



INCIDENTAL HARASSMENT AUTHORIZATION

The Lamont-Doherty Earth Observatory of Columbia University (L-DEO) is hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1371(a)(5)(D)) to incidentally harass marine mammals, under the following conditions:

1. This incidental harassment authorization (IHA) is valid for one year from the date of issuance.
2. This IHA is valid only for geophysical survey activity at the Reykjanes Ridge in the North Atlantic Ocean, as specified in L-DEO's IHA application.
3. General Conditions
 - (a) A copy of this IHA must be in the possession of L-DEO, the vessel operator, the lead protected species observer (PSO), and any other relevant designees of L-DEO operating under the authority of this IHA.
 - (b) The species and/or stocks authorized for taking are listed in Table 1. Authorized take, by Level A and Level B harassment only, is limited to the species and numbers listed in Table 1.
 - (c) The taking by serious injury or death of any of the species listed in Table 1 or any taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this IHA. Any taking exceeding the authorized numbers listed in Table 1 is prohibited and may result in the modification, suspension, or revocation of this IHA.
 - (d) L-DEO must ensure that relevant vessel personnel and the PSO team participate in a joint onboard briefing led by the vessel operator and lead PSO to ensure that responsibilities, communication procedures, marine mammal monitoring protocols, operational procedures, and IHA requirements are clearly understood.
4. Mitigation Requirements
 - a. L-DEO must use independent, dedicated, trained visual and acoustic PSOs, meaning that the PSOs must be employed by a third-party observer provider, must not have tasks other than to conduct observational effort, collect data, and communicate with and instruct relevant vessel crew with regard to the presence of marine mammals and mitigation requirements (including brief alerts regarding maritime hazards), and must have successfully completed an approved PSO



training course appropriate for their designated task (visual or acoustic). Individual PSOs may perform acoustic and visual PSO duties (though not at the same time).

- b. At least one visual and two acoustic PSOs must have a minimum of 90 days at-sea experience working in those roles, respectively, during a deep penetration seismic survey, with no more than 18 months elapsed since the conclusion of the at-sea experience.
- c. Visual Observation
 - i. 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 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 exclusion and buffer zones must begin no less than 30 minutes prior to ramp-up and must continue until one hour after use of the airgun array ceases or until 30 minutes past sunset.
 - ii. Visual PSOs must coordinate to ensure 360° visual coverage around the vessel from the most appropriate observation posts, and must conduct visual observations using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner.
 - iii. Visual PSOs must immediately communicate all observations to the acoustic PSO(s) on duty, including any determination by the PSO regarding species identification, distance, and bearing and the degree of confidence in the determination.
 - iv. During good conditions (e.g., daylight hours; Beaufort sea state (BSS) 3 or less), visual PSOs must 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.
 - v. Visual PSOs may be on watch for a maximum of four consecutive hours followed by a break of at least one 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.
- d. Acoustic Monitoring
 - i. The Holder must use a towed passive acoustic monitoring system (PAM) 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.

- ii. When both visual and acoustic PSOs are on duty, all detections must 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.
- iii. Acoustic PSOs may be on watch for a maximum of four consecutive hours followed by a break of at least one hour between watches and may conduct a maximum of 12 hours of observation per 24-hour period. Combined observational duties may not exceed 12 hours per 24-hour period for any individual PSO.
- iv. Survey activity may continue for 30 minutes when the PAM system malfunctions or is damaged, while the PAM operator 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:
 - 1. Sea state is less than or equal to BSS 4;
 - 2. With the exception of delphinids, no marine mammals detected solely by PAM in the applicable shutdown zone in the previous two hours;
 - 3. 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
 - 4. 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.
- e. Shutdown zones and buffer zones
 - i. Except as provided in 4(e)(ii), the PSOs must establish and monitor a 500-m shutdown zone and additional 500-m buffer zone (total 1000 m). The 1000-m zone must serve to focus observational effort but not limit such effort; observations of marine mammals beyond this distance shall also be recorded as described in 5(d) below and/or trigger shutdown as described in 4(g)(iii) below, as appropriate. The shutdown zone encompasses the area at and below the sea surface out to a radius of 500 m from the edges of the airgun array (rather than being based on the center of the array or around the vessel itself) (0–500 m). The buffer zone encompasses the area at and below the sea surface from the edge of the shutdown zone, out to a radius of 1000 meters from the edges of the airgun array (500–1000 m). During use of the airgun array, occurrence of marine mammals within the buffer zone (but outside the shutdown zone) must be communicated to the operator to prepare for the potential shutdown of the airgun array. PSOs must monitor the shutdown zone

