DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648–XC940]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Narwhal, LLC Oil and Gas Exploration Activities in West Harrison Bay, Alaska

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

ACTION: Notice; proposed incidental harassment authorization; request for comments on proposed authorization and possible renewal.

SUMMARY: NMFS has received a request from Narwhal, LLC (Narwhal) for authorization to take marine mammals incidental to oil and gas exploration activities in west Harrison Bay, Alaska. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an incidental harassment authorization (IHA) to incidentally take marine mammals during the specified activities. NMFS is also requesting comments on a possible one-time, one-year renewal that could be issued under certain circumstances and if all requirements are met, as described in Request for Public Comments at the end of this notice. NMFS will consider public comments prior to making any final decision on the issuance of the requested MMPA authorization and agency responses will be summarized in the final notice of our decision.

DATES: Comments and information must be received no later than June 16, 2025.

ADDRESSES: Submit all electronic public comments via the Federal e-Rulemaking Portal. Go to *https://www.regulations.gov* and enter NOAA–NMFS–2025–0042 in the Search box. Click on the ''Comment'' icon, complete the required fields, and enter or attach your comments.

Instructions: Comments sent by any other method, to any other address or individual, or received after the end of the comment period, may not be considered by NMFS. All comments received are a part of the public records and will generally be posted for public viewing on *https://www.regulations.gov* without change. All personal identifying information (*e.g.,* name, address), confidential business information, or otherwise sensitive information submitted voluntarily by the sender will be publicly accessible. NMFS will accept anonymous comments (enter ''N/A'' in the required fields if you wish to remain anonymous). Attachments to electronic comments will be accepted in Microsoft Word, Excel, or Adobe PDF file formats only.

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/national/marine-mammal-protection/incidental-take-authorizations-oil-and-gas.* In case of problems accessing these documents, please call the contact listed below.

FOR FURTHER INFORMATION CONTACT: Craig Cockrell, Office of Protected Resources, 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.

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216–6A, NMFS must review our proposed action (*i.e.,* the issuance of an IHA) with respect to potential impacts on the human environment.

Accordingly, NMFS is preparing an Environmental Assessment (EA) to consider the environmental impacts associated with the issuance of the proposed IHA. In accordance with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) and NOAA policy and procedures (NOAA Administrative Order 216–6A and its Companion Manual), NMFS has prepared a draft environmental assessment analyzing the potential impacts of NMFS' proposed action of issuance of an IHA. NMFS is seeking public comment on the draft EA. The draft EA is available at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-oil-and-gas* for a 30 day public comment period. NMFS will consider all comments submitted in response to this notice prior to concluding the NEPA process or making a final decision on the IHA request.

Summary of Request

On October 25, 2022, NMFS received a request from Narwhal for an IHA to take marine mammals incidental to oil and gas exploration activities in and around west Harrison Bay, Alaska. After withdrawing its original request, on November 1, 2024, Narwhal resubmitted its application, which included a revised project schedule and minor changes to its activity. The application was deemed adequate and complete on January 27, 2025. Narwhal's request is for take of four marine mammal species by Level B harassment only. Neither Narwhal nor NMFS expect serious injury or mortality to result from the specified activity, and therefore, an IHA is appropriate.

Description of Proposed Activity

Overview

Narwhal proposes to conduct shallow hazard geophysical surveys and exploratory drilling operations, which includes construction and operation of ice trails, roads, and pads, in west Harrison Bay, Alaska to explore its oil and gas leases in the area. The activities would occur between August 2025 and July 2026 and would occur primarily in west Harrison Bay and the area between west Harrison Bay and Prudhoe Bay, Alaska. Narwhal would also conduct mobilization and barge transport activities out of Prudhoe Bay, Alaska. Shallow hazard geophysical surveys (hereinafter, ''shallow water hazard surveys'') would use airguns and

sparkers as acoustic sources and would introduce underwater sound that may result in take by Level B harassment of marine mammals. Construction and operation of sea ice trails around the Colville River Delta may result in take by Level B harassment of ringed seals due to the introduction of underwater sound. A number of other activities would occur during the course of this project but are not expected to result in take of marine mammals.

Dates and Duration

The proposed IHA would be effective for a period of one year, and activities are anticipated to occur year-round. Work that may result in the take of marine mammals is expected to take place between August and September (shallow hazard surveys) and through December and March (ice trail construction and operation). Figure 2–1 of Narwhal's IHA application provides more detail regarding timing of project activities. Please refer to Narwhal's application for additional information about the timing of its various proposed activities. Shallow hazard surveys at all six sites would take place over approximately 12 days and would occur over a 12 hour period each day. Offshore ice road and trail construction would occur over approximately 167 days and would occur as needed throughout a 24-hour period.

Several communities on the North Slope of Alaska engage in marine mammal subsistence hunting activities at varying times and in varying locations. These subsistence hunts are further described below in the Potential Effects of Specified Activities on Subsistence Uses of Marine Mammals section. The proposed activities would occur closest to the marine subsistence use area used by the Native Village of Nuiqsut, which typically occurs August 25th to September 15th or earlier if whaling is complete.

Specific Geographic Region

Narwhal's proposed activities would primarily occur in west Harrison Bay and between Oliktok Point and west Harrison Bay in the Beaufort Sea, Alaska. Additionally, the activity would include transit between west Harrison Bay and Prudhoe Bay, Alaska. All activities would occur primarily in shallow waters of 3 meters (m) or less.

