.2	0.8
Minke whale	*Balaenoptera acutorostrata*	Canadian East Coast	-/-; N	21,968 (0.31; 17,002; 2016)	4,044[6]	170	10.6
Blue whale	*Balaenoptera musculus*	Western North Atlantic	E/D;Y	unk (unk; 402; 1980-2008)	33[7]	0.8	0
Superfamily Odontoceti (toothed whales, dolphins, and porpoises)							
Family Physeteridae							
Sperm whale	*Physeter macrocephalus*	North Atlantic	E/D;Y	4,349 (0.28; 3,451; 2016)	6,576[6]	3.9	0
Family Kogiidae							
Pygmy sperm whale	*Kogia breviceps*	Western North Atlantic	-/-; N	7,750 (0.38; 5,689; 2016)	7,980[7]	46	0
Dwarf sperm whale	*Kogia sima*	Western North Atlantic	-/-; N				
Family Ziphiidae (beaked whales)							
Cuvier's beaked Whale	*Ziphius cavirostris*	Western North Atlantic	-/-; N	5,744 (0.36, 4,282, 2016)	5,588[7]	43	0.2
Blainville's beaked Whale	*Mesoplodon densirostris*	Western North Atlantic	-/-; N	10,107 (0.27; 8,085; 2016)[4]	6,526[7]	81[4]	0[4]
True's beaked whale	*Mesoplodon mirus*	Western North Atlantic	-/-; N				
Gervais' beaked whale	*Mesoplodon europaeus*	Western North Atlantic	-/-; N				
Family Delphinidae							
Long-finned pilot whale	*Globicephala melas*	Western North Atlantic	-/-; N	39,215 (0.30; 30,627; 2016)	23,905[7,8]	306	9
Short finned pilot whale	*Globicephala macrorhynchus*	Western North Atlantic	-/-;Y	28,924 (0.24; 23,637; 2016)		236	136

Rough-toothed dolphin	*Steno bredanensis*	Western North Atlantic	-/-; N	136 (1.0; 67; 2016)	1,011[7]	0.7	0
Bottlenose dolphin	*Tursiops truncatus*	Western North Atlantic Offshore	-/-; N	62,851 (0.23; 51,914, 2016)	68,739[6]	519	28
Pantropical spotted dolphin	*Stenella attenuata*	Western North Atlantic	-/-; N	6,593 (0.52; 4,367; 2016)	1,403[7]	44	0
Atlantic spotted dolphin	*Stenella frontalis*	Western North Atlantic	-/-; N	39,921 (0.27; 32,032; 2016)	39,352[6]	320	0
Spinner dolphin	*Stenella longirostris*	Western North Atlantic	-/-; N	4,102 (0.99; 2,045; 2016)	885[7]	21	0
Clymene dolphin	*Stenella clymene*	Western North Atlantic	-/-; N	4,237 (1.03; 2,071; 2016)	8,576[7]	21	0
Striped dolphin	*Stenella coeruleoalba*	Western North Atlantic	-/-; N	67,036 (0.29; 52,939; 2016)	54,707[7]	529	0
Fraser's dolphin	*Lagenodelphis hosei*	Western North Atlantic	-/-; N	unk	658[7]	unk	0
Risso's dolphin	*Grampus griseus*	Western North Atlantic	-/-; N	35,215(0.19; 30,051; 2016)	24,260[6]	301	34
Common dolphin	*Delphinus delphis*	Western North Atlantic	-/-; N	172,947 (0.21; 145,216; 2016)	144,036[6]	1,452	390
Melon-headed whale	*Peponocephala electra*	Western North Atlantic	-/-; N	unk	618[7]	unk	0
Pygmy killer whale	*Feresa attenuate*	Western North Atlantic	-/-; N	unk	68[7]	unk	0
False killer whale	*Pseudorca crassidens*	Western North Atlantic	-/-; N	1,791 (0.56; 1,154; 2016)	139[7]	12	0
Killer whale	*Orcinus orca*	Western North Atlantic	-/-; N	unk	73[7]	unk	0
Family Phocoenidae (porpoises)							
Harbor porpoise	*Phocoena phocoena*	Gulf of Maine/Bay of Fundy	-/-; N	95,543 (0.31; 74,034; 2016)	55,049[6]	851	164

[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 or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

[2] NMFS marine mammal stock assessment reports online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region/*. CV is coefficient of variation; Nmin is the minimum estimate of stock abundance; unknown (unk).

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

[4] The values for Mesoplodont beaked whales would also represent Sowerby's beaked whales, which are not expected to occur in the survey area.

[5]Modeled abundance from Roberts *et al.* (2023)

[6]Averaged monthly (May-Oct) abundance

[7]Only single annual abundance given
[8]Modeled abundance for pilot whale is grouped together for both short-finned and long-finned pilot whales.

As indicated above, all 29 species in Table 1 temporally and spatially co-occur with the activity to the degree that take is reasonably likely to occur. Species that could potentially occur in the research area but are not likely to be harassed due to the rarity of their occurrence (*i.e.,* are considered extralimital or rare visitors to the waters of the northwest Atlantic Ocean), or because their known migration through the area does not align with the survey dates, were omitted.

A detailed description of the of the species likely to be affected by the geophysical survey, including brief introductions to the species and relevant stocks as well as available information regarding population trends and threats, and information regarding local occurrence, were provided in the **Federal Register** notice for the proposed IHA (88 FR 37390, June 7, 2023). Since that time, we are not aware of any changes in the status of these species and stocks; therefore, detailed descriptions are not provided here. Please refer to that **Federal Register** notice for these descriptions. Please also refer to NMFS' website (*https://www.fisheries.noaa.gov/find-species*) for generalized species accounts.

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. 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 hearing groups based on directly measured (behavioral or auditory evoked potential techniques) or estimated hearing ranges (behavioral response data, anatomical modeling, *etc.*). Note that no direct measurements of hearing ability

have been successfully completed for mysticetes (*i.e.*, low-frequency (LF) 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 LF 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 2.

Table 2 -- 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).	

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information.

Potential Effects of Specified Activities on Marine Mammals and Their Habitat

The effects of underwater noise from L-DEO's survey activities have the potential to result in harassment of marine mammals in the vicinity of the survey area. The notice of proposed IHA (88 FR 37390, June 7, 2023) included a discussion of the effects of anthropogenic noise on marine mammals and the potential effects of underwater noise

from L-DEO on marine mammals and their habitat. That information and analysis is not repeated here; please refer to the notice of proposed IHA (88 FR 37390, June 7, 2023).

Estimated Take of Marine Mammals

This section provides an estimate of the number of incidental takes authorized through the IHA, which will inform both NMFS' consideration of "small numbers," and the negligible impact determinations.

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).

Anticipated takes would primarily be Level B harassment, as use of the airgun arrays have the potential to result in disruption of behavioral patterns of marine mammals. There is also some potential for auditory injury (Level A harassment) to result for species of certain hearing groups due to the size of the predicted auditory injury zones for those groups. Auditory injury is less likely to occur for MF species, due to their relative lack of sensitivity to the frequencies at which the primary energy of an airgun signal is found, as well as such species' general lower sensitivity to auditory injury as compared to HF cetaceans. As discussed in further detail below, we do not expect auditory injury for MF cetaceans. The mitigation and monitoring measures are expected to minimize the severity of such taking to the extent practicable. No mortality is anticipated as a result of these activities. Below we describe how the take numbers are estimated.

For acoustic impacts, 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) the number of days of activities. We note that while these factors can contribute to a basic calculation to provide an initial prediction of potential 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 take estimates.

Acoustic Thresholds

NMFS recommends the use of acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur Permanent Threshold Shift (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 or exposure context (*e.g.*, frequency, predictability, duty cycle, duration of the exposure, signal-to-noise ratio, distance to the source), the environment (*e.g.*, bathymetry, other noises in the area, predators in the area), and the receiving animals (hearing, motivation, experience, demography, life stage, depth) and can be difficult to predict (*e.g.*, Southall *et al.*, 2007, 2021; Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a metric that is both predictable and measurable for most activities, NMFS typically uses a generalized acoustic threshold based on received level to estimate the onset of behavioral

harassment. NMFS generally predicts that marine mammals are likely to be behaviorally harassed in a manner considered to be Level B harassment when exposed to underwater anthropogenic noise above root-mean-squared pressure received levels (RMS SPL) of 120 dB (referenced to 1 micropascal (re 1 μPa)) for continuous (*e.g.,* vibratory pile driving, drilling) and above RMS SPL 160 dB re 1 μPa for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources. Generally speaking, Level B harassment take estimates based on these behavioral harassment thresholds are expected to include any likely takes by Temporary Threshold Shift (TTS) as, in most cases, the likelihood of TTS occurs at distances from the source less than those at which behavioral harassment is likely. TTS of a sufficient degree can manifest as behavioral harassment, as reduced hearing sensitivity and the potential reduced opportunities to detect important signals (conspecific communication, predators, prey) may result in changes in behavior patterns that would not otherwise occur.

