

APPENDIX D

Typical Mitigation Measures for Protected Marine Mammal Species

BOEM intends to incorporate these mitigation measures into SAP letters of approval.

Mitigation Measures included in the Proposed Action for Protected Marine Mammal Species for Site Characterization and Site Assessment Activities to Support Offshore Wind Projects

Any survey monitoring plan must meet the following minimum requirements specified below, except when complying with these requirements would put the safety of the vessel or crew at risk.

A. Minimize Interactions with Protected Species during Geophysical Survey Operations

To avoid injury of protected marine mammal species and minimize any potential disturbance, the following measures will be implemented for all vessels operating survey equipment in the boomer, sparker, and bubble gun equipment categories, and equipment with similar specifications within these categories.

Required mitigations:

1. For situational awareness a Monitoring Zone (1,000 meters (m) (3,281 feet (ft) in all directions) for protected species must be monitored around all vessels operating boomer, sparker, or bubble gun equipment.
 - a. The Monitoring Zone must be monitored by approved third-party protected species observers (PSOs) at all times and any observed listed species must be recorded (see reporting requirements below).
 - b. For monitoring around an autonomous surface vessel (ASV), where remote PSO monitoring must occur from the mother vessel, a dual thermal/HD camera must be installed on the mother vessel facing forward and angled in a direction so as to provide a field of view ahead of the vessel and around the ASV. PSOs must be able to monitor the real-time output of the camera on hand-held computer tablets. Images from the cameras must be able to be captured and reviewed to assist in verifying species identification. A monitor must also be installed in the bridge displaying the real-time images from the thermal/HD camera installed on the front of the ASV itself, providing a further forward view of the craft. In addition, night-vision goggles with thermal clip-ons and a handheld spotlight must be provided and used such that PSOs can focus observations in any direction around the mother vessel and/or the ASV.
2. To minimize exposure to noise that could be disturbing, a 500 m Exclusion Zone for ESA-listed whale species visible at the surface must be established around each vessel operating boomer, sparker, or bubble gun equipment.
 - a. The Exclusion Zone(s) must be monitored by third-party PSOs at all times when noise-producing equipment is being operated and all observed listed species must be recorded (see reporting requirements below).
 - b. If an ESA-listed whale is detected within or entering the respective Exclusion Zone, any noise-producing equipment operating below 180 kHz must be shut off until the minimum separation distance (see vessel strike avoidance below) is re-established and the measures in (5) are carried out.
 - i. A PSO must notify the survey crew that a shutdown of all active boomer, sparker, and bubble gun acoustic sources below 180 kHz is immediately required. The vessel operator

and crew must comply immediately with any call for a shutdown by the PSO. Any disagreement or discussion must occur only after shutdown.

- c. If the Exclusion Zone(s) cannot be adequately monitored for whale presence (i.e., a PSO determines conditions, including at night or other low-visibility conditions, are such that listed whales cannot be reliably sighted within the Exclusion Zone(s), the survey must be stopped until such time that the Exclusion Zone(s) can be reliably monitored.
3. Before any noise-producing survey equipment is deployed, the Monitoring Zone (1,000 m (3,281 ft) for all marine mammal species) must be monitored for 30 minutes of pre-clearance observation.
 - a. If any ESA-listed species is observed within the Monitoring Zone during the 30-minute pre-clearance period, the 30-minute clock must be paused. If the PSO confirms the animal has exited the zone and headed away from the survey vessel, the 30-minute clock that was paused may resume. The pre-clearance clock will reset to 30 minutes if the animal dives or visual contact is otherwise lost.
 4. The Lessee must ensure that, when technically feasible, a “ramp up” of the electromechanical survey equipment occurs at the start or re-start of geophysical survey activities. A ramp up must begin with the power of the smallest acoustic equipment for the geophysical survey at its lowest power output. When technically feasible the power will then be gradually turned up and other acoustic sources added in a way such that the source level would increase gradually.
 5. Following a shutdown for any reason, ramp up of the equipment may begin immediately only if: (a) the shutdown is less than 30 minutes, (b) visual monitoring of the Exclusion Zone(s) continued throughout the shutdown, (c) the animal(s) causing the shutdown was visually followed and confirmed by PSOs to be outside of the Exclusion Zone(s) and heading away from the vessel, and (d) the Exclusion Zone(s) remains clear of all listed species. If all (a, b, c, and d) the conditions are not met, the Monitoring Zone (1,000 m (3,281 ft) for all species) must be monitored for 30 minutes of pre-clearance observation before noise-producing equipment can be turned back on.
 6. In order for geophysical surveys to be conducted at night or during low-visibility conditions, PSOs must be able to effectively monitor the Exclusion Zone(s). No surveys may occur if the Exclusion Zone(s) cannot be reliably monitored for the presence of ESA-listed whales to ensure avoidance of injury to those species.
 - a. The Lessee must submit an Alternative Monitoring Plan (AMP) to the Bureau of Ocean Energy Management (BOEM) detailing the monitoring methodology that will be used during nighttime and low-visibility conditions and an explanation of how it will be effective at ensuring that the Exclusion Zone(s) can be maintained during nighttime and low-visibility survey operations. The plan must be submitted 60 days before survey operations are set to begin.
 - b. The plan must include technologies that have the technical feasibility to detect all ESA-listed whales out to 500 m (1,640 ft).
 - c. PSOs should be trained and experienced with the proposed night vision technology.
 - d. The AMP must describe how calibration will be performed, for example, by including observations of known objects at set distances and under various lighting conditions. This calibration could be performed during mobilization and periodically throughout the survey operation.