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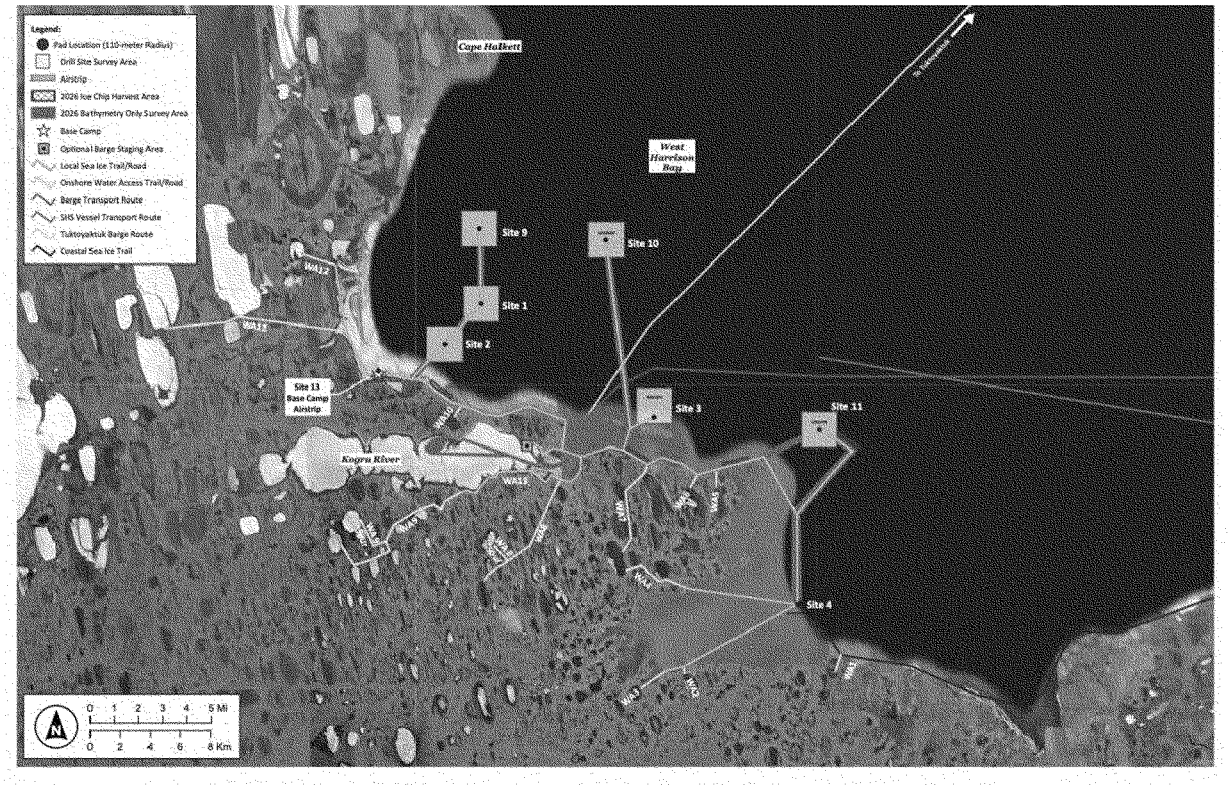

Figure 1-- Project Area

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Detailed Description of the Specified Activity

Narwhal is proposing to conduct a variety of activities in and around Harrison Bay, Alaska in support of oil and gas exploration.

Shallow Water Hazard Surveys

Narwhal plans to conduct shallow hazard surveys beginning in August 2025 at up to six offshore locations to identify up to four sites for exploratory drilling in winter 2026 (figure 1–5 of Narwal's application). The shallow hazard surveys include use of a single airgun as the primary acoustic source and would also use a sub-bottom profiler (SBP), echosounder/fathometer, side scan sonar (SSS), and sparker.

Use of acoustic sources other than the sparker and airgun are not reasonably expected to result in take of marine mammals and will not be discussed further beyond the brief summaries provided below.

Non-parametric SBPs are used to provide high data density in sub-bottom profiles that are typically required for

cable routes, very shallow water, and archaeological surveys. Parametric SPBs are usually mounted on a pole, either over the side of the vessel or through a moon pool in the bottom of the hull. The SBP proposed by Narwhal will be pointed vertically from the water surface into the water column along track lines spaced 600 m (1969 ft), 300 m (984 ft), and 150 m (492 ft) apart. For the proposed project, the SBP used would generate sound pulses at frequencies around 2 to 16 kHz. Ruppel *et al.* (2022) recommend that towed SBPs, including the Compressed High-Intensity Radar Pulse (CHIRP) SBP planned for use by Narwhal, be considered de minimis with regard to their potential to cause incidental take of marine mammals. The authors base this conclusion largely on the low likelihood that marine mammals would experience a received level exceeding 160 dB re 1 µPa (see *Background on Active Acoustic Sound Sources and Acoustic Terminology* Section) as a result of typical use of this class of acoustic sources. NMFS has determined that this is appropriate here and, therefore, considers use of SBPs by Narwhal as unlikely to result in incidental take of marine mammals.

Narwhal anticipates collecting bathymetric data using a single-beam echosounder due to the shallow water at each survey location. Echosounders and fathometers are used to determine water depths and general bottom topography. Echosounder and fathometer sonar systems project sonar pulses in angled beams from a transducer mounted to a ship's hull. The beams radiate out from the transducer in a fan-shaped pattern orthogonally to the ship's direction. SSS are used for seabed sediment classification purposes and to identify natural and man-made acoustic targets on the seafloor. The sonar device emits conical or fan-shaped pulses down toward the seafloor in multiple beams at a wide angle, perpendicular to the path of the sensor through the water column. The proposed echosounders, fathometers, and SSS have operating frequencies >200 kHz which are outside the general hearing range of marine mammals. Therefore, take is not expected to occur from use of these sources.