L-DEO's planned survey includes the use of impulsive seismic sources (*e.g.*, Bolt airguns), and therefore the 160 dB re 1 μPa is applicable for analysis of Level B harassment.

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). L-DEO's planned survey includes the use of impulsive seismic sources (*e.g.*, airguns).

These thresholds are provided in the table below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS' 2018 Technical Guidance, which may be accessed at:

www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance.

Table 3 -- Thresholds Identifying the Onset of Permanent Threshold Shift

	PTS Onset Acoustic Thresholds* (Received Level)	
Hearing Group	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 1µPa^{2}s. 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 are used in estimating the area ensonified above the acoustic thresholds, including source levels and transmission loss coefficient.

When the NMFS Technical Guidance (2016a) 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.

The planned survey would entail the use of a 36-airgun array with a total discharge volume of 6,600 in^3 at a tow depth of 10-12 m. L-DEO's model results are used to determine the 160 dB_{rms} radius for the 36-airgun array in water depth ranging from >100 to 5,200 m. Received sound levels have been predicted by L-DEO's model (Diebold *et al.*, 2010) as a function of distance from the 36-airgun array. Models for the 36-airgun array used a 12-m tow depth. This modeling approach uses ray tracing for the direct wave traveling from the array to the receiver and its associated source ghost (reflection at the air-water interface in the vicinity of the array), in a constant-velocity half-space (infinite homogeneous ocean layer, unbounded by a seafloor). In addition, propagation measurements of pulses from the 36-airgun array at a tow depth of 6 m have been reported in deep water (~1600 m), intermediate water depth on the slope (~600–1,100 m),

and shallow water (~50 m) in the Gulf of Mexico (Tolstoy *et al.*, 2009; Diebold *et al.*, 2010).

For deep and intermediate water cases, the field measurements cannot be used readily to derive the harassment isopleths, as at those sites the calibration hydrophone was located at a roughly constant depth of 350-550 m, which may not intersect all the SPL isopleths at their widest point from the sea surface down to the assumed maximum relevant water depth (~2,000 m) for marine mammals. At short ranges, where the direct arrivals dominate and the effects of seafloor interactions are minimal, the data at the deep sites are suitable for comparison with modeled levels at the depth of the calibration hydrophone. At longer ranges, the comparison with the model—constructed from the maximum SPL through the entire water column at varying distances from the airgun array—is the most relevant.

In deep and intermediate water depths at short ranges, sound levels for direct arrivals recorded by the calibration hydrophone and L-DEO model results for the same array tow depth are in good alignment (see Figures 12 and 14 in Diebold *et al.*, 2010). Consequently, isopleths falling within this domain can be predicted reliably by the L-DEO model, although they may be imperfectly sampled by measurements recorded at a single depth. At greater distances, the calibration data show that seafloor-reflected and sub-seafloor-refracted arrivals dominate, whereas the direct arrivals become weak and/or incoherent (see Figures 11, 12, and 16 in Diebold *et al.*, 2010). Aside from local topography effects, the region around the critical distance is where the observed levels rise closest to the model curve. However, the observed sound levels are found to fall almost entirely below the model curve. Thus, analysis of the Gulf of Mexico calibration measurements demonstrates that although simple, the L-DEO model is a robust tool for conservatively estimating isopleths.

The survey would acquire data with the 36-airgun array at a tow depth of 10-12 m. For deep water (>1000 m), we use the deep-water radii obtained from L-DEO model results down to a maximum water depth of 2,000 m for the 36-airgun array. The radii for intermediate water depths (100-1,000 m) are derived from the deep-water ones by applying a correction factor (multiplication) of 1.5, such that observed levels at very near offsets fall below the corrected mitigation curve (see Figure 16 in Diebold *et al.*, 2010).

L-DEO's modeling methodology is described in greater detail in L-DEO's application. The estimated distances to the Level B harassment isopleth for the airgun configuration are shown in Table 4.

Table 4 -- Predicted Radial Distances from the R/V Langseth Seismic Source to Isopleth Corresponding to Level B Harassment Threshold

Airgun Configuration	Tow Depth (m)	Water Depth (m)	Predicted distances (in m) to the Level B harassment threshold
4 strings, 36 airguns, 6,600 in^3	12	>1,000	6,733[1]
		100-1,000	10,100[2]

[1]Distance is based on L-DEO model results.
[2]Distance is based on L-DEO model results with a 1.5 × correction factor between deep and intermediate water depths.

Table 5 presents the modeled PTS isopleths for each cetacean hearing group based on L-DEO modeling incorporated in the companion user spreadsheet (NMFS 2018).

Table 5 -- Modeled Radial Distance to Isopleths Corresponding to Level A Harassment Thresholds

	Low Frequency	Mid Frequency	High Frequency
MCS Surveys			
PTS SEL_{cum}	**320.2**	0	1

PTS Peak	38.9	**13.6**	**268.3**
OBS Surveys			
PTS SEL_{cum}	**80**	0	0.3
PTS Peak	38.9	**13.6**	**268.3**

The largest distance (in bold) of the dual criteria (SEL cum or Peak) was used to estimate threshold distances and potential takes by Level A harassment.

Predicted distances to Level A harassment isopleths, which vary based on marine mammal hearing groups, were calculated based on modeling performed by L-DEO using the Nucleus software program and the NMFS user spreadsheet, described below. The acoustic thresholds for impulsive sounds (*e.g.*, airguns) contained in the NMFS Technical Guidance were presented as dual metric acoustic thresholds using both SEL_{cum} and peak sound pressure metrics (NMFS 2016a). 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.*, 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. In recognition of the fact that the requirement to calculate Level A harassment ensonified areas could be more technically challenging to predict due to the duration component and the use of weighting functions in the new SEL_{cum} thresholds, NMFS developed an optional user spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or occurrence to facilitate the estimation of take numbers.

The SEL_{cum} for the 36-airgun array is derived from calculating the modified farfield signature. The farfield signature is often used as a theoretical representation of the source level. To compute the farfield signature, the source level is estimated at a large distance (right) below the array (*e.g.*, 9 km), and this level is back projected mathematically to a notional distance of 1 m from the array's geometrical center. However, it has been recognized that the source level from the theoretical farfield

signature is never physically achieved at the source when the source is an array of multiple airguns separated in space (Tolstoy *et al.*, 2009). Near the source (at short ranges, distances <1 km), the pulses of sound pressure from each individual airgun in the source array do not stack constructively as they do for the theoretical farfield signature. The pulses from the different airguns spread out in time such that the source levels observed or modeled are the result of the summation of pulses from a few airguns, not the full array (Tolstoy *et al.*, 2009). At larger distances, away from the source array center, sound pressure of all the airguns in the array stack coherently, but not within one time sample, resulting in smaller source levels (a few dB) than the source level derived from the far-field signature. Because the far-field signature does not take into account the large array effect near the source and is calculated as a point source, the far-field signature is not an appropriate measure of the sound source level for large arrays. See L-DEO's application for further detail on acoustic modeling.

Auditory injury is unlikely to occur for MF cetaceans, given very small modeled zones of injury for those species (all estimated zones less than 15 m for MF cetaceans), in context of distributed source dynamics. The source level of the array is a theoretical definition assuming a point source and measurement in the far-field of the source (MacGillivray, 2006). As described by Caldwell and Dragoset (2000), an array is not a point source, but one that spans a small area. In the far-field, individual elements in arrays will effectively work as one source because individual pressure peaks will have coalesced into one relatively broad pulse. The array can then be considered a "point source." For distances within the near-field, *i.e.*, approximately two to three times the array dimensions, pressure peaks from individual elements do not arrive simultaneously because the observation point is not equidistant from each element. The effect is destructive interference of the outputs of each element, so that peak pressures in the near-field will be significantly lower than the output of the largest individual element. Here,

the relevant peak isopleth distances would in all cases be expected to be within the near-field of the array where the definition of source level breaks down. Therefore, actual locations within this distance of the array center where the sound level exceeds the relevant peak SPL thresholds would not necessarily exist. In general, Caldwell and Dragoset (2000) suggest that the near-field for airgun arrays is considered to extend out to approximately 250 m.