- e. PSOs shall make nighttime observations from a platform with no visual barriers, due to the potential for the reflectivity from bridge windows or other structures to interfere with the use of the night vision optics.
7. If multiple survey vessels are operating within a lease, adjacent lease areas, or exploratory cable routes, a minimum separation distance (to be determined on a survey specific basis, dependent on equipment being used) must be maintained between survey vessels to ensure that sound sources do not overlap.
8. Any visual observations of listed species by crew or project personnel must be communicated to PSOs on-duty.
9. During good conditions (e.g., daylight hours; Beaufort scale 3 or less) when survey equipment is not operating, to the maximum extent practicable, PSOs must conduct observations for listed species for comparison of sighting rates and behavior with and without use of active geophysical survey equipment. Any observed listed species must be recorded regardless of any mitigation actions required.

B. Minimize Vessel Interactions with Listed Species

All vessels associated with survey activities (transiting or actively surveying) must comply with the vessel strike avoidance measures specified below. The only exception is when the safety of the vessel or crew necessitates deviation from these requirements. If any such incidents occur, they must be reported as outlined below.

Required mitigations:

1. Vessel captain and crew must maintain a vigilant watch for all protected marine mammal species and slow down, stop their vessel, or alter course, as appropriate, regardless of vessel size, to avoid striking any protected species. The presence of a single individual at the surface may indicate the presence of submerged animals in the vicinity; therefore, precautionary measures should always be exercised.
2. Any time a survey vessel is underway (transiting or surveying), a PSO must monitor a Vessel Strike Avoidance Zone (500 m (1,640 ft) or greater from any sighted whales or other unidentified large marine mammal and 50 m (164 ft) or greater from any other marine mammal species visible at the surface, unless the marine mammals are actively approaching the vessel) to ensure detection of that animal in time to take necessary measures to avoid striking the animal. If the survey vessel does not require a PSO for the type of survey equipment used, a trained crew lookout or PSO may be used. For monitoring around the autonomous surface vessels, regardless of the equipment it may be operating, a dual thermal/HD camera must be installed on the mother vessel facing forward and angled in a direction so as to provide a field of view ahead of the vessel and around the ASV. A dedicated operator must be able to monitor the real-time output of the camera on hand-held computer tablets. Images from the cameras must be able to be captured and reviewed to assist in verifying species identification. A monitor must also be installed in the bridge displaying the real-time images from the thermal/high definition (HD) camera installed on the front of the ASV itself, providing a further forward view of the craft.