Additionally, Narwhal may conduct vibracore sediment sampling to obtain shallow cores of the seafloor sediment from the surface. Sediment cores will be analyzed for load-bearing capacity, shear strength, grain size, and other parameters to be determined. The proposed mini vibracore sampler is a hand-held device with a 3-position switch that allows immediate on/off controls. To collect samples, an electric motor oscillates the core barrel into the sediment to extract a sediment core. Generally, the sound source (driving mechanism) operates for one to two minutes with the entire process requiring less than 1 hour. Vibracoring would produce a very brief duration of continuous non-impulsive sound. NMFS does not typically expect that vibracoring or similar sources of continuous noise to result in incidental take of marine mammals.

High-resolution three-dimensional (3D) seismic surveys are also expected to be conducted at the four potential drilling sites using a single 105 cubic inch (cu. in.; 1,721 cubic centimeter (cc)) towed airgun and geophone sound receivers. Approximately 480 geophones will be embedded in the seafloor by hand with a wood or aluminum planting pole to a maximum depth of 2 m (6.56 ft) in a grid pattern. The grids would be spaced at 50 m (164 ft) intervals along receiver lines as shown in figure 1–7 of Narwhal's application. This pattern will be the same in each of the four exploratory drilling locations. The airgun would fire about once every 6 or 7 seconds while traveling at a speed of approximately 2 m per second.

The airgun will be towed by the source vessel perpendicular to the receiver lines, while a support vessel will deploy and retrieve the geophones from the seafloor. Narwhal expects the survey for each site to take approximately 2 days to survey over a 12 hour period each day. In total to survey the six sites it is anticipated to take up to 30 days to complete the seismic surveys (including retrieving the geophones; 12 days of airgun use). Use of the airgun is expected to present the potential to cause incidental take of marine mammals.

Narwhal proposes to use a sparker during shallow hazard survey activities. Use of the sparker has the potential to cause incidental take of marine mammals. Sparkers are medium penetration impulsive sources used to map deep subsurface stratigraphy (soils down to at least 100 m (328 ft) below the seabed in sand and at least 125 m (410 ft) below the seabed in mixed sediments). Sparkers are typically towed behind the vessel, and may be operated with different numbers of electrode tips to allow tuning of the acoustic waveform for specific applications. Narwhal plans to use the Applied Acoustics UHD Dura-Spark or a similar system. The operation of the sparker is expected to result in the incidental take of marine mammals.

Vessels used for the shallow water hazard surveys will be mobilized from West Dock in Prudhoe Bay or from Oliktok Point. Periodic resupply, logistics support, and personnel transfers for the surveys would occur at Oliktok Point. Figures 1–1 and 1–5 of Narwhal's application show the anticipated mobilization and resupply routes for the shallow water hazard survey vessel(s). Narwhal estimates daily trips between Oliktok Point and the west Harrison Bay work area will be required over a period of 35 days during shallow water hazard survey. Bathymetry, side scan sonar, and sub-bottom profiling will require one survey vessel and one support vessel. The 3D seismic survey will require one vessel equipped with a single airgun, one vessel responsible for deploying and retrieving geophones on the seafloor, and one to two support vessels for berthing crew and expediting. The non-3D seismic shallow hazard survey work (bathymetry, sub-bottom profiler, side scan sonar, sparker) will be conducted from a single vessel, with the possible inclusion of one additional vessel for additional berth capacity, if necessary. The berthing vessel may transit to Oliktok Point during the day if necessary to pick up supplies or transport personnel. The operation of these vessels are not expected to result in take of marine mammals.

Sea Ice Trail Construction and Operation

Sea ice trails would be used by Narwhal to support the transport of light tracked vehicles and would largely consist of unimproved roads once constructed. Narwhal would use snow machines and light-weight tracked vehicles to mark the sea ice trail corridor as soon as it is determined to be safe to access (*i.e.,* as soon as there is stable grounded sea ice along the shoreline at Oliktok Point). Narwhal will install a small, 15-person camp on a 0.008 km^2 (.004 mi^2) pad adjacent to Oliktok Point on the grounded sea ice (Oliktok Point camp). This location will receive freight from the existing gravel road infrastructure to be transferred to west Harrison Bay.

After completion of the Oliktok Point camp, the crew will construct the first section of the sea ice trail southwesterly along the coast on grounded ice to the Colville River Delta. The coastal sea ice trail may be smoothed during all-terrain vehicle (ATV) passes with a drag (*i.e.,* pulling a pipe or similar straight tool behind the ATV) during setting of the trail and periodically thereafter. Narwhal would need to thicken the ice in five or six channels in the Colville

River Delta to support any heavy equipment transport that may be needed.

To thicken the ice, seawater will be pumped to the surface and allowed to freeze in layers until at least 0.9 m of ice thickness has been achieved to allow for heavy equipment to be moved down the trail. Narwhal would manually install lightweight equipment such as centrifugal pumps to pump water to the ice surface. These pumps would be periodically repositioned along the route across the channel. Heavier pumping/auger equipment, which would be self-driven from Oliktok Point along the grounded sea ice trail, would be used to complete thickening of the sea ice once the channel ice is thick enough to support such equipment. Narwhal anticipates that thickening will require mobilization of six pumping units, which will be mobilized to west Harrison Bay upon completion of the ice trail route. Narwhal anticipates that the thickening of the Delta channels would take up to 25 days, and that thickening would require six trips per day between Oliktok Point and the western extent of the Delta for fuel resupply, crew change, and technical support.