In order to provide quantitative support for this theoretical argument, we calculated expected maximum distances at which the near-field would transition to the far-field (Table 5). For a specific array one can estimate the distance at which the near-field transitions to the far-field by:

$$D = \frac{L^2}{4\lambda}$$

With the condition that $D >> \lambda$, and where D is the distance, L is the longest dimension of the array, and λ is the wavelength of the signal (Lurton, 2002). Given that λ can be defined by:

$$\lambda = \frac{v}{f}$$

where f is the frequency of the sound signal and v is the speed of the sound in the medium of interest, one can rewrite the equation for D as:

$$D = \frac{fL^2}{4v}$$

and calculate D directly given a particular frequency and known speed of sound (here assumed to be 1,500 m per second in water, although this varies with environmental conditions).

To determine the closest distance to the arrays at which the source level predictions in Table 5 are valid (*i.e.*, maximum extent of the near-field), we calculated D based on an assumed frequency of 1 kHz. A frequency of 1 kHz is commonly used in near-field/far-field calculations for airgun arrays (Zykov and Carr, 2014; MacGillivray,

2006; NSF and USGS, 2011), and based on representative airgun spectrum data and field measurements of an airgun array used on the Langseth, nearly all (greater than 95 percent) of the energy from airgun arrays is below 1 kHz (Tolstoy *et al*., 2009). Thus, using 1 kHz as the upper cut-off for calculating the maximum extent of the near-field should reasonably represent the near-field extent in field conditions.

If the largest distance to the peak sound pressure level threshold was equal to or less than the longest dimension of the array (*i.e*., under the array), or within the near-field, then received levels that meet or exceed the threshold in most cases are not expected to occur. This is because within the near-field and within the dimensions of the array, the source levels specified in Appendix A of L-DEO's application are overestimated and not applicable. In fact, until one reaches a distance of approximately three or four times the near-field distance the average intensity of sound at any given distance from the array is still less than that based on calculations that assume a directional point source (Lurton, 2002). The 6,600-in^3 airgun array planned for use during the survey has an approximate diagonal of 28.8 m, resulting in a near-field distance of approximately 138.7 m at 1 kHz (NSF and USGS, 2011). Field measurements of this array indicate that the source behaves like multiple discrete sources, rather than a directional point source, beginning at approximately 400 m (deep site) to 1 km (shallow site) from the center of the array (Tolstoy *et al*., 2009), distances that are actually greater than four times the calculated 138.7-m near-field distance. Within these distances, the recorded received levels were always lower than would be predicted based on calculations that assume a directional point source, and increasingly so as one moves closer towards the array (Tolstoy *et al*., 2009). Given this, relying on the calculated distance (138.7 m) as the distance at which we expect to be in the near-field is a conservative approach since even beyond this distance the acoustic modeling still overestimates the actual received level. Within the near-field, in order to explicitly

evaluate the likelihood of exceeding any particular acoustic threshold, one would need to consider the exact position of the animal, its relationship to individual array elements, and how the individual acoustic sources propagate and their acoustic fields interact. Given that within the near-field and dimensions of the array source levels would be below those assumed here, we believe exceedance of the peak pressure threshold would only be possible under highly unlikely circumstances.

In consideration of the received sound levels in the near-field as described above, we expect the potential for Level A harassment of MF cetaceans to be de minimis, even before the likely moderating effects of aversion and/or other compensatory behaviors (*e.g.*, Nachtigall *et al*., 2018) are considered. We do not believe that Level A harassment is a likely outcome for any MF cetacean and are not authorizing any take by Level A harassment for these species.

The Level A and Level B harassment estimates are based on a consideration of the number of marine mammals that could be within the area around the operating airgun array where received levels of sound ≥160 dB re 1 µPa RMS are predicted to occur (see Table 1). The estimated numbers are based on the densities (numbers per unit area) of marine mammals expected to occur in the area in the absence of seismic surveys. To the extent that marine mammals tend to move away from seismic sources before the sound level reaches the criterion level and tend not to approach an operating airgun array, these estimates likely overestimate the numbers actually exposed to the specified level of sound.

Marine Mammal Occurrence

In this section we provide information about the occurrence of marine mammals, including density or other relevant information which will inform the take calculations.

Habitat-based density models produced by the Duke University Marine Geospatial Ecology Laboratory (Roberts *et al*., 2016; Roberts *et al.*, 2023) represent the

best available information regarding marine mammal densities in the survey area. This density information 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 based on additional data as well as certain methodological improvements. More information is available online at *https://seamap.env.duke.edu/models/Duke/EC/*. Marine mammal density estimates in the survey area (animals/km^2) were obtained using the most recent model results for all taxa.

Monthly density grids (*e.g.*, rasters) for each species were overlaid with the Survey Area and values from all grid cells that overlapped the Survey Area (plus a 40-km buffer) were averaged to determine monthly mean density values for each species. Monthly mean density values within the survey area were averaged for each of the two water depth categories (intermediate and deep) for the months May to October. The highest mean monthly density estimates for each species were used to estimate take.

Take Estimation

Here we describe how the information provided above is synthesized to produce a quantitative estimate of the take that is reasonably likely to occur and authorized. In order to estimate the number of marine mammals predicted to be exposed to sound levels that would result in Level A or Level B harassment, radial distances from the airgun array to the predicted isopleth corresponding to the Level A harassment and Level B harassment thresholds are calculated, as described above. Those radial distances are then used to calculate the area(s) around the airgun array predicted to be ensonified to sound levels that exceed the harassment thresholds. The distance for the 160-dB Level B harassment

threshold and PTS (Level A harassment) thresholds (based on L-DEO model results) was used to draw a buffer around the area expected to be ensonified (*i.e.*, the survey area). The ensonified areas were then increased by 25 percent to account for potential delays, which is the equivalent to adding 25 percent to the planned line km to be surveyed. The highest mean monthly density for each species was then multiplied by the daily ensonified areas (increased as described above), and then multiplied by the number of survey days (40) to estimate potential takes (see Appendix B of L-DEO's application for more information).

L-DEO generally assumed that their estimates of marine mammal exposures above harassment thresholds equate to take and requested authorization of those takes. Those estimates in turn form the basis for our take authorization numbers. For the species for which NMFS does not expect there to be a reasonable potential for take by Level A harassment to occur, *i.e.*, MF cetaceans, we have added L-DEO's estimated exposures above Level A harassment thresholds to their estimated exposures above the Level B harassment threshold to produce a total number of incidents of take by Level B harassment that is authorized. Estimated exposures and take numbers for authorization are shown in Table 6. As requested by L-DEO with NMFS concurrence, when zero take was calculated we have authorized one group size of take as a precaution since the species could potentially occur in the survey area.

Table 6 -- Estimated Take for Authorization

Species	Stock	Estimated Take		Authorized Take		Abundance[3]	Percent of Stock
		Level B	Level A	Level B	Level A		
North Atlantic right whale	Western North Atlantic	0	0	0	0	338[4]	n/a
Humpback whale	Gulf of Maine	0	0	2[1]	0	2,259[6]	<0.1
Fin whale	Western North Atlantic	5	0	5	0	3,587[5]	0.1
Sei whale	Nova Scotia	28	2	28	2	1,043[5]	2.9
Minke whale	Canadian East Coast	20	1	20	1	4,044[5]	0.5