- a. Survey plans must include identification of vessel strike avoidance measures, including procedures for equipment shut down and retrieval, communication between PSOs/crew lookouts, equipment operators, and the captain, and other measures necessary to avoid vessel strike while maintaining vessel and crew safety. If any circumstances are anticipated that may preclude the implementation of this requirement, they must be clearly identified in the survey plan and alternative procedures outlined in the plan to ensure minimum distances are maintained and vessel strikes can be avoided.
 - b. All vessel crew members must be briefed in the identification of protected marine mammal species that may occur in the survey area and in regulations and best practices for avoiding vessel collisions. Reference materials must be available aboard all project vessels for identification of listed species. The expectation and process for reporting of protected species sighted during surveys must be clearly communicated and posted in highly visible locations aboard all project vessels, so that there is an expectation for reporting to the designated vessel contact (such as the lookout or the vessel captain), as well as a communication channel and process outlined for crew members to do so.
 - c. A minimum separation distance of 500 m (1,640 ft) from all whales (including unidentified large whales) must be maintained around all surface vessels at all times.
 - d. If a large whale is identified within 500 m of the forward path of any vessel, the vessel operator must steer a course away from the whale at 10 knots (18.5 km/hr) or less until the 500 m minimum separation distance has been established. Vessels may also shift to idle if feasible.
 - e. If a large whale is sighted within 200 m (656 ft) of the forward path of a vessel, the vessel operator must reduce speed and shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 500 m (1,640 ft). If stationary, the vessel must not engage engines until the large whale has moved beyond 500 m.
3. To monitor the Vessel Strike Avoidance Zone, a PSO (or crew lookout if PSOs are not required) must be posted during all times a vessel is underway (transiting or surveying) to monitor for protected species within a 180-degree direction of the forward path of the vessel (90 degrees port to 90 degrees starboard).
 - a. If the trained lookout is a vessel crew member, this must be their designated role and primary responsibility while the vessel is underway. Any designated crew lookouts must receive training on protected species identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements. All observations must be recorded per reporting requirements.
 - b. Regardless of monitoring duties, all crew members responsible for navigation duties must receive site-specific training on protected species sighting/reporting and vessel strike avoidance measures.
 4. Vessels underway must not divert their course to approach any listed species.
 5. Wherever available, the Lessee must ensure all vessel operators check for daily information regarding protected species sighting locations. These media may include, but are not limited to: Channel 16 broadcasts, and the Whale/Ocean Alert app.

C. Entanglement Avoidance

Any mooring systems used during survey activities prevent any potential entanglement or entrainment of listed species, and in the unlikely event that entanglement does occur, ensure proper reporting of entanglement events according to the measures specified below.

Required Mitigations:

1. The Lessee must ensure that any buoys attached to the seafloor use the best available mooring systems. Buoys, lines (chains, cables, or coated rope systems), swivels, shackles, and anchor designs must prevent any potential entanglement of listed species while ensuring the safety and integrity of the structure or device.
2. All mooring lines and ancillary attachment lines must use one or more of the following measures to reduce entanglement risk: shortest practicable line length, rubber sleeves, weak-links, chains, cables or similar equipment types that prevent lines from looping, wrapping, or entrapping protected species.
3. Any equipment must be attached by a line within a rubber sleeve for rigidity. The length of the line must be as short as necessary to meet its intended purpose.
4. If a live or dead marine protected species becomes entangled, the Lessee must immediately contact the applicable stranding network coordinator using the reporting contact details (see Reporting Requirements, section E below) and provide any on-water assistance requested.
5. All buoys must be properly labeled with the Lessee's contact information.

D. Protected Species Observers

The Lessee must use qualified third-party PSOs to observe Monitoring and Exclusion Zones as outlined in the conditions above.

Required Mitigations:

1. All PSOs must have received NMFS approval to act as a PSO for geophysical surveys. The Lessee must provide to BOEM, upon request, documentation of NMFS approval as PSOs for geophysical activities in the Pacific and copies of the most recent training certificates of individual PSOs' successful completion of a commercial PSO training course with an overall examination score of 80% or greater. Instructions and application requirements to become a NMFS- approved PSO can be found at: <https://www.fisheries.noaa.gov/new-england-mid-atlantic/careers-and-opportunities/protected-species-observers>.
2. Crew members serving as lookouts must receive training on protected species identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements.
3. PSOs deployed for geophysical survey activities must be employed by a third-party observer provider. While the vessel is underway, they must have no other tasks other than to conduct observational effort, record data, and communicate with and instruct relevant vessel crew to the

presence of protected marine mammal species and associated mitigation requirements. PSOs on duty must be clearly listed on daily data logs for each shift.