Critical habitat for ringed seals was designated on April 1, 2022 (87 FR 19232) and outlined three primary biological features of suitable habitat, one of which is water depths greater than 3 m. Whenever possible, sea ice trials will be constructed on grounded ice to minimize the need for sea ice thickening and the potential to encounter ringed seal habitat defined in NMFS (2022a). Only small portions of sea ice trail are expected to be constructed in areas that may be in waters less than 3 m in depth (*i.e.,* the Colville River Delta portion). Narwhal anticipates that it would construct a section of the coastal sea ice trail (57.8 km; 35.9 mi) over a period of 12 days, after thickening of the Colville River Delta channels. Construction of this section of the sea ice trail would not require significant ice construction work. Narwhal would complete construction with a two-person crew and two ATVs to scout the remaining trail and set the global positioning system (GPS) points along the trail, as the construction generally consists of packing the trail with repeated ATV passes to create a hard and relatively smooth surface to travel on. Narwhal may also use a drag on initial passes to establish a smooth surface. The two-person crew will return to Oliktok Point after completing the trail to support mobilization of additional equipment to the west Harrison Bay area.

Narwhal anticipates that total construction of the coastal sea ice trail will occur over a period of 30 days and that the completed trail would be 57.8 km long with an approximate average width of 340 m.

During exploratory drilling operations (described below) over an 86-day period, an estimated average of 10 ATV trips per day will transit from Oliktok Point to the west Harrison Bay area for daily resupply if supporting a two-rig program. For a one-rig program, approximately five ATV trips per day are anticipated for daily support. The ATVs will travel in groups of two or more for safety purposes resulting in an average of two to four groups of ATVs transiting the sea ice trail daily during this period. Each trip will likely take approximately 6 hours (*i.e.,* 12 hours roundtrip within a 24-hour period).

Narwhal would transport, during mobilization phase, all necessary equipment to the west Harrison Bay area via the coastal sea ice trail utilizing various ATVs (*e.g.,* rolligons or steiger tractors). Narwhal will transport camp and ice construction equipment first, followed by equipment and materials needed for exploratory drilling after ice pads are complete. The ATVs will travel in groups of two or more for safety reasons. Typically, one or two groups of ATVs will travel on the trail on a daily basis. Narwhal anticipates approximately 410 ATV trips as part of mobilization activities in January and early February 2026. If Narwhal stages equipment and materials in advance (discussed above), mobilization would require approximately 120 ATV trips on the coastal sea ice trail rather than 210 trips.

During the construction and operation of the sea ice trail across the Colville River Delta, NMFS expects that take could occur due to the potential for open leads or cracks in the sea ice, which could provide suitable habitat for ringed seals.

Project Demobilization

Narwhal would relocate all project equipment, materials, and personnel from the west Harrison Bay operations area to Oliktok Point after completion of drilling operations. This demobilization would occur over up to 200 ATV trips via the coastal sea ice trail and would be completed by the end of April or early May 2026. NMFS expects that this activity may result in take due to disturbance caused by ATV presences on the sea ice trail in the Coleville River Delta section.

Onshore, Offshore, and Freshwater Lake Surveys, Archaeological, Historical and Cultural Resources Clearance Surveys and Thermistor Install and Water Access Roads

Narwhal plans to conduct several activities onshore in the west Harrison Bay area. Field archaeological surveys would be conducted in the area immediately south of west Harrison Bay where onshore ice roads would be constructed (see below) to access freshwater source lakes. These surveys would occur in mid-to-late July 2026. Offshore archaeological and historical surveys would also be conducted to assess routes planned for the coastal sea ice trail, roads, and pads. Coastal areas of the project with shallow water less than 1.8 m in depth are inaccessible by the geophysical survey vessels. Narwhal plans to conduct lake surveys to locate adequate freshwater supplies for its activities during August 2025. Surveys will be conducted using helicopters to visually inspect water sources from the air and a zodiac type or other small vessel will be used to assess various characteristics such as fish presence and water quality. Surveys would occur over approximately 10 days and would include one daily flight to the work area from Deadhorse, Alaska. Aerial surveys would be flown by helicopter at an altitude of 457 m (1499 ft), unless such an altitude is unsafe. Narwhal may land one to three times per day during the onshore surveys. Narwhal anticipates that onshore surveys would occur over approximately three days and the offshore and lake surveys to occur over 10 days. Narwhal would also construct lake access roads and may install thermistors along the tundra access routes from the sea ice to selected source water lakes to monitor soil temperatures during freeze up fall 2025.

These activities would occur over land or over extremely shallow waters in West Harrison Bay, and therefore, are not anticipated to harass marine mammals and are not discussed further.

Optional Staging on Kogru Airstrip and Barges

Narwhal may stage equipment in advance of winter activities to reduce the total number of ATV trips and time required for mobilizing project equipment via the coastal sea ice trail from Oliktok Point and to enable faster start-up once sea ice conditions permit. Advance equipment staging would occur during mid-August or September of 2025. Narwhal identified two options for advance staging sites.

Option 1, Kogru Airstrip—Narwhal would use the existing gravel Kogru

airstrip (see figure 1–10 of Narwhal's IHA application) and place a series of interlocking tundra mats between the shoreline and the airstrip to provide support for offloading materials from barges along shore up to the existing Kogru airstrip. This scenario would require water depth sufficient for barge activity in the nearshore vicinity of the Kogru airstrip.