Blue whale	Western North Atlantic	2	0	2	0	33[6]	6.1
Sperm whale	North Atlantic	706	3	709	0	6,576[5]	9.3
Kogia spp.		601	50	601	50	7,980[6]	8.2
Cuvier's beaked whale	Western North Atlantic	365	1	366	0	5,588[6]	6.5
Mesoplodont beaked whales		154	1	155	0	6,526[6]	2.4
Pilot whales		1,424	4	1,428	0	23,905[6]	6
Rough-toothed dolphin	Western North Atlantic	301	1	302	0	1,011[6]	30
Bottlenose dolphin	Western North Atlantic Offshore	4,445	12	4,457	0	68,739[5]	6.5
Pantropical spotted dolphin	Western North Atlantic	419	1	420	0	1,403[6]	30
Atlantic spotted dolphin	Western North Atlantic	1,768	6	1,774	0	39,352[5]	4.5
Spinner dolphin	Western North Atlantic	149	0	149	0	885[6]	16.8
Clymene dolphin	Western North Atlantic	0	0	182[2]	0	8,576[6]	2.1
Striped dolphin	Western North Atlantic	0	0	46[1]	0	54,707[6]	<0.1
Fraser's dolphin	Western North Atlantic	226	1	227	0	658[6]	34.5
Risso's dolphin	Western North Atlantic	1,277	3	1,280	0	24,260[5]	5.3
Common dolphin	Western North Atlantic	181	1	182	0	144,036[5]	0.1
Melon-headed whale	Western North Atlantic	212	1	213	0	618[6]	34.5
Pygmy killer whale	Western North Atlantic	20	0	20	0	68[6]	29.4
False killer whale	Western North Atlantic	4	0	6[2]	0	139[6]	4.3
Killer whale	Western North Atlantic	6	0	6	0	73[6]	8.2
Harbor porpoise	Gulf of Maine/Bay of Fundy	0	0	3[1]	0	55,049[5]	<0.1

[1]Take increased to mean group size from AMAPPS (Palka *et al.*, 2017 and 2021).
[2]Take increased to mean group size from Ocean Biogeographic Information System (OBIS) (2023).
[3]Modeled abundance (Roberts *et al.*, 2023) used unless noted
[4]Abundance from draft 2022 U.S, Atlantic and Gulf of Mexico Marine Mammal SARs
[5]Averaged monthly (May-Oct) abundance
[6]Only single annual abundance given

Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of

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

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, NMFS considers 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, and impact on operations.

Vessel-Based Visual Mitigation Monitoring

Visual monitoring requires the use of trained observers (herein referred to as visual protected species observers (PSO)) to scan the ocean surface for the presence of marine mammals. The area to be scanned visually includes primarily the shutdown zone (SZ), within which observation of certain marine mammals requires shutdown of the acoustic source, but also a buffer zone and, to the extent possible depending on

conditions, the surrounding waters. The buffer zone means an area beyond the SZ to be monitored for the presence of marine mammals that may enter the SZ. During pre-start clearance monitoring (*i.e.*, before ramp-up begins), the buffer zone also acts as an extension of the SZ in that observations of marine mammals within the buffer zone would also prevent airgun operations from beginning (*i.e.*, ramp-up). The buffer zone encompasses the area at and below the sea surface from the edge of the 0–500 m SZ, out to a radius of 1,000 m from the edges of the airgun array (500–1,000 m). This 1,000-m zone (SZ plus buffer) represents the pre-start clearance zone. Visual monitoring of the SZ and adjacent waters is intended to establish and, when visual conditions allow, maintain zones around the sound source that are clear of marine mammals, thereby reducing or eliminating the potential for injury and minimizing the potential for more severe behavioral reactions for animals occurring closer to the vessel. Visual monitoring of the buffer zone is intended to (1) provide additional protection to marine mammals that may be in the vicinity of the vessel during pre-start clearance, and (2) during airgun use, aid in establishing and maintaining the SZ by alerting the visual observer and crew of marine mammals that are outside of, but may approach and enter, the SZ.

L-DEO must use dedicated, trained, and NMFS-approved PSOs. The PSOs must have no tasks other than to conduct observational effort, record observational data, and communicate with and instruct relevant vessel crew with regard to the presence of marine mammals and mitigation requirements. PSO resumes shall be provided to NMFS for approval.

At least one of the visual and two of the acoustic PSOs (discussed below) aboard the vessel must have a minimum of 90 days at-sea experience working in those roles, respectively, with no more than 18 months elapsed since the conclusion of the at-sea experience. One visual PSO with such experience shall be designated as the lead for the entire protected species observation team. The lead PSO shall serve as primary point of

contact for the vessel operator and ensure all PSO requirements per the IHA are met. To the maximum extent practicable, the experienced PSOs should be scheduled to be on duty with those PSOs with appropriate training but who have not yet gained relevant experience.

During survey operations (*e.g.*, any day on which use of the airgun array is planned to occur, and whenever the airgun array is in the water, whether activated or not), a minimum of two visual PSOs 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). Visual monitoring of the pre-start clearance zone must begin no less than 30 minutes prior to ramp-up, and monitoring must continue until 1 hour after use of the airgun array ceases or until 30 minutes past sunset. Visual PSOs shall coordinate to ensure 360° visual coverage around the vessel from the most appropriate observation posts, and shall conduct visual observations using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner.

PSOs shall establish and monitor the shutdown and buffer zones. These zones shall be based upon the radial distance from the edges of the airgun array (rather than being based on the center of the array or around the vessel itself). During use of the airgun array (*i.e.*, anytime airguns are active, including ramp-up), detections of marine mammals within the buffer zone (but outside the SZ) shall be communicated to the operator to prepare for the potential shutdown of the airgun array. Visual PSOs will immediately communicate all observations to the on duty acoustic PSO(s), including any determination by the PSO regarding species identification, distance, and bearing and the degree of confidence in the determination. Any observations of marine mammals by crew members shall be relayed to the PSO team. During good conditions (*e.g.*, daylight hours; Beaufort sea state (BSS) 3 or less), visual PSOs shall conduct observations when the airgun array is not operating for comparison of sighting rates and behavior with and

without use of the airgun array and between acquisition periods, to the maximum extent practicable.

Visual PSOs may be on watch for a maximum of 4 consecutive hours followed by a break of at least 1 hour between watches and may conduct a maximum of 12 hours of observation per 24-hour period. Combined observational duties (visual and acoustic but not at same time) may not exceed 12 hours per 24-hour period for any individual PSO.

Passive Acoustic Monitoring

Passive acoustic monitoring (PAM) means the use of trained personnel (sometimes referred to as PAM operators, herein referred to as acoustic PSOs) to operate PAM equipment to acoustically detect the presence of marine mammals. Acoustic monitoring involves acoustically detecting marine mammals regardless of distance from the source, as localization of animals may not always be possible. Acoustic monitoring is intended to further support visual monitoring (during daylight hours) in maintaining an SZ around the sound source that is clear of marine mammals. In cases where visual monitoring is not effective (*e.g.*, due to weather, nighttime), acoustic monitoring may be used to allow certain activities to occur, as further detailed below.

PAM would take place in addition to the visual monitoring program. Visual monitoring typically is not effective during periods of poor visibility or at night, and even with good visibility, is unable to detect marine mammals when they are below the surface or beyond visual range. Acoustic monitoring can be used in addition to visual observations to improve detection, identification, and localization of cetaceans. The acoustic monitoring would serve to alert visual PSOs (if on duty) when vocalizing cetaceans are detected. It is only useful when marine mammals vocalize, but it can be effective either by day or by night, and does not depend on good visibility. It would be monitored in real time so that the visual observers can be advised when cetaceans are detected.

The R/V Langseth will use a towed PAM system, which must be monitored by at a minimum one on duty acoustic PSO beginning at least 30 minutes prior to ramp-up and at all times during use of the airgun array. Acoustic PSOs may be on watch for a maximum of 4 consecutive hours followed by a break of at least 1 hour between watches and may conduct a maximum of 12 hours of observation per 24-hour period. Combined observational duties (acoustic and visual but not at same time) may not exceed 12 hours per 24-hour period for any individual PSO.

Survey activity may continue for 30 minutes when the PAM system malfunctions or is damaged, while the acoustic PSO diagnoses the issue. If the diagnosis indicates that the PAM system must be repaired to solve the problem, operations may continue for an additional 10 hours without acoustic monitoring during daylight hours only under the following conditions:

- Sea state is less than or equal to BSS 4;
- No marine mammals (excluding delphinids) detected solely by PAM in the applicable SZ in the previous 2 hours;
- NMFS is notified via email as soon as practicable with the time and location in which operations began occurring without an active PAM system; and
- Operations with an active airgun array, but without an operating PAM system, do not exceed a cumulative total of 10 hours in any 24-hour period.

Establishment of Shutdown and Pre-Start Clearance Zones

An SZ is a defined area within which occurrence of a marine mammal triggers mitigation action intended to reduce the potential for certain outcomes, *e.g.,* auditory injury, disruption of critical behaviors. The PSOs would establish a minimum SZ with a 500-m radius. The 500-m SZ would be based on radial distance from the edge of the airgun array (rather than being based on the center of the array or around the vessel

itself). With certain exceptions (described below), if a marine mammal appears within or enters this zone, the airgun array would be shut down.

