UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

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 as specified in L-DEO's 2022 IHA application and for use of an airgun array aboard the R/V *Langseth* with characteristics specified in the IHA application, in the Northeast Pacific Ocean at the Cascadia Subduction Zone and Juan de Fuca Plate.

(3) <u>General Conditions</u>

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 B harassment only, is limited to the species and numbers listed in Table 1.

c. The taking by Level A harassment, 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 amounts listed in Table 1 is prohibited and may result in the modification, suspension, or revocation of this IHA.

d. During use of the acoustic source, if any marine mammal species that are not listed in Table 1 appear within or enter the Level B harassment zone (Table 2) the acoustic source must be shut down.

e. 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, protected species monitoring protocols, operational procedures, and IHA requirements are clearly understood.

(4) <u>Mitigation Requirements</u>

The holder of this Authorization is required to implement the following mitigation measures:

a. L-DEO must use independent, dedicated, trained visual 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 protected species and mitigation requirements (including brief alerts regarding maritime hazards), and must have successfully completed an approved PSO training course.

b. At least one visual PSO must have a minimum of 90 days at-sea experience working in that role during a shallow penetration or low energy 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 acoustic source is planned to occur, and whenever the acoustic source 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).

   ii. Visual monitoring of the exclusion and buffer zones must begin no less than 30 minutes prior to ramp-up, including for nighttime ramp-ups, and must continue until one hour after use of the acoustic source ceases or until 30 minutes past sunset.

   iii. 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. The estimated harassment zone is provided in Table 2 for reference.

   iv. During good conditions (e.g., daylight hours; Beaufort sea state (BSS) 3 or less), visual PSOs must conduct observations when the acoustic source is not operating for comparison of sighting rates and behavior with and without use of the acoustic source and between acquisition periods, 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.

d. Exclusion zones and buffer zones

   i. Except as provided below in 4(d)(ii), the PSOs must establish and monitor exclusion zones and additional buffer zones. During all survey effort, the exclusion zone shall be 100 m with an additional 100 m buffer zone (total 200

m). The 200-m zone shall serve to focus observational effort but not limit such effort; observations of marine mammals beyond these distances shall also be recorded as described in 5(d) below and/or trigger shutdown as described in 4(g)(iv) below, as appropriate. The exclusion zone encompasses the area at and below the sea surface out to the defined distance from the edges of the airgun array (rather than being based on the center of the array or around the vessel itself). The buffer zone encompasses the area at and below the sea surface from the edge of the exclusion zone, out to the defined distance from the edges of the airgun array. During use of the acoustic source, occurrence of marine mammals within the buffer zone (but outside the exclusion zone) must be communicated to the operator to prepare for the potential shutdown of the acoustic source. PSOs must monitor the exclusion zone and buffer zone for a minimum of 30 minutes prior to ramp-up (i.e., pre-start clearance).

ii. An extended 500-m exclusion zone must be established for Beaked whales (*Ziphiidae* spp.), Dwarf and pygmy sperm whales (*Kogia* spp.), killer whale (*Orcinus orca*), a large whale[1] with a calf, and groups of 6 or more large whales during all survey effort. No buffer zone is required.

e. Pre-start clearance and Ramp-up

i. A ramp-up procedure must be followed at all times as part of the activation of the acoustic source, except as described under 4(e)(v). Ramp-up must begin with activation of on 45 in^3 airgun, with the second 45 in^3 airgun added after 5 minutes.

ii. Ramp-up must not be initiated if any marine mammal is within the exclusion or buffer zone. If a marine mammal is observed within the exclusion 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, including sperm whales, pygmy sperm whales, dwarf sperm whales, beaked whales, pilot whales, killer whales, Risso's dolphin).

iii. PSOs must monitor the exclusion and buffer zones during ramp-up, and ramp-up must cease and the source must be shut down upon visual observation of a marine mammal within the exclusion 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.

iv. If the acoustic source 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

[1] Large whale defined as sperm whale or any baleen whale; calf is defined as an animal less than two-thirds the body size of an adult observed to be in close association with an adult.

maintained constant observation and no detections of marine mammals have occurred within the applicable exclusion zone. For any longer shutdown, pre-start clearance observation and ramp-up are required. For any shutdown at night or in periods of poor visibility (e.g., BSS 4 or greater), ramp-up is required, but if the shutdown period was brief and constant observation was maintained, pre-start clearance watch is not required.