Option 2, Protected Location in West Harrison Bay—Narwhal would tow up to six empty anchored barges from Tuktoyaktuk, Canada, and anchor them in a protected location within west Harrison Bay. The barges would be pushed into a sandy beach by tug and frozen in place during fall 2025. Narwhal would use a temporary ramp to offload a front-end loader onto the beach. The loader would then set 4 to 6 anchors on the beach to hold the barges fast to the shoreline. The barges will be tied to each other in a rectangle arrangement to provide a continuous staging surface for the placement of equipment and materials.

Narwhal may also place two to four anchors in the water at the open-water end of the barges. These anchors would be set by lowering them into the water (estimate 1 m (3 ft) depth) from a barge with the same loader, and then connecting the anchors to the moored barges. Final locations for placement of anchors on the beach and in open water will be subject to a mooring analysis that will ensure the barges are not moved off location by wind and ice movement during breakup. Narwhal identified protected locations for this option in the Kogru River, near the Eskimo Islands and other western areas of Harrison Bay (see figure 1–12 in Narwhal's IHA application), generally in waters less than 1 m deep. Narwhal does not anticipate needing a tug to hold the barge against significant tides or currents, as the area selected for advanced staging will be relatively calm and in shallow water.

Narwhal anticipates that transfer of equipment and materials for advance staging would require a total of five barge trips from West Dock/Prudhoe Bay or Oliktok Point. However, vessel transit is not generally anticipated to result in take of marine mammals due to the proposed routes in relatively shallow water and the slow speed of the vessels. Given this, NMFS does not anticipate either option to result in take of marine mammals due to the transport of barges for equipment staging, and these activities are not discussed further.

Narwhal would employ a two-person caretaker crew that would remain on site during the staging period mid-August through September 2025 to monitor the equipment and fuel, patrol the area, and collect basic ocean data. The crew would stay at a small skid camp located at the advance staging location. Narwhal may repurpose the small skid camp as a company office and sleeping facility at the drilling location during drilling operations or it may be set as the safety stop at the approximate halfway point of the coastal sea ice trail. Narwhal anticipates one helicopter flight per week will provide support to the caretaker crew. NMFS does not expect take to occur during these flights given they would occur mostly over land and over 457 m in elevation as specified in the Proposed Mitigation section.

The advance staging barges would be transported back to Tuktoyaktuk, Canada in the latter half of July or early August 2026 when ice conditions permit barge transport.

Sea Ice Road Construction and Operation

Narwhal would construct local sea ice roads to support exploratory drilling operations. Ice roads are designed to accommodate heavier equipment, including standard vehicles such as pick-up trucks, SUVs, buses and other trucks to be used to transport personnel and equipment including the drilling rigs to the drill sites. Table 1–4 of Narwhal's application summarizes the estimated lengths of each ice road and timeframes for construction.

Narwhal also proposes that between January 20 and April 12, 2026, it will take an estimated five ATV trips per day between Oliktok Point and the west Harrison Bay operations base for resupply. The ATVs will travel in groups of two or more for safety purposes resulting in an average of one or two groups of ATVs transiting the sea ice trail daily during this period. Each trip will likely take approximately six hours (*i.e.,* 12 hours roundtrip within a 24-hr period).

Narwhal would determine the final west Harrison Bay ice road routes to exploratory drilling locations and onshore freshwater source lakes using ongoing geological and geophysical analysis, the results of the shallow hazard surveys, and the pre-clearance archaeological and freshwater lake surveys.

Where the ice road route includes floating sections of sea ice, Narwhal would thicken the ice using flooding techniques shown in figure 1–19 of Narwhal's application. Narwhal will thicken the road until the ice is grounded or at least 1.5 m (5 ft) to 1.8 m (6 ft) thick. After the ice road is sufficiently grounded or thickened to the prescribed depth, Narwhal will place a freshwater cap on the ice road to provide a harder and more durable surface for equipment. In a typical year, natural sea ice growth in west Harrison Bay generally reaches a maximum thickness of approximately 1.8 m by the end of April, which is anticipated to be the maximum ice road thickness. Flooding and ice buildup or maintenance activities may be conducted during non-daylight hours.

Narwhal would need to smooth the sea ice road routes as well. On grounded sea ice road sections that do not require flooding, Narwhal would conduct smoothing using ATV techniques used on the coastal sea ice trail or by using a motor grader. Ungrounded sea ice road sections that did require flooding to thicken the road would generally be smoothed out by the flooding process, though Narwhal may use a motor grader when the road is near completion and can support heavier equipment. Narwhal would use a bulldozer to breach any ice ridges present on the ice road route, though ice ridges are not anticipated to be a significant issue in west Harrison Bay, as the ice sheet is generally very smooth over most of the area with ice ridging occurring along the subsea feature of Pacific Shoal. Re-routing of sea ice roads will be minimized whenever possible.

Narwhal anticipates that the maintained ice road width, including taper areas and shoulders where blown snow may be placed, would be approximately 49 m (161 ft). Vehicle trips on local ice roads in west Harrison Bay would be concentrated between the base camp and the active drilling and testing location(s). Narwhal anticipates 25 round trips would occur on a daily basis between the rig and base camp for drilling and an additional 20 round trips per day for testing (separate from drilling; *i.e.,* 45 total trips). Well testing operations on a given well would be anticipated to last approximately 10 days.

The construction and operation of the sea ice roads is expected to be conducted entirely on grounded sea ice which would not be suitable habitat for ringed seals and therefore, NMFS does not expect take of marine mammals to occur on ice roads. As stated above, the portion of the sea ice trail that crosses the Colville River Delta is the only portion where NMFS expects take of marine mammals to occur.