The pre-start clearance zone is defined as the area that must be clear of marine mammals prior to beginning ramp-up of the airgun array, and includes the SZ plus the buffer zone. Detections of marine mammals within the pre-start clearance zone would prevent airgun operations from beginning (*i.e.*, ramp-up).

The 500-m SZ is intended to be precautionary in the sense that it would be expected to contain sound exceeding the injury criteria for all cetacean hearing groups, (based on the dual criteria of SEL_{cum} and peak SPL), while also providing a consistent, reasonably observable zone within which PSOs would typically be able to conduct effective observational effort. Additionally, a 500-m SZ is expected to minimize the likelihood that marine mammals will be exposed to levels likely to result in more severe behavioral responses. Although significantly greater distances may be observed from an elevated platform under good conditions, we believe that 500 m is likely regularly attainable for PSOs using the naked eye during typical conditions. The pre-start clearance zone simply represents the addition of a buffer to the SZ, doubling the SZ size during pre-clearance.

An extended SZ of 1,500 m must be enforced for all beaked whales and *Kogia* species. No buffer of this extended SZ is required, as NMFS concludes that this extended SZ is sufficiently protective to mitigate harassment to beaked whales and *Kogia* species.

Pre-start Clearance and Ramp-up

Ramp-up (sometimes referred to as "soft start") means the gradual and systematic increase of emitted sound levels from an airgun array. Ramp-up begins by first activating a single airgun of the smallest volume, followed by doubling the number of active elements in stages until the full complement of an array's airguns are active. Each stage should be approximately the same duration, and the total duration should not be less than

approximately 20 minutes. The intent of pre-start clearance observation (30 minutes) is to ensure no marine mammals are observed within the pre-start clearance zone (or extended SZ, for beaked whales and *Kogia* spp.) prior to the beginning of ramp-up. During the pre-start clearance period is the only time observations of marine mammals in the buffer zone would prevent operations (*i.e.*, the beginning of ramp-up). The intent of ramp-up is to warn marine mammals of pending seismic survey operations and to allow sufficient time for those animals to leave the immediate vicinity prior to the sound source reaching full intensity. A ramp-up procedure, involving a step-wise increase in the number of airguns firing and total array volume until all operational airguns are activated and the full volume is achieved, is required at all times as part of the activation of the airgun array. All operators must adhere to the following pre-start clearance and ramp-up requirements:

- The operator must notify a designated PSO of the planned start of ramp-up as agreed upon with the lead PSO; the notification time should not be less than 60 minutes prior to the planned ramp-up in order to allow the PSOs time to monitor the pre-start clearance zone (and extended SZ) for 30 minutes prior to the initiation of ramp-up (pre-start clearance);
- Ramp-ups shall be scheduled so as to minimize the time spent with the source activated prior to reaching the designated run-in;
- One of the PSOs conducting pre-start clearance observations must be notified again immediately prior to initiating ramp-up procedures and the operator must receive confirmation from the PSO to proceed;
- Ramp-up may not be initiated if any marine mammal is within the applicable shutdown or buffer zone. If a marine mammal is observed within the pre-start clearance zone (or extended SZ, for beaked whales and *Kogia* species) during the 30 minute pre-start clearance period, ramp-up may not begin until the animal(s) has been observed exiting the zones or until an additional time period has elapsed with no further

sightings (15 minutes for small odontocetes, and 30 minutes for all mysticetes and all other odontocetes, including sperm whales, beaked whales, and large delphinids, such as pilot whales);

- Ramp-up shall begin by activating a single airgun of the smallest volume in the array and shall continue in stages by doubling the number of active elements at the commencement of each stage, with each stage of approximately the same duration. Duration shall not be less than 20 minutes. The operator must provide information to the PSO documenting that appropriate procedures were followed;
- PSOs must monitor the pre-start clearance zone (and extended SZ) during ramp-up, and ramp-up must cease and the source must be shut down upon detection of a marine mammal within the applicable zone. Once ramp-up has begun, detections of marine mammals within the buffer zone do not require shutdown, but such observation shall be communicated to the operator to prepare for the potential shutdown;
- Ramp-up may occur at times of poor visibility, including nighttime, if appropriate acoustic monitoring has occurred with no detections in the 30 minutes prior to beginning ramp-up. Airgun array activation may only occur at times of poor visibility where operational planning cannot reasonably avoid such circumstances;
- If the airgun array is shut down for brief periods (*i.e.*, less than 30 minutes) for reasons other than implementation of prescribed mitigation (*e.g.*, mechanical difficulty), it may be activated again without ramp-up if PSOs have maintained constant visual and/or acoustic observation and no visual or acoustic detections of marine mammals have occurred within the pre-start clearance zone (or extended SZ, where applicable). For any longer shutdown, pre-start clearance observation and ramp-up are required.; and

- Testing of the airgun array involving all elements requires ramp-up.

Testing limited to individual source elements or strings does not require ramp-up but does require pre-start clearance of 30 minutes.

Shutdown

The shutdown of an airgun array requires the immediate de-activation of all individual airgun elements of the array. Any PSO on duty will have the authority to delay the start of survey operations or to call for shutdown of the airgun array if a marine mammal is detected within the applicable SZ. The operator must also establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the airgun array to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch. When both visual and acoustic PSOs are on duty, all detections will be immediately communicated to the remainder of the on-duty PSO team for potential verification of visual observations by the acoustic PSO or of acoustic detections by visual PSOs. When the airgun array is active (*i.e.*, anytime one or more airguns is active, including during ramp-up) and (1) a marine mammal appears within or enters the applicable SZ and/or (2) a marine mammal (other than delphinids, see below) is detected acoustically and localized within the applicable SZ, the airgun array will be shut down. When shutdown is called for by a PSO, the airgun array will be immediately deactivated and any dispute resolved only following deactivation. Additionally, shutdown will occur whenever PAM alone (without visual sighting), confirms presence of marine mammal(s) in the SZ. If the acoustic PSO cannot confirm presence within the SZ, visual PSOs will be notified but shutdown is not required.

Following a shutdown, airgun activity would not resume until the marine mammal has cleared the SZ. The animal would be considered to have cleared the SZ if it is visually observed to have departed the SZ (*i.e.*, animal is not required to fully exit the buffer zone where applicable), or it has not been seen within the SZ for 15 minutes for

small odontocetes, or 30 minutes for all mysticetes and all other odontocetes, including sperm whales, beaked whales, *Kogia* species, and large delphinids, such as pilot whales.

The shutdown requirement is waived for small dolphins if an individual is detected within the SZ. As defined here, the small dolphin group is intended to encompass those members of the Family Delphinidae most likely to voluntarily approach the source vessel for purposes of interacting with the vessel and/or airgun array (*e.g.*, bow riding). This exception to the shutdown requirement applies solely to specific genera of small dolphins (*Delphinus, Lagenodelphis, Stenella, Steno,* and *Tursiops*).

We include this small dolphin exception because shutdown requirements for small dolphins under all circumstances represent practicability concerns without likely commensurate benefits for the animals in question. Small dolphins are generally the most commonly observed marine mammals in the specific geographic region and would typically be the only marine mammals likely to intentionally approach the vessel. As described above, auditory injury is extremely unlikely to occur for MF cetaceans (*e.g.*, delphinids), as this group is relatively insensitive to sound produced at the predominant frequencies in an airgun pulse while also having a relatively high threshold for the onset of auditory injury (*i.e.*, permanent threshold shift).

A large body of anecdotal evidence indicates that small dolphins commonly approach vessels and/or towed arrays during active sound production for purposes of bow riding, with no apparent effect observed (*e.g.*, Barkaszi *et al.*, 2012; Barkaszi and Kelly, 2018). The potential for increased shutdowns resulting from such a measure would require the Langseth to revisit the missed track line to reacquire data, resulting in an overall increase in the total sound energy input to the marine environment and an increase in the total duration over which the survey is active in a given area. Although other MF hearing specialists (*e.g.*, large delphinids) are no more likely to incur auditory injury than are small dolphins, they are much less likely to approach vessels. Therefore, retaining a

shutdown requirement for large delphinids would not have similar impacts in terms of either practicability for the applicant or corollary increase in sound energy output and time on the water. We do anticipate some benefit for a shutdown requirement for large delphinids in that it simplifies somewhat the total range of decision-making for PSOs and may preclude any potential for physiological effects other than to the auditory system as well as some more severe behavioral reactions for any such animals in close proximity to the Langseth.