and buffer zone for a minimum of 30 minutes prior to ramp-up (i.e., pre-start clearance).

- ii. An extended 1500 m shutdown zone must be established for all beaked whales, a large whale with a calf, and groups of six or more large whales. No buffer zone is required.

f. Pre-start clearance and Ramp-up

- i. A ramp-up procedure must be followed at all times as part of the activation of the airgun array, except as described under 4(f)(viii).
- ii. 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 shutdown and buffer zone for 30 minutes prior to the initiation of ramp-up.
- iii. Ramp-ups shall be scheduled so as to minimize the time spent with the source activated prior to reaching the designated run-in.
- iv. One of the PSOs conducting the pre-start clearance observations must be notified again immediately prior to initiating ramp-up procedures and the operator must receive confirmation from the PSOs to proceed.
- v. Ramp-up must not be initiated if any marine mammal is within the shutdown or buffer zone. If a marine mammal is observed within the shutdown zone or the buffer zone during the 30 minute pre-start clearance period, ramp-up may not begin until the animal(s) has been observed exiting the zone or until an additional time period has elapsed with no further sightings (15 minutes for small odontocetes and pinnipeds, and 30 minutes for mysticetes and all other odontocetes).
- vi. Ramp-up must begin by activating a single airgun of the smallest volume in the array and must 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 must not be less than 20 minutes. The operator must provide information to the PSO documenting that appropriate procedures were followed.
- vii. PSOs must monitor the shutdown and buffer zones during ramp-up, and ramp-up must cease and the source must be shut down upon visual observation or acoustic detection (other than pinnipeds and delphinids) of a marine mammal within the shutdown zone. Once ramp-up has begun, observations of marine mammals within the buffer zone do not require shutdown, but such observation must be communicated to the operator to prepare for the potential shutdown.

- viii. Where operational planning cannot reasonably avoid such circumstances 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.
 - ix. If the airgun array is shut down for brief periods (i.e., less than 30 minutes) for reasons other than that described for shutdown (e.g., mechanical difficulty), it may be activated again without ramp-up if PSOs have maintained constant observation and no detections of marine mammals have occurred within the applicable shutdown zone. For any longer shutdown, pre-start clearance observation and ramp-up are required.
 - x. 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 watch.
- g. Shutdown requirements
- i. Any PSO on duty has the authority to delay the start of survey operations or to call for shutdown of the airgun array.
 - ii. The operator must 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.
 - iii. When the airgun array is active (i.e., anytime one or more airguns is active, including during ramp-up) and (1) a marine mammal (excluding pinnipeds and delphinids of the species described in 4(g)(iv)) appears within or enters the shutdown zone and/or (2) a marine mammal is detected acoustically and localized within the shutdown zone, the airgun array must be shut down. When shutdown is called for by a PSO, the airgun array must be immediately deactivated. Any dispute regarding a PSO shutdown must be resolved after deactivation.
 - iv. The shutdown requirement described in 4(g)(iii) shall be waived for pinnipeds and small dolphins of the following genera: *Delphinus*, *Lagenodelphis*, *Stenella*, and *Tursiops*.
 - 1. If a pinniped or dolphin of these genera is visually and/or acoustically detected and localized within the shutdown zone, no shutdown is required unless the PSO confirms the individual to be of a genus other than those listed above, in which case a shutdown is required.