Ice Pad Construction for Drilling Operations

As described below in the Exploratory Drilling Operations section, Narwhal

would conduct exploratory drilling operations at four sites that it surveys. Therefore, it would construct four sea ice pads (one at each drill site) using the same techniques described above for sea ice roads. Narwhal would construct sea ice pads in shallow water (1 m or less) using the flooding techniques if the ice is not already grounded. Narwhal may also add snow or ice chips to water to freeze the material in place. All ice pads will be grounded with additional ice above sea level to protect against ice movement during a storm event with higher seas. Narwhal would construct ice pads in deeper water (up to 2.5 m) with spray ice techniques to build up the base level with sufficient ice above sea level to ensure the ice pad will not be moved during a storm surge event.

When the desired pad elevation has been achieved, Narwhal would smooth the ice surface with a bulldozer and motor grader, and add a freshwater cap to provide a durable work surface as is done for the ice roads. Ice pad construction would occur concurrently with ice road construction and would take approximately 2–3 weeks depending on water depth and ambient temperatures. Ice pads will be constructed in sequence. The finished diameter of an ice pad would be approximately 183 m (600 ft).

NMFS does not expect take of marine mammals to occur due to the construction of ice pads since pads would only be constructed on grounded sea ice.

Temporary Airstrip and Base Camp Construction and Use

Narwhal plans to construct a temporary airstrip on grounded sea ice (23 m (75 ft) wide and up to 1,525 m (5,003 ft) long). The specific location is generally anticipated to be close to the exploratory drilling base camp (see figure 1–16 in Narwhal's IHA application). To construct the airstrip, Narwhal would plow snow off the sea ice to create a smooth surface for aircraft and install perimeter lighting for visual flight operations. Narwhal may plow the strip as necessary with a motor grader to remove snow, or use a snow blower if large drifts occur. However, the airstrip will be sited to avoid drifted snow to the extent possible. Narwhal may periodically spread fresh water on the runway surface as needed to maintain a hard, smooth, and safe surface for aircraft.

Aircraft would use the temporary airstrip between December 6, 2025 and May 5, 2026. Narwhal does not anticipate using helicopters after the sea ice airstrip is established. During ice construction and drilling, Narwhal anticipates that it would make approximately 68 flights using fixed wing aircraft.

NMFS does not anticipate that use of aircraft associated with this project would result in take of marine mammals. Born *et al.* (1999) analyzed ''escape responses'' (*i.e.,* hauled out animals entering the water) from an aircraft and a helicopter flying at an altitude of 150 m (492 ft). The results of the study indicated that if the aircraft do not approach the seals closer than 500 m (1,640 ft) at that altitude, the risk of flushing the seals into the water can be greatly reduced. While Bradford and Weller (2005) note that helicopter presence resulted in flushing of most of the hauled out seals during observations, they did not note specific distances of the helicopter at which flushing occurred. Use of aircraft is not expected to result in take given the proposed mitigation measures related to aircraft that reduce the potential for take. See the Proposed Mitigation section of this document for further detail.

Narwhal would assemble and start up the base camp where it will set modules approximately 3.7 m (12 ft) wide by 18 m (59 ft) long side by side with a front end loader. Narwhal has not determined the exact camp location, but estimates that the footprint of the overall camp facility would be 100 m (328 ft) by 50 m (164 ft). Narwhal may use additional sea ice area around camp for staging equipment and materials, fuel storage, and loading and receipt of freight. NMFS does not expect take to occur during the construction of the base camp on sea ice since it would be constructed on grounded ice.

Summer Cleanup

In early July 2026, after the snow has melted off the tundra, Narwhal would use a helicopter to conduct cleanup of the coastal sea ice route and freshwater access routes in the west Harrison Bay area. Narwhal would collect and dispose of project debris that can be safely retrieved. Narwhal would use one helicopter to complete this work over a period of approximately 3 to 5 days, including possible weather delays. These activities would require approximately 6 hours per day of flight time with up to 25–40 landings per day.

The use of the helicopter is not expected to result in take. However, this proposed IHA includes mitigation measures related to all aircraft that further reduce any potential for take. See the Proposed Mitigation section of this document for further detail.

Exploratory Drilling Operations

Upon completion of the sea ice roads and pads, Narwhal would assemble the exploratory drilling rig on site over about 7 to 10 days. Exploratory drilling is estimated to occur over 21 days per well including moving between sites via sea ice road. Narwhal may conduct flow testing on a well after the rig has been moved to the next well.

To conduct well testing, Narwhal would install a test tree on top of a completed well to control flow from the well at the surface. Prior to flowing fluids to the surface, Narwhal will perforate the well casing downhole to allow formation fluids to flow into the well. Well fluids would flow through the tree into a choke manifold and then to a line heater and into a three-phase separator. High pressure piping will connect all testing equipment. Separated gas will be measured and flared with oil and water directed to separate tanks for measurement. Produced liquids will either be reinjected back into the well after testing is complete or backhauled to the Prudhoe Bay infrastructure for disposal. Testing operations including rig up and rig down of the test spread is anticipated to take 15 days. At the completion of testing operations, the well will be plugged and abandoned in accordance with Alaska Oil and Gas Conservation Commission regulations. Plugging and abandonment will include pumping cement into the well to seal off the casing perforations, any annuli, and a surface cement plug will be installed in the upper 45 m of the wellbore. After cementing, the well will be cut off at least five feet below the seafloor.

Exploratory drilling operations would be conducted 24 hours per day. Narwhal anticipates that rig moves between wells would take 5 days or less and would be done with conventional heavy haul trucks and trailers. Each rig move is anticipated to require 60 truck trips from one drilling location to the next. Narwhal anticipates that drilling operations would occur over approximately 82 days, including time to move the rig, for the entirety of the drilling operation. All drilled exploration wells will be plugged and abandoned during the 2025/2026 winter season.