- a. Non-third-party observers may be approved by NMFS on a case-by-case basis for limited, specific duties in support of approved third-party PSOs.
4. A minimum of one PSO (assuming condition 5 is met) must be observing for protected marine mammal species at all times when noise-producing equipment is operating, or the survey vessel is actively transiting. The Lessee must include a PSO schedule showing that the number of PSOs used is sufficient to effectively monitor the affected area for the project (e.g., surveys) and record the required data. PSOs must not be on watch for more than 4 consecutive hours, with at least a 2-hour break after a 4-hour watch. PSOs must not work for more than 12 hours in any 24-hour period.
 5. Visual monitoring must occur from the most appropriate vantage point on the associated operational platform that allows for 360-degree visual coverage around the vessel. If 360-degree visual coverage is not possible from a single vantage point, multiple PSOs must be on watch to ensure such coverage.
 6. The Lessee must ensure that suitable equipment is available to each PSO to adequately observe the full extent of the Monitoring and Exclusion Zones during all vessel operations and meet all reporting requirements.
 - a. Visual observations must be conducted using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner.
 - b. Rangefinders (at least one per PSO, plus backups) or reticle binoculars (e.g., 7 x 50) of appropriate quality (at least one per PSO, plus backups) to estimate distances to listed species located in proximity to the vessel and Monitoring and Exclusion Zone(s).
 - c. Digital cameras with a telephoto lens that is at least 300 mm or equivalent on a full-frame single lens reflex (SLR). The camera or lens should also have an image stabilization system. The camera system must be used to record sightings and verify species identification whenever possible.
 - d. A laptop or tablet to collect and record data electronically.
 - e. Global Positioning System (GPS) Units if data collection/reporting software does not have built-in positioning functionality.
 - f. PSO data must be collected in accordance with standard data reporting software tools, and electronic data submission standards approved by BOEM and the National Marine Fisheries Service (NMFS) for the particular activity.
 - g. Any other tools deemed necessary to adequately perform PSO tasks.

E. Reporting Requirements

To ensure compliance and evaluate effectiveness of mitigation measures, regular reporting of survey activities and information on protected species will be required as follows.

Required Mitigations:

1. Data from all PSO observations must be recorded based on standard PSO collection and reporting requirements. PSOs must use standardized electronic data forms to record data. The following information must be reported electronically in a format approved by BOEM and NMFS:

Visual Effort:

- a. Vessel name.
- b. Dates of departures and returns to port with port name.
- c. Lease number.
- d. PSO names and affiliations.
- e. PSO ID (if applicable).
- f. PSO location on vessel.
- g. Height of observation deck above water surface.
- h. Visual monitoring equipment used.
- i. Dates and times (Greenwich Mean Time) of survey on/off effort and times corresponding with PSO on/off effort.
- j. Vessel location (latitude/longitude, decimal degrees) when survey effort begins and ends; vessel location at beginning and end of visual PSO duty shifts; recorded at 30-second intervals if obtainable from data collection software.
- k. Vessel heading and speed at beginning and end of visual PSO duty shifts and upon any change.
- l. Water depth (if obtainable from data collection software).
- m. Environmental conditions while on visual survey (at beginning and end of PSO shift and whenever conditions change significantly), including wind speed and direction, Beaufort scale, Beaufort wind force, swell height, swell angle, precipitation, cloud cover, temperature, sun glare, and overall visibility to the horizon.
- n. Factors that may be contributing to impaired observations during each PSO shift change or as needed as environmental conditions change (e.g., vessel traffic, equipment malfunctions).
- o. Survey activity information, such as type of survey equipment in operation, acoustic source power output while in operation, and any other notes of significance (i.e., pre-clearance survey, ramp-up, shutdown, end of operations, etc.).

Visual Sighting (all Visual Effort fields plus):

- a. Watch status (sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform).
- b. Vessel/survey activity at time of sighting.
- c. PSO/PSO ID who sighted the animal.
- d. Time of sighting.
- e. Initial detection method.