2. If there is uncertainty regarding identification, visual PSOs may use best professional judgement in making the decision to call for a shutdown.
- v. Upon implementation of shutdown, the source may be reactivated after the marine mammal(s) has been observed exiting the applicable shutdown zone (*i.e.*, animal is not required to fully exit the buffer zone where applicable) or following a clearance period (15 minutes for small odontocetes, and 30 minutes for mysticetes and all other odontocetes) with no further observation of the marine mammal(s).
- vi. Shutdown of the array is required upon observation of a species for which authorization has not been granted or a species for which authorization has been granted but the authorized number of takes has been met, approaching or observed within any harassment zone (*see* table 2 and table 3).
- h. Vessel strike avoidance
 - i. Vessel operators and crew 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 mammals. A visual observer aboard the vessel must monitor a vessel strike avoidance zone around the vessel (separation 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 to taxonomic group (*i.e.*, as a large whale, or other marine mammal).
 - ii. Vessel speeds must be reduced to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near a vessel.
 - iii. The vessel must maintain a minimum separation distance of 100 m from sperm whales and all baleen whales.
 - iv. The vessel 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).
 - v. When marine mammals are sighted while a vessel is underway, the vessel must 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.

5. Monitoring Requirements

- a. The operator must provide PSOs with bigeye reticle binoculars (e.g., 25 x 150; 2.7 view angle; individual ocular focus; height control) of appropriate quality solely for PSO use. These must 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.
- b. The operator must 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. Such equipment, at a minimum, must include:
 - i. PAM must include a system that has been verified and tested by an experienced acoustic PSO that will be using it during the trip for which monitoring is required.
 - ii. Reticle binoculars (e.g., 7 x 50) of appropriate quality (at least one per PSO, plus backups).
 - iii. Global Positioning Unit (GPS) (plus backup).
 - iv. Digital single-lens reflex cameras of appropriate quality that capture photographs and video (plus backup).
 - v. Compass (plus backup)
 - vi. Radios for communication among vessel crew and PSOs (at least one per PSO, plus backups).
 - vii. Any other tools necessary to adequately perform necessary PSO tasks.
- c. Protected Species Observers (PSOs, Visual and Acoustic) Qualifications
 - i. PSOs must have successfully completed an acceptable 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.
 - ii. NMFS must review and approve PSO resumes.
 - iii. One visual PSO with experience as shown in 4(b) shall be designated as the lead for the PSO team. The lead must coordinate duty schedules and roles for

the PSO team and serve as primary point of contact for the vessel operator. (Note that the responsibility of coordinating duty schedules and roles may instead be assigned to a shore-based, third-party monitoring coordinator.) To the maximum extent practicable, the lead PSO must devise the duty schedule such that experienced PSOs are on duty with those PSOs with appropriate training but who have not yet gained relevant experience.

- iv. 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.
 - v. 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.
 - vi. The educational requirements may be waived if the PSO has acquired the relevant skills through alternate experience. Requests for such a waiver must be submitted to NMFS and must include written justification. Requests must be granted or denied (with justification) by NMFS within one 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 marine mammal surveys; or (3) previous work experience as a PSO; the PSO should demonstrate good standing and consistently good performance of PSO duties.
- d. Data Collection
- i. PSOs must use standardized electronic data collection forms. PSOs must 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.
 - ii. At a minimum, the following information must be recorded:
 - 1. Vessel name, vessel size and type, maximum speed capability of vessel;
 - 2. Dates (MM/DD/YYYY) of departures and returns to port with port name;
 - 3. PSO names and affiliations, PSO ID (initials or other identifier);

4. Date (MM/DD/YYYY) and participants of PSO briefings (as discussed in General Requirement);
 5. Visual monitoring equipment used (description);
 6. PSO location on vessel and height (meters) of observation location above water surface;
 7. Watch status (description);
 8. 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;
 9. Vessel location (decimal degrees) when survey effort began and ended and vessel location at beginning and end of visual PSO duty shifts;
 10. Vessel location (decimal degrees) at 30-second intervals if obtainable from data collection software, otherwise at a practical regular interval;
 11. Vessel heading (compass heading) and speed (knots) at beginning and end of visual PSO duty shifts and upon any change;
 12. Water depths (meters) (if obtainable from data collection software);
 13. 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;
 14. 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
 15. Vessel/survey activity information (and changes thereof) (description), such as airgun array 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.).
- iii. Upon visual observation of any marine mammals, the following information must be recorded:
1. Sighting ID (numeric);
 2. Watch status (sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform);