Visual PSOs shall use best professional judgment in making the decision to call for a shutdown if there is uncertainty regarding identification (*i.e.*, whether the observed marine mammal(s) belongs to one of the delphinid genera for which shutdown is waived or one of the species with a larger SZ).

L-DEO must implement shutdown if a marine mammal species for which take was not authorized, or a species for which authorization was granted but the authorized takes have been met, approaches the Level A or Level B harassment zones. L-DEO must also implement shutdown if any large whale (defined as a sperm whale or any mysticete species) with a calf (defined as an animal less than two-thirds the body size of an adult observed to be in close association with an adult) and/or an aggregation of six or more large whales are observed at any distance. Finally, L-DEO must implement shutdown upon detection (visual or acoustic) of a North Atlantic right whale at any distance.

Vessel Strike Avoidance

Vessel personnel should use an appropriate reference guide that includes identifying information on all marine mammals that may be encountered. Vessel operators must comply with the below measures except under extraordinary circumstances when the safety of the vessel or crew is in doubt or the safety of life at sea is in question. These requirements do not apply in any case where compliance would

create an imminent and serious threat to a person or vessel or to the extent that a vessel is restricted in its ability to maneuver and, because of the restriction, cannot comply.

Vessel operators and crews must maintain a vigilant watch for all marine mammals and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any marine mammal. A single marine mammal at the surface may indicate the presence of submerged animals in the vicinity of the vessel; therefore, precautionary measures should always be exercised. A visual observer aboard the vessel must monitor a vessel strike avoidance zone around the vessel (distances stated below). Visual observers monitoring the vessel strike avoidance zone may be third-party observers (*i.e.*, PSOs) or crew members, but crew members responsible for these duties must be provided sufficient training to 1) distinguish marine mammals from other phenomena and 2) broadly to identify a marine mammal as a right whale, other whale (defined in this context as sperm whales or baleen whales other than right whales), or other marine mammals.

All vessels, regardless of size, must observe a 10-knot speed restriction in specific areas designated by NMFS for the protection of North Atlantic right whales from vessel strikes. These include all Seasonal Management Areas (SMA) (when in effect) and any dynamic management areas (DMA) (when in effect). See *www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-ship-strikes-north-atlantic-right-whales* for specific detail regarding these areas.

Vessel speeds must be reduced to 10 kn or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near a vessel.

All vessels must maintain a minimum separation distance of 500 m from right whales. If a right whale is sighted within the relevant separation distance, the vessel must steer a course away at 10 knots or less until the 500-m separation distance has been established. If a whale is observed but cannot be confirmed as a species other than a right

whale, the vessel operator must assume that it is a right whale and take appropriate action.

All vessels must maintain a minimum separation distance of 100 m from sperm whales and all other baleen whales.

All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all other marine mammals, with an understanding that at times this may not be possible (*e.g.*, for animals that approach the vessel).

When marine mammals are sighted while a vessel is underway, the vessel shall take action as necessary to avoid violating the relevant separation distance (*e.g.*, attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If marine mammals are sighted within the relevant separation distance, the vessel must reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear or any vessel that is navigationally constrained.

Operational Restrictions

L-DEO must limit airgun use to between May 1 and October 31. Vessel movement and other activities that do not require use of airguns may occur outside of these dates. If any activities (non-seismic) are conducted between November 1 and April 30, L-DEO must submit daily observations to the NMFS Southeast Regional Office (SERO). L-DEO must also notify SERO on the start and end date of seismic operations in the survey area via email at *nmfs.ser.research.notification@noaa.gov*.

To further prevent exposure of North Atlantic right whales during a time when they may start to migrate to calving and nursing grounds in coastal and shelf waters adjacent to the survey area, the L-DEO must not conduct seismic survey activities in the nearshore portions (*i.e.*, survey tracklines) of the action area on or after October 1

through April 30. We define "nearshore lines" as those within 100 km of the U.S. shore in areas north of 31° N and within 80 km from the U.S. shore in areas south of 31°N. Relative to the survey area, these nearshore portions of the survey area overlap with higher density areas for North Atlantic right whale during the month of October as shown in Roberts *et al.* (2023).

Based on our evaluation of the applicant's measures, as well as other measures considered by NMFS, NMFS has determined that the mitigation measures provide the means of 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.

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 while conducting the activities. 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 activity; 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.

Vessel-Based Visual Monitoring

As described above, PSO observations would take place during daytime airgun operations. During seismic survey operations, at least five visual PSOs would be based aboard the Langseth. Two visual PSOs would be on duty at all times during daytime hours. Monitoring shall be conducted in accordance with the following requirements:

- The operator shall provide PSOs with bigeye binoculars (*e.g.*, 25 x 150; 2.7 view angle; individual ocular focus; height control) of appropriate quality solely for PSO use. These shall be pedestal-mounted on the deck at the most appropriate vantage point that provides for optimal sea surface observation, PSO safety, and safe operation of the vessel; and
- The operator will work with the selected third-party observer provider to ensure PSOs have all equipment (including backup equipment) needed to adequately perform necessary tasks, including accurate determination of distance and bearing to observed marine mammals.

PSOs must have the following requirements and qualifications:

- PSOs shall be independent, dedicated, trained visual and acoustic PSOs and must be employed by a third-party observer provider;
- PSOs shall have no tasks other than to conduct observational effort (visual or acoustic), collect data, and communicate with and instruct relevant vessel crew with regard to the presence of protected species and mitigation requirements (including brief alerts regarding maritime hazards);
- PSOs shall have successfully completed an approved PSO training course appropriate for their designated task (visual or acoustic). Acoustic PSOs are required to complete specialized training for operating PAM systems and are encouraged to have familiarity with the vessel with which they will be working;
- PSOs can act as acoustic or visual observers (but not at the same time) as long as they demonstrate that their training and experience are sufficient to perform the task at hand;
- NMFS must review and approve PSO resumes accompanied by a relevant training course information packet that includes the name and qualifications (*i.e.*, experience, training completed, or educational background) of the instructor(s), the course outline or syllabus, and course reference material as well as a document stating successful completion of the course;
- PSOs must successfully complete relevant training, including completion of all required coursework and passing (80 percent or greater) a written and/or oral examination developed for the training program;
- PSOs must have successfully attained a bachelor's degree from an accredited college or university with a major in one of the natural sciences, a minimum of 30 semester hours or equivalent in the biological sciences, and at least one undergraduate course in math or statistics; and

- The educational requirements may be waived if the PSO has acquired the relevant skills through alternate experience. Requests for such a waiver shall be submitted to NMFS and must include written justification. Requests shall be granted or denied (with justification) by NMFS within 1 week of receipt of submitted information. Alternate experience that may be considered includes, but is not limited to: (1) secondary education and/or experience comparable to PSO duties; (2) previous work experience conducting academic, commercial, or government-sponsored protected species surveys; or (3) previous work experience as a PSO; the PSO should demonstrate good standing and consistently good performance of PSO duties.
- For data collection purposes, PSOs shall use standardized electronic data collection forms. PSOs shall record detailed information about any implementation of mitigation requirements, including the distance of animals to the airgun array and description of specific actions that ensued, the behavior of the animal(s), any observed changes in behavior before and after implementation of mitigation, and if shutdown was implemented, the length of time before any subsequent ramp-up of the airgun array. If required mitigation was not implemented, PSOs should record a description of the circumstances. At a minimum, the following information must be recorded:
    - Vessel name, vessel size and type, maximum speed capability of vessel;
    - Dates (MM/DD/YYYY) of departures and returns to port with port name;
    - PSO names and affiliations, PSO ID (initials or other identifier);
    - Date (MM/DD/YYYY) and participants of PSO briefings;
    - Visual monitoring equipment used (description);

- PSO location on vessel and height (meters) of observation location above water surface;
- Watch status (description);
- Dates (MM/DD/YYYY) and times (Greenwich Mean Time/UTC) of survey on/off effort and times (GMC/UTC) corresponding with PSO on/off effort;
- Vessel location (decimal degrees) when survey effort began and ended and vessel location at beginning and end of visual PSO duty shifts;
- Vessel location (decimal degrees) at 30-second intervals if obtainable from data collection software, otherwise at practical regular interval;
- Vessel heading (compass heading) and speed (knots) at beginning and end of visual PSO duty shifts and upon any change;
- Water depth (meters) (if obtainable from data collection software);
- Environmental conditions while on visual survey (at beginning and end of PSO shift and whenever conditions changed significantly), including BSS and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon;
- Factors that may have contributed to impaired observations during each PSO shift change or as needed as environmental conditions changed (description) (*e.g.*, vessel traffic, equipment malfunctions); and

- Vessel/Survey activity information (and changes thereof) (description), such as airgun power output while in operation, number and volume of airguns operating in the array, tow depth of the array, and any other notes of significance (*i.e.*, pre-start clearance, ramp-up, shutdown, testing, shooting, ramp-up completion, end of operations, streamers, *etc.*).