- f. Sightings cue.
 - g. Vessel location at time of sighting (decimal degrees).
 - h. Direction of vessel's travel (compass direction).
 - i. Direction of animal's travel relative to the vessel.
 - j. Identification of the animal (e.g., genus/species, lowest possible taxonomic level, or unidentified); also note the composition of the group if there is a mix of species.
 - k. Species reliability.
 - l. Radial distance.
 - m. Distance method.
 - n. Group size; estimated number of animals (high/low/best).
 - o. Estimated number of animals by cohort (adults, yearlings, juveniles, calves, group composition, etc.).
 - p. 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).
 - q. Detailed behavior observations (e.g., number of blows, number of surfaces, breaching, spyhopping, diving, feeding, traveling; as explicit and detailed as possible; note any observed changes in behavior).
 - r. Mitigation Action. Description of any actions implemented in response to the sighting (e.g., delays, shutdown, ramp-up, speed or course alteration, etc.) and time and location of the action.
 - s. Behavioral Observation to Mitigation.
 - t. Equipment Operating During Sighting.
 - u. Source Depth.
 - v. Source Frequency.
 - w. Animal's closest point of approach and/or closest distance from the center point of the acoustic source.
 - x. Time Entered Exclusion Zone.
 - y. Time Exited Exclusion Zone.
 - z. Time in Exclusion Zone.
 - aa. Photos/Video.
2. The PSO Provider or Lessee must submit raw PSO sightings and trackline data by the 15th of each month for the previous calendar month of surveys to renewable_reporting@boem.gov and incidental.take@noaa.gov. Data must be submitted in Excel spreadsheet format or in another format approved by BOEM and NMFS.
3. The Lessee must submit a monitoring report to BOEM and NMFS within 90 days after completion of yearly survey activities. The report must fully document the methods and monitoring protocols,

summarize the data recorded during monitoring, estimate the number of protected species that may have been taken during survey activities; and describe, assess, and compare the effectiveness of monitoring and mitigation measures. PSO raw sightings and trackline data must also be provided with the final monitoring report.

4. In the event of a vessel strike of a protected species by any survey vessel, the Lessee must immediately report the incident to BOEM (renewable_reporting@boem.gov) and NMFS (incidental.take@noaa.gov) and the NOAA West Coast Region Stranding Hotline at 1-866-767-6114. The report must include the following information:
 - a. Name, telephone, and email of the person providing the report.
 - b. The vessel name.
 - c. The Lease Number.
 - d. Time, date, and location (latitude/longitude) of the incident.
 - e. Species identification (if known) or description of the animal(s) involved.
 - f. Vessel's speed during and leading up to the incident.
 - g. Vessel's course/heading and what operations were being conducted (if applicable).
 - h. Status of all sound sources in use.
 - i. 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.
 - j. Environmental conditions (wave height, wind speed, light, cloud cover, weather, water depth).
 - k. Estimated size and length of animal that was struck.
 - l. Description of the behavior of the species immediately preceding and following the strike.
 - m. If available, description of the presence and behavior of any other protected species immediately preceding the strike.
 - n. Disposition of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, last sighted direction of travel, status unknown, disappeared).
 - o. To the extent practicable, photographs or video footage of the animal(s).
5. The Lessee must ensure that sightings of any injured or dead listed species are immediately reported, regardless of whether the injury or death is related to survey operations, to BOEM (renewable_reporting@boem.gov), NMFS (incidental.take@noaa.gov), and the NOAA West Coast stranding hotline at 1-866-767-6114. If the Lessee's activity is responsible for the injury or death, the Lessee must ensure that the vessel assist in any salvage effort as requested by NMFS. When reporting sightings of injured or dead listed species, the following information must be included:
 - a. Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable).
 - b. Species identification (if known) or description of the animal(s) involved.
 - c. Condition of the animal(s) (including carcass condition if the animal is dead).
 - d. Observed behaviors of the animal(s), if alive.

- e. If available, photographs or video footage of the animal(s).
 - f. General circumstances under which the animal was discovered.
6. Reporting and Contact Information:
- a. Dead and/or Injured Protected Species:
 - 1. NOAA West Coast stranding hotline at 1-866-767-6114.
 - i. Injurious Takes of Endangered and Threatened Species:
 - 1. NOAA NMFA Long Beach Office, Protected Resources Division
(incidental.take@noaa.gov)
 - 2. BOEM Environment Branch for Renewable Energy, Phone: 703-787-1340, Email:
renewable_reporting@boem.gov