Drilling sounds are expected to transmit poorly from the drill rig machinery through ice or soft substrate into the water (Richardson *et al.* 1995). Recordings of underwater sounds during drilling operations were recorded in late February and early March of 2001 and 2002 from Northstar Island, an artificial gravel island located

approximately 125 km (77 mi) east of west Harrison Bay in water 11.9 m (39 ft) deep. Underwater sound during drilling alone (*i.e.,* without other production noises from the island) were reported in Blackwell *et al.* (2004a) as 114 dB re 1µPa at 250 m (820 ft) from the source during ice-covered conditions. The lowest level of underwater sound recorded during drilling alone was reported as 104 dB re 1µPa at 1 km, while background sound levels (measured at 95 dB re 1µPa) were reached 2 to 4 km from the source (Blackwell *et al.* 2004a). None of these underwater sounds exceeded the120-dB root mean square continuous noise threshold criterion (see Background on Active Acoustic Sound Sources and Acoustic Terminology section) at the reported distances close to the island, and similar low-level underwater sounds are expected during short-term (*i.e.,* 25 non-continuous days) exploratory drilling in west Harrison Bay.

Airborne drilling sounds are similarly not expected to exceed the 100 dB re 20 1µPa threshold criterion for pinnipeds (other than harbor seals). In the early winter-spring of 2001 and 2002, the levels, frequency characteristics, and range dependence of sounds and vibrations during industrial activity (*i.e.,* mainly drilling and production) at Northstar were recorded (Blackwell *et al.* 2004a). The ''drilling'' category included only periods of time during which the drill bit was boring through subsurface formations. Only recordings when wind speed was <5 m/s were used to minimize contamination in the data. The highest (80 dB re: 20 mPa) and lowest (44 dB re: 20 mPa) broadband levels were recorded in 2002 at 220 m (722 ft) and 9.4 km (31 ft), respectively. NMFS concludes that neither airborne nor underwater noise resulting from drilling operations is likely to exceed associated threshold criteria. As a result, no take of marine mammals is anticipated during exploratory drilling during winter in west Harrison Bay and this activity is not discussed further.

Proposed mitigation, monitoring, and reporting measures are described in detail later in this document (please see Proposed Mitigation and Proposed Monitoring and Reporting).

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the 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; *https://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*).

Table 1 lists all species or stocks for which take is likely from the specified activities and proposed to be authorized 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. While no serious injury or mortality is anticipated or proposed to be 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 managed stocks in this region are assessed in NMFS' U.S. Alaska SARs. All values presented in table 1 are the most recent available at the time of publication, including from the draft 2024 SARs, and are available online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments.*

TABLE 1—SPECIES [1] LIKELY IMPACTED BY THE SPECIFIED ACTIVITIES

Common name	Scientific name	Stock	ESA/ MMPA status; strategic (Y/N) [2]	Stock abundance (CV, N_{min}, most recent abundance survey) [3]	PBR	Annual mortality/ serious injury (M/SI) [4]
Order Artiodactyla—Cetacea—Mysticeti (baleen whales)						
Family Balaenidae:						
Bowhead whale	*Balaena mysticetus*	Western Arctic	E, D, Y	15,227 (0.165, 13,263, 2019).	133	57
Order Carnivora—Pinnipedia						
Family Phocidae (earless seals):						
Bearded Seal	*Erignathus barbatus*	Beringia	T, D, Y	Unknown (UND) (UND, UND, 2013).	UND	6,709
Ringed Seal	*Pusa hispida*	Arctic	T, D, Y	UND (UND, UND, 2013)	UND	6,459
Spotted Seal	*Phoca largha*	Bering	-, -, N	461,625 (N/A, 423,237, 2013).	25,394	5,254

[1] Information on the classification of marine mammal species can be found on the web page for The Society for Marine Mammalogy's Committee on Taxonomy (*https://marinemammalscience.org/science-and-publications/list-marine-mammal-species-subspecies/*).

[2] Endangered Species Act (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.

[3] 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.

[4] 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 M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range.

As indicated above, all four species, comprising four managed stocks, in table 1 temporally and spatially co-occur with the specified activities to the degree that take is reasonably likely to occur. While gray whale (*Eschrichtius robustus*), beluga whale (*Delphinapterus leucas*), and harbor porpoise (*Phocoena phocoena*) have been documented in the Beaufort Sea, the temporal and/or spatial occurrence of these species is such that take is not expected to occur, and they are not discussed further beyond the explanation provided here. Gray whales and harbor porpoises rarely occur east of Point Barrow, approximately 200 km west of the project area. Further, while beluga whales occasionally occur in the Beaufort Sea, they are generally distributed at or beyond the continental shelf break outside of the project area (Ireland *et al.* 2016).

In addition, the polar bear (*Ursus maritimus*) may be found in west Harrison Bay. However, polar bear are managed by the U.S. Fish and Wildlife Service and are not considered further in this document.

Bowhead Whale

Of the five stocks of bowhead whale, only the Western Arctic stock occurs in U.S. waters. The Western Arctic stock of bowhead whales are distributed seasonally in ice-covered waters of the Arctic and near-Arctic, generally between 60 degrees and 75 degrees North latitude in the Western Arctic Basin (Moore and Reeves 1993; Muto *et al.* 2018). The majority of the stock migrates annually from wintering areas (December to March) in the central and northwestern Bering Sea, north through the Chukchi Sea in the spring (April through May) following offshore ice leads around the coast of Alaska, and into the eastern Beaufort Sea where they spend most of the summer (June through early to mid-October). Most animals from the stock return to the Bering Sea in the fall (September through December) where they overwinter (Braham *et al.* 1980; Moore and Reeves 1993; Citta *et al.* 2015; Muto *et al.* 2018).