- Upon visual observation of any marine mammals, the following information must be recorded:
  - Sighting ID (numeric);
  - Watch status (sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform);
  - Location of PSO/observer (description);
  - Vessel activity at the time of the sighting (*e.g.*, deploying, recovering, testing, shooting, data acquisition, other);
  - PSO who sighted the animal/ID;
  - Time/date of sighting (GMT/UTC, MM/DD/YYYY);
  - Initial detection method (description);
  - Sighting cue (description);
  - Vessel location at time of sighting (decimal degrees);
  - Water depth (meters);
  - Direction of vessel's travel (compass direction);

- Speed (knots) of the vessel from which the observation was made;
- Direction of animal's travel relative to the vessel (description, compass heading);
- Bearing to sighting (degrees);
- Identification of the animal (*e.g.*, genus/species, lowest possible taxonomic level, or unidentified) and the composition of the group if there is a mix of species;
- Species reliability (an indicator of confidence in identification) (1 = unsure/possible, 2 = probable, 3 = definite/sure, 9 = unknown/not recorded);
- Estimated distance to the animal (meters) and method of estimating distance;
- Estimated number of animals (high/low/best) (numeric);
- Estimated number of animals by cohort (adults, yearlings, juveniles, calves, group composition, *etc.*);
- Description (as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics);
- Detailed behavior observations (*e.g.*, number of blows/breaths, number of surfaces, breaching, spyhopping, diving, feeding,

traveling; as explicit and detailed as possible; note any observed changes in behavior);

- Animal's closest point of approach (meters) and/or closest distance from any element of the airgun array;
- Description of any actions implemented in response to the sighting (*e.g.*, delays, shutdown, ramp-up) and time and location of the action.
- Photos (Yes/No);
- Photo Frame Numbers (List of numbers); and
- Conditions at time of sighting (Visibility; Beaufort Sea State);

If a marine mammal is detected while using the PAM system, the following information should be recorded:

- An acoustic encounter identification number, and whether the detection was linked with a visual sighting;
- Date and time when first and last heard;
- Types and nature of sounds heard (*e.g.*, clicks, whistles, creaks, burst pulses, continuous, sporadic, strength of signal); and
- Any additional information recorded such as water depth of the hydrophone array, bearing of the animal to the vessel (if determinable), species or taxonomic group (if determinable), spectrogram screenshot, and any other notable information.

Reporting

The Holder shall submit a draft comprehensive report on all activities and monitoring results within 90 days of the completion of the survey or expiration of the IHA, whichever comes sooner. The report must describe all activities conducted and

sightings of marine mammals, must provide full documentation of methods, results, and interpretation pertaining to all monitoring, and must summarize the dates and locations of survey operations and all marine mammal sightings (dates, times, locations, activities, associated survey activities). The draft report shall also include geo-referenced time-stamped vessel tracklines for all time periods during which airgun arrays were operating. Tracklines should include points recording any change in airgun array status (*e.g.*, when the sources began operating, when they were turned off, or when they changed operational status such as from full array to single gun or vice versa). GIS files shall be provided in ESRI shapefile format and include the UTC date and time, latitude in decimal degrees, and longitude in decimal degrees. All coordinates shall be referenced to the WGS84 geographic coordinate system. In addition to the report, all raw observational data shall be made available. The report must summarize data collected as described above in "Data Collection." A final report must be submitted within 30 days following resolution of any comments on the draft report.

The report must include a validation document concerning the use of PAM, which should include necessary noise validation diagrams and demonstrate whether background noise levels on the PAM deployment limited achievement of the planned detection goals. Copies of any vessel self-noise assessment reports must be included with the report.

Reporting NARW

Although not anticipated, if a North Atlantic right whale is observed at any time by PSOs or personnel on any project vessels, during surveys or during vessel transit, L-DEO must immediately report sighting information to the NMFS North Atlantic Right Whale Sighting Advisory System: 877-WHALE-HELP (877-942-5343). North Atlantic right whale sightings in any location must also be reported to the U.S. Coast Guard via channel 16.

Reporting Injured or Dead Marine Mammals

Discovery of injured or dead marine mammals—In the event that personnel involved in the survey activities discover an injured or dead marine mammal, the L-DEO shall report the incident to the OPR, NMFS, and to the NMFS Southeast Regional Stranding Coordinator as soon as feasible. The report must include the following information:

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

Vessel strike—In the event of a strike of a marine mammal by any vessel involved in the activities covered by the authorization, L-DEO shall report the incident to OPR, NMFS, and to the NMFS Southeast Regional Stranding Coordinator as soon as feasible. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Vessel's speed during and leading up to the incident;
- Vessel's course/heading and what operations were being conducted (if applicable);
- Status of all sound sources in use;
- Description of avoidance measures/requirements that were in place at the time of the strike and what additional measure were taken, if any, to avoid strike;
- Environmental conditions (*e.g.*, wind speed and direction, BSS, cloud cover, visibility) immediately preceding the strike;

- Species identification (if known) or description of the animal(s) involved;
- Estimated size and length of the animal that was struck;
- Description of the behavior of the marine mammal immediately preceding and following the strike;
- If available, description of the presence and behavior of any other marine mammals present immediately preceding the strike;
- Estimated fate of the animal (*e.g.*, dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and
- To the extent practicable, photographs or video footage of the animal(s).

Actions to Minimize Additional Harm to Live-Stranded (or Milling) Marine Mammals

In the event of a live stranding (or near-shore atypical milling) event within 50 km of the survey operations, where the NMFS stranding network is engaged in herding or other interventions to return animals to the water, the Director of OPR, NMFS (or designee), will advise L-DEO of the need to implement shutdown procedures for all active airgun arrays operating within 50 km of the stranding. Shutdown procedures for live stranding or milling marine mammals include the following: if at any time, the marine mammal(s) die or are euthanized, or if herding/intervention efforts are stopped, the Director of OPR, NMFS (or designee), will advise the IHA-holder that the shutdown around the animals' location is no longer needed. Otherwise, shutdown procedures will remain in effect until the Director of OPR, NMFS (or designee), determines and advises L-DEO that all live animals involved have left the area (either of their own volition or following an intervention).

If further observations of the marine mammals indicate the potential for re-stranding, additional coordination with the IHA-holder will be required to determine what measures are necessary to minimize that likelihood (*e.g.*, extending the shutdown or moving operations farther away) and to implement those measures as appropriate.

Additional Information Requests—if NMFS determines that the circumstances of any marine mammal stranding found in the vicinity of the activity suggest investigation of the association with survey activities is warranted, and an investigation into the stranding is being pursued, NMFS will submit a written request to L-DEO indicating that the following initial available information must be provided as soon as possible, but no later than 7 business days after the request for information:

- Status of all sound source use in the 48 hours preceding the estimated time of stranding and within 50 km of the discovery/notification of the stranding by NMFS; and
- If available, description of the behavior of any marine mammal(s) observed preceding (*i.e.*, within 48 hours and 50 km) and immediately after the discovery of the stranding.

In the event that the investigation is still inconclusive, the investigation of the association of the survey activities is still warranted, and the investigation is still being pursued, NMFS may provide additional information requests, in writing, regarding the nature and location of survey operations prior to the time period above.