v. Testing of the acoustic source 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.

f. Shutdown requirements

i. Any PSO on duty has the authority to delay the start of survey operations or to call for shutdown of the acoustic source.

ii. The operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic source to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch.

iii. When the airgun array is active (i.e., anytime one or more airguns is active, including during ramp-up) and a marine mammal appears within or enters the exclusion zone, the acoustic source 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 requirements described in 4(f)(iii) shall be waived for small dolphins of the following genera: *Delphinus, Stenella, and Lissodelphis.*

1. If a small delphinid (individual of the Family Delphinidae, which includes the aforementioned dolphin genera), is visually detected and localized within the exclusion zone, no shutdown is required unless the PSO confirms the individual to be of a genera 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 exclusion 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 pinnipeds, and 30 minutes for mysticetes and all other odontocetes, including sperm whales, beaked whales, pilot whales, killer whales, and Risso's dolphin) 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 with in any harassment zone (Table 2).

g. Vessel strike avoidance

i. Vessel operators and crews must maintain a vigilant watch for all protected species and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any protected species. A visual observer aboard the vessel must monitor a vessel strike avoidance zone around the vessel (distances stated below). Visual observers monitoring the vessel strike avoidance zone may be third-party observers (i.e., PSOs) or crew members, but crew members responsible for these duties must be provided sufficient training to 1) distinguish protected species from other phenomena and 2) broadly to identify a marine mammal to taxonomic group (i.e., as a large whale or other marine mammal).

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

iii. The vessel must maintain a minimum separation distance of 500 m from North Pacific right whales. If a whale is observed but cannot be confirmed as a species other than a right whale, the vessel operator must assume that it is a right whale and take appropriate action.

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

v. 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).

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

vii. 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.

(5) Monitoring Requirements

The holder of this Authorization is required to conduct marine mammal monitoring during survey activity. Monitoring must be conducted in accordance with the following requirements:

a. The operator must provide a night-vision device suited for the marine environment for use during nighttime ramp-up pre-clearance, at the discretion of the PSOs. At minimum, the device should feature automatic brightness and gain control, bright light protection, infrared illumination, and optics suited for low-light situations.

b. The operator must 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 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.

c. 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. Reticle binoculars (e.g., 7 x 50) of appropriate quality (at least one per PSO, plus backups).

   ii. Global Positioning Unit (GPS) (plus backup).

   iii. Digital single-lens reflex cameras of appropriate quality that capture photographs and video (plus backup).

   iv. Compass (plus backup)

   v. Radios for communication among vessel crew and PSOs (at least one per PSO, plus backups).

   vi. Any other tools necessary to adequately perform necessary PSO tasks.

d. Protected Species Observers Qualifications

   i. PSOs must have successfully completed an approved PSO training course.

   ii. NMFS must review and approve PSO resumes.

   iii. NMFS shall have one week to approve PSOs from the time that the necessary information is submitted, after which PSOs meeting the minimum requirements shall automatically be considered approved.

iv. One 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.

v. 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.

vi. 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.

vii. 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 protected species surveys; or (3) previous work experience as a PSO; the PSO should demonstrate good standing and consistently good performance of PSO duties.

e. Data Collection

i. PSOs must use standardized data collection forms, whether hard copy or electronic. PSOs must record detailed information about any implementation of mitigation requirements, including the distance of animals to the acoustic source 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 acoustic source. 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 and call sign;

2. PSO names and affiliations;

3. Date and participants of PSO briefings (as discussed in General Requirement);

4. Dates of departure and return to port with port name;

5. Dates and times (Greenwich Mean Time) of survey effort and times corresponding with PSO effort;

6. Vessel location (latitude/longitude) when survey effort began and ended and vessel location at beginning and end of visual PSO duty shifts;

7. Vessel heading and speed at beginning and end of visual PSO duty shifts and upon any line change;

8. 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;

9. Factors that may have contributed to impaired observations during each PSO shift change or as needed as environmental conditions changed (e.g., vessel traffic, equipment malfunctions); and

10. Survey activity information, such as acoustic source 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 protected species, the following information must be recorded:

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

2. PSO who sighted the animal;

3. Time of sighting;

4. Vessel location at time of sighting;

5. Water depth;

6. Direction of vessel's travel (compass direction);

7. Direction of animal's travel relative to the vessel;

8. Pace of the animal;

9. Estimated distance to the animal and its heading relative to vessel at initial sighting;

10. 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;

11. Estimated number of animals (high/low/best);

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

13. 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);

14. 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);

15. Animal's closest point of approach (CPA) and/or closest distance from any element of the acoustic source;

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

17. Description of any actions implemented in response to the sighting (e.g., delays, shutdown, ramp-up) and time and location of the action.

(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. The draft report must include the following:

i. Summary of all activities conducted and sightings of protected species near the activities;

ii. Summary of all data required to be collected (see 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, including which array was being used 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;

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) (301-427-8401), NMFS and to the NMFS West Coast regional Stranding Coordinator (866-767-6114). 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, the IHA-holder shall report the incident to OPR, NMFS and to the West Coast Regional Stranding Coordinator 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).

c. Reporting Species of Concern – L-DEO must immediately report all observations of Southern Resident killer whales and North Pacific Right Whales to OPR, NMFS (301-427-8401). The report must include the following information:

i. Time, date, and location (latitude/longitude, water depth) of the observation;

ii. Description of the animal(s) seen, including number of animals, estimated age and sex classes observed, and distinguishing features;

iii. Behavior observations (e.g., number of blows/breaths, number of surfaces, breaching, spyhopping, diving, feeding, traveling; as explicit and detailed as possible);

iv. Direction of vessel's travel (compass direction) and direction of animal's travel relative to the vessel; and

v. Platform activity at time of sighting (e.g., deploying, recovering, testing, shooting, data acquisition, other).

(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

a. 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:

i. 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).

ii. The request for renewal must include the following:

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

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

iii. 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.

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Kimberly Damon-Randall,

Director, Office of Protected Resources,

National Marine Fisheries Service.

Table 1. Numbers of Incidental Take of Marine Mammals Authorized.

Species	MMPA Stock	Authorized Take by Level B Harassment
Humpback whale (*Megaptera novaeangliae*)	California/Oregon/Washington	2
Blue whale (*Balaenoptera musculus)*	Eastern North Pacific	2
Fin whale (*Balaenoptera physalus*)	California/Oregon/Washington	4
Sei whale (*Valaenoptera borealis*)	Eastern North Pacific	2
Minke whale (*Balaenoptera acutorostrata*)	California/Oregon/Washington	2
Sperm whale (*Physeter macroccephalus*)	California/Oregon/Washington	7
Baird's beaked whale (*Berardius Bairdii*)	California/Oregon/Washington	9
Small beaked whale (*Mesoplodon* spp.)	California/Oregon/Washington	4[1]
Striped dolphin (*Stenella coeruleoalba*)	California/Oregon/Washington	46
Short-beaked common dolphin (*Delphinus delphis*)	California/Oregon/Washington	179
Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)	California/Oregon/Washington	99
Northern right whale dolphin (*Lissodelphis borealis*)	California/Oregon/Washington	82
Risso's dolphin (*Grampus griseus*)	California/Oregon/Washington	22

Killer whale (*Orcinus orca)*	West Coast Transient North Pacific Offshore	7
Pygmy/dwarf sperm whale (*Kogia* spp.*)*	California/Oregon/Washington	3
Dall's porpoise (*Phocoenoides dalli)*	California/Oregon/Washington	155
Northern fur seal (*Callorhinus ursinus)*	Eastern Pacific California	17
Guadalupe fur seal (*Arctocephalus townsendi)*	Mexico	49
California sea lion (*Zalophus californianus)*	United States	9
Steller sea lion (*Eumetopias jubatus*)	Eastern	4
Northern elephant seal (*Mirounga angustirostris*)	California Breeding	62

[1]Includes one take of each: Balinville's beaked whale, Stejneger's beaked whale, Cuvier's beaked whale, and Hubbs' beaked whale.

Table 2. Level B Harassment Zones

Airgun Configuration	Water Depth (m)	Level B harassment zone (m)
Two 45 in^3 GI guns	>1,000	553