3. Location of PSO/observer (description);
4. Vessel activity at the time of the sighting (*e.g.*, deploying, recovering, testing, shooting, data acquisition, other);
5. PSO who sighted the animal/ID;
6. Time/date of sighting (GMT/UTC, MM/DD/YYYY);
7. Initial detection method (description);
8. Sighting cue (description);
9. Vessel location at time of sighting (decimal degrees);
10. Water depth (meters);
11. Direction of vessel's travel (compass direction);
12. Speed (knots) of the vessel from which the observation was made;
13. Direction of animal's travel relative to the vessel (description, compass heading);
14. Bearing to sighting (degrees);
15. 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;
16. Species reliability (an indicator of confidence in identification) (1=unsure/possible, 2=probable, 3=definite/sure, 9=unknown/not recorded);
17. Estimated distance to the animal (meters) and method of estimating distance;
18. Estimated number of animals (high/low/best) (numeric);
19. Estimated number of animals by cohort (adults, yearlings, juveniles, calves, group composition, etc.);
20. 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);

21. 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);
 22. Animal's closest point of approach (CPA) (meters) and/or closest distance from any element of the airgun array;
 23. Description of any actions implemented in response to the sighting (*e.g.*, delays, shutdown, ramp-up) and time and location of the action.
 24. Photos (Yes/No);
 25. Photo Frame Numbers (list of numbers); and
 26. Conditions at a time of sighting (*e.g.*, visibility, BSS)
- iv. If a marine mammal is detected while using the PAM system, the following information must be recorded:
1. An acoustic encounter identification number, and whether the detection was linked with a visual sighting;
 2. Date (MM/DD/YYYY) and time (GMT/UTC) when first and last heard;
 3. Types and nature of sounds heard (*e.g.*, clicks, whistles, creaks, burst pulses, continuous, sporadic, strength of signal); and
 4. 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.

6. Reporting

(a) L-DEO must submit a draft comprehensive report to NMFS on all activities and monitoring results within 90 days of the completion of the survey or expiration of the IHA, whichever comes sooner. A final report must be submitted within 30 days following resolution of any comments on the draft report. If no comments are received from NMFS within 30 calendar days of receipt of the draft report, the report shall be considered final. The draft report must include the following:

- (i) Summary of all activities conducted and sightings of marine mammals near the activities;
- (ii) Summary of all data required to be collected (see condition 5(d));

- (iii) Full documentation of methods, results, and interpretation pertaining to all monitoring;
 - (iv) Summary of dates and locations of survey operations (including (1) the number of days on which the airgun array was active and (2) the percentage of time and total time the array was active during daylight vs. nighttime hours (including dawn and dusk)) and all marine mammal sightings (dates, times, locations, activities, associated survey activities);
 - (v) Geo-referenced time-stamped vessel tracklines for all time periods during which airguns were operating. Tracklines should include points recording any change in airgun status (e.g., when the airguns began operating, when they were turned off, or when they changed from full array to single gun or vice versa);
 - (vi) GIS files in ESRI shapefile format and UTC date and time, latitude in decimal degrees, and longitude in decimal degrees. All coordinates must be referenced to the WGS84 geographic coordinate system; and
 - (vii) Raw observational data.
- (b) Reporting Injured or Dead Marine Mammals
- (i) Discovery of Injured or Dead Marine Mammal – In the event that personnel involved in the survey activities covered by the authorization discover an injured or dead marine mammal, L-DEO must report the incident to the Office of Protected Resources (OPR) (PR.ITP.MonitoringReports@noaa.gov) as soon as feasible. The report must include the following information:
 1. Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
 2. Species identification (if known) or description of the animal(s) involved;
 3. Condition of the animal(s) (including carcass condition if the animal is dead);
 4. Observed behaviors of the animal(s), if alive;
 5. If available, photographs or video footage of the animal(s); and
 6. General circumstances under which the animal was discovered.
 - (ii) Vessel Strike – In the event of a ship strike of a marine mammal by any vessel involved in the activities covered by the authorization, L-DEO must

report the incident to OPR as soon as feasible. The report must include the following information:

1. Time, date, and location (latitude/longitude) of the incident;
 2. Species identification (if known) or description of the animal(s) involved;
 3. Vessel's speed during and leading up to the incident;
 4. Vessel's course/heading and what operations were being conducted (if applicable);
 5. Status of all sound sources in use;
 6. Description of avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike;
 7. Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, visibility) immediately preceding the strike;
 8. Estimated size and length of animal that was struck;
 9. Description of the behavior of the marine mammal immediately preceding and following the strike;
 10. If available, description of the presence and behavior of any other marine mammals immediately preceding the strike;
 11. 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
 12. To the extent practicable, photographs or video footage of the animal(s).
7. This Authorization may be modified, suspended or revoked if the holder fails to abide by the conditions prescribed herein (including, but not limited to, failure to comply with monitoring or reporting requirements), or if NMFS determines: (1) the authorized taking is likely to have or is having more than a negligible impact on the species or stocks of affected marine mammals, or (2) the prescribed measures are likely not or are not effecting the least practicable adverse impact on the affected species or stocks and their habitat.
8. Renewals

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

- (a) A request for renewal is received no later than 60 days prior to the needed Renewal IHA effective date (the Renewal IHA expiration date cannot extend beyond one year from expiration of this IHA).
- (b) The request for renewal must include the following:
 - (i) An explanation that the activities to be conducted under the requested Renewal IHA are identical to the activities analyzed for this IHA, are a subset of the activities, or include changes so minor that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take).
 - (ii) A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.
- (c) Upon review of the request for Renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings made in support of this IHA remain valid.

Kimberly Damon-Randall,
Director, Office of Protected Resources,
National Marine Fisheries Service

Table 1. Authorized take numbers, by species

| Species | Authorized Take | |
|------------------------------|-----------------|---------|
| | Level B | Level A |
| Humpback whale | 80 | 3 |
| Minke whale | 84 | 3 |
| Fin whale | 82 | 3 |
| Sei whale | 113 | 4 |
| Blue whale | 1 | 0 |
| Sperm whale | 214 | 0 |
| Northern bottlenose whale | 2 | 0 |
| Beaked whale ¹ | 255 | 0 |
| Risso's dolphin | 916 | 0 |
| Atlantic white-sided dolphin | 4,060 | 0 |
| Bottlenose dolphin | 976 | 0 |
| Striped dolphin | 148 | 0 |
| White-beaked dolphin | 46 | 0 |
| Common dolphin | 13,468 | 0 |
| Long-finned pilot whale | 1,022 | 0 |
| Killer whale | 24 | 0 |
| Harbor porpoise | 1,181 | 45 |
| Phocid seals ² | 5,879 | 0 |

¹ Beaked whale guild. Includes Cuvier's beaked whale, Blainville's beaked whale, and Sowerby's beaked whale.

² Seal guild. Includes hooded seal, harp seal, bearded seal, gray seal, and harbor seal.

Table 2. Modeled Radial Distances (m) to Isopleths Corresponding to Level A Harassment Thresholds.

| Airgun Configuration | Survey type | Level A harassment zone (m) | | | |
|---|-------------|-----------------------------|--------------|--------------|------------------|
| | | LF cetaceans | MF cetaceans | HF cetaceans | Phocid pinnipeds |
| 36 airgun array (6600 in ³) | MCS | 320.2 | 13.6 | 268.3 | 43.7 |
| | OBS | 103.6 | 13.6 | 268.3 | 43.7 |

Table 3. Modeled Radial Distances (m) to Isopleths Corresponding to Level B Harassment Threshold.

| Airgun Configuration | Water Depth (m) | Level B harassment zone (m) |
|---|-----------------|-----------------------------|
| 36 airgun array (6600 in ³) | >1000m | 6,733 |
| | 100-1000m | 10,100 |