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 impacts or responses (*e.g.*, intensity, duration), the context of any

impacts or responses (*e.g.*, critical reproductive time or location, foraging impacts affecting energetics), 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' 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 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, the discussion of our analysis applies to all the species listed in Table 1, given that the anticipated effects of this activity on these different marine mammal stocks are expected to be similar. Where there are meaningful differences between species or stocks they are included as separate subsections below. NMFS does not anticipate that serious injury or mortality would occur as a result of L-DEO's planned survey, even in the absence of mitigation, and no serious injury or mortality is authorized. As discussed in the "Potential Effects of Specified Activities on Marine Mammals and Their Habitat" section above, non-auditory physical effects and vessel strike are not expected to occur. NMFS expects that the majority of potential takes would be in the form of short-term Level B behavioral harassment in the form of temporary avoidance of the area or decreased foraging (if such activity was occurring), reactions that are considered to be of low severity and with no lasting biological consequences (*e.g.*, Southall *et al.*, 2007).

We are authorizing a limited number of Level A harassment of 4 species in the form of PTS, and Level B harassment only of the remaining marine mammal species. If any PTS is incurred in marine mammals as a result of the planned activity, we expect only a small degree of PTS that would not result in severe hearing impairment because of

the constant movement of both the Langseth and of the marine mammals in the project areas, as well as the fact that the vessel is not expected to remain in any one area in which individual marine mammals would be expected to concentrate for an extended period of time. Additionally, L-DEO would shut down the airgun array if marine mammals approach within 500 m (with the exception of specific genera of dolphins, see "Mitigation" section), further reducing the expected duration and intensity of sound, and therefore the likelihood of marine mammals incurring PTS. Since the duration of exposure to loud sounds will be relatively short it would be unlikely to affect the fitness of any individuals. Also, as described above, we expect that marine mammals would likely move away from a sound source that represents an aversive stimulus, especially at levels that would be expected to result in PTS, given sufficient notice of the Langseth's approach due to the vessel's relatively low speed when conducting seismic surveys. Accordingly, we expect that the majority of takes would be in the form of short-term Level B behavioral harassment in the form of temporary avoidance of the area or decreased foraging (if such activity were occurring), reactions that are considered to be of low severity and with no lasting biological consequences (*e.g.*, Southall *et al.*, 2007; Ellison *et al.*, 2012).

In addition to being temporary, the maximum expected Level B harassment zone around the survey vessel is 6,733 m for water depths greater than 1,000 m (and up to 10,100 m in water depths of 100 to 1,000 m). Therefore, the ensonified area surrounding the vessel is relatively small compared to the overall distribution of animals in the area and their use of the habitat. Feeding behavior is not likely to be significantly impacted as prey species are mobile and are broadly distributed throughout the survey area; therefore, marine mammals that may be temporarily displaced during survey activities are expected to be able to resume foraging once they have moved away from areas with disturbing levels of underwater noise. Because of the short duration (40 days) and 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 survey area and there are no feeding areas known to be biologically important to marine mammals within the survey area. There is no designated critical habitat for any ESA-listed marine mammals in the survey area.

Marine Mammal Species with Active Unusual Mortality Events (UMEs)

There are several active UMEs occurring in the vicinity of L-DEO's survey area. Elevated humpback whale mortalities have occurred along the Atlantic coast from Maine through Florida since January 2016. Of the cases examined, approximately half had evidence of human interaction (ship strike or entanglement). The UME does not yet provide cause for concern regarding population-level impacts. Despite the UME, the relevant population of humpback whales (the West Indies breeding population, or DPS) remains stable at approximately 12,000 individuals.

Beginning in January 2017, elevated minke whale strandings have occurred along the Atlantic coast from Maine through South Carolina, with highest numbers in Massachusetts, Maine, and New York. This event does not provide cause for concern regarding population level impacts, as the likely population abundance is greater than 20,000 whales, and the UME is pending closure.

The mitigation measures are expected to reduce the number and/or severity of takes for all species listed in Table 1, including those with active UMEs, to the level of least practicable adverse impact. In particular they would provide animals the opportunity to move away from the sound source throughout the survey area before seismic survey equipment reaches full energy, thus preventing them from being exposed to sound levels

that have the potential to cause injury (Level A harassment) or more severe Level B harassment.

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

- No serious injury or mortality is anticipated or authorized;
- The activity is temporary and of relatively short duration (40 days);
- The vast majority of anticipated impacts of the activity on marine mammals would be temporary behavioral changes due to avoidance of the area around the vessel;
- The availability of alternative areas of similar habitat value for marine mammals to temporarily vacate the survey area during the survey to avoid exposure to sounds from the activity is readily abundant;
- The potential adverse effects on fish or invertebrate species that serve as prey species for marine mammals from the survey would be temporary and spatially limited, and impacts to marine mammal foraging would be minimal;
- The mitigation measures are expected to reduce the number of takes by Level A harassment (in the form of PTS) by allowing for detection of marine mammals in the vicinity of the vessel by visual and acoustic observers; and
- The mitigation measures, including visual and acoustic shutdowns are expected to minimize potential impacts to marine mammals (both amount and severity).

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 monitoring and mitigation measures, NMFS finds that the total

marine mammal take from the activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

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

The amount of take NMFS is authorizing is below one-third of the estimated stock abundance for all species with available abundance estimates except for melon headed whale and Fraser's dolphin; for these species, the amount of take authorized by NMFS could amount to 34.5 percent of the modeled population abundance. Applying qualitative factors into our analysis, however, NMFS anticipates that actual take will be well below the one-third threshold. First, spatial factors lead us to believe only small numbers of the species will be taken given that the survey area is a very small fraction of these species' range. The melon headed whale occurs in deep waters offshore of the southeastern U.S. and in the Gulf of Mexico extending as far south as southern Brazil, while Fraser's dolphin also occurs off the Western Atlantic in deep waters (1,000 m) from the Gulf of Mexico extending as far south as Uruguay. The Blake Plateau is a tiny fraction of these wide ranges, and NMFS does not anticipate, based on the species' behavior and life histories, a substantial percentage of either stock to concentrate in the

Blake Plateau. This prediction is additionally informed by the fact that there have been zero OBIS database sightings of either species within the survey area. Second, temporal factors suggest only small numbers of take given that the activity would occur only over 40 days and during this brief period it is extremely unlikely that significant numbers of individual members of these species will be present near the survey area. Last, our calculation of 34.5 percent take is conservative in that it assumes that each anticipated take affects a different individual from the population. In fact, certain individuals may experience more than a single take, and given that fact, we would expect actual take to affect well below one-third of the relevant populations.

Based on the analysis contained herein of the planned activity (including the mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS finds that small numbers of marine mammals would 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 (ESA; 16 U.S.C. 1531 *et seq*.) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally whenever we authorize take for endangered or threatened species, in this case with the ESA Interagency Cooperation Division within NMFS' OPR.

The NMFS OPR ESA Interagency Cooperation Division issued a Biological Opinion under section 7 of the ESA, on the issuance of an IHA to L-DEO under section 101(a)(5)(D) of the MMPA by the NMFS OPR Permits and Conservation Division. The Biological Opinion concluded that the action is not likely to jeopardize the continued existence of ESA-listed North Atlantic right whales, blue whales, fin whales, sei whales, and sperm whales.

National Environmental Policy Act (NEPA)

In compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), as implemented by the regulations published by the Council on Environmental Quality (40 CFR parts 1500–1508), the NSF prepared an Environmental Analysis (EA) to consider the direct, indirect, and cumulative effects to the human environment from the planned marine geophysical survey off of North Carolina. NSF's EA was made available to the public for review and comment in relation to its suitability for adoption by NMFS in order to assess the impacts to the human environment of issuance of an IHA to L-DEO. In compliance with NEPA and the Council on Environmental Quality regulations, as well as NOAA Administrative Order 216–6, NMFS has reviewed the NSF's EA, determined it to be sufficient, and adopted that EA and signed a Finding of No Significant Impact (FONSI) available on our website at *https://www.fisheries.noaa.gov/action/incidental-take-authorization-lamont-doherty-earth-observatorys-marine-geophysical-surveys*. NSF's EA is available at *https://www.nsf.gov/geo/oce/envcomp/*.

Authorization

NMFS has issued an IHA to L-DEO for the incidentalharassment of small numbers of 29 marine mammal species incidental to a marine geophysical survey of Blake Plateau in the northwest Atlantic Ocean that includes the previously explained mitigation, monitoring and reporting requirements.

Dated: July 10, 2023.

Kimberly Damon-Randall,

Director, Office of Protected Resources,

National Marine Fisheries Service.

[FR Doc. 2023-14946 Filed: 7/13/2023 8:45 am; Publication Date: 7/14/2023]