The annual migration of the Western Arctic stock to and from the summer feeding grounds in the Beaufort Sea has been monitored by the Bureau of Ocean Energy Management (BOEM) (and predecessor agencies), NMFS, and/or industry since 1982 (Treacy *et al.* 2006; Blackwell *et al.* 2007; Ireland *et al.* 2009; Reiser *et al.* 2011; Bisson *et al.* 2013; Clarke *et al.* 2014). Survey data indicate that the fall migration off northern Alaska occurs primarily over the continental shelf, generally 12–37 mi (19–60 km) offshore, in waters 11–60 m deep (Moore *et al.* 1989; Moore and Reeves 1993; Treacy 2002; Monnett and Treacy 2005; Treacy *et al.* 2006). Waters less than 4.5 m deep are considered too shallow to support these whales, and in three decades of aerial surveys by BOEM Aerial Surveys of Arctic Marine Mammals (ASAMM), no bowhead whale has been recorded in waters less than 5 m deep (Clarke and Ferguson 2010).

In September 2020, Brower *et al.* (2022) reported an unusual sighting of an aggregation of bowhead whales just east of Harrison Bay (see figure 4–2 of Narwhal's application). Bowhead whales had not typically been observed in this area since 1982, when similar aerial surveys (now referred to as ASAMM) began (Brower *et al.* 2022). The sighting data represented in figure 4–2 of Narwhal's application are approximately 5 to 10 km west-northwest of Narwhal's proposed activities that would occur during the open-water season. As described in Brower *et al.* (2022), the aggregation of bowheads near Harrison Bay was attributed to a large oceanographic front due to high freshwater discharge from the Colville River (three and a half times the historical mean), which can aggregate prey.

Hauser *et al.* (2008) reported results for bowhead whale surveys near the Colville River Delta in August and September 2008, reporting that most bowheads were observed between 25 and 30 km north of the barrier islands offshore. In 2017, Quintillion Subsea Operations, LLC monitored for marine mammals during installation of a fiber optics cable more than 50 km offshore of Oliktok Point moving west to Point Barrow and beyond (Green *et al.* 2018). In the fall of 2017, the project recorded 17 groups of bowhead whales (25 individuals) during operations offshore of Oliktok Point. Bowhead whale group size ranged from 1 to 5 with a mean of 1.47 (Green *et al.* 2018).

In September 2022 as part of a long term study, researchers tagged 11 bowhead whales with satellite transmitters to help determine how decreasing sea ice, changing wind patterns, warmer water, and increasing human activity are affecting bowhead whale behavior and distribution (*http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.bowhead*). This project began in 2006 and is a collaboration among the Alaska Department of Fish and Game (ADF&G), the Alaska Eskimo Whaling Commission (AEWC), Whaling Captain's Associations of Barrow, Kaktovik, Gambell, and Savoonga, the Aklavik and Tuktoyaktuk Hunters and Trappers Committees, the North Slope Borough (NSB), the Barrow Arctic Science Consortium, the Department of Fisheries and Oceans Canada, and the Greenland Institute of Natural Resources. Further analysis of the movement patterns showed that these tagged animals from 2022 did not extend into Harrison Bay, Alaska.

Critical habitat has not been designated for the bowhead whale. However, Clarke *et al.* (2023) identified several Biological Important Areas (BIAs) for feeding and migration for both mature and juvenile whales that directly overlap or occur close to the project area. Bowhead feeding BIAs encompass much of the Arctic region from May through December with the August, September, and October BIAs occurring close to the proposed project area. These areas were delineated from data collected during the ASAMM survey where both juvenile and adult bowhead whales were observed feeding or milling (Clark *et al.* 2023). Ferguson *et al.* (2023) found that correlations with Arctic krill (*Euphausia superba*) and specifically ''krill traps'' created by wind driven upwelling bringing prey from depth and concentrating it near freshwater runoff drove much of the feeding aggregations. Migratory BIAs also occur in the vicinity of the project area and overlap with feeding BIAs from August through October. Migration routes were found closely correlated with feeding areas and essentially contain the same habitat type as described above (Clark *et al.* 2023). The reproductive BIAs identified for bowhead whale all occur over 32 km (20 mi) offshore from the project area and are not anticipated to be affected by Narwhal's activities.

In summary, we expect that bowhead whales would occur within the project area during the open water season. Much of the presence of bowhead whales and their important habitat as described above would be at the farthest extent of the project area during the open water periods. NMFS expects that there is some potential for bowhead whales to occur in the project area in the summer and fall and may experience disturbance from the underwater noise produced during the operation of the seismic airgun. NMFS would not expect bowheads to be present during Narwhal's ice-cover activities.

Bearded Seal

The Alaska stock of bearded seals occur seasonally in the shallow shelf waters of the Beaufort, Chukchi, and

Bering Seas (Cameron *et al.* 2010). A reliable population estimate for the entire stock is not available. The actual number of ringed seals in the U.S. portion of the Bering Sea is likely much higher (Young *et al.* 2023). Bearded seals are closely associated with ice and their migration coincides with the sea ice retreat and advancement. During winter, most bearded seals in Alaskan waters are found in the Bering Sea as their movements are related to the advance and retreat of sea ice (Kelly 1988). In the Chukchi and Beaufort seas, favorable conditions for bearded seals are more limited, and they are less abundant. From mid-April to June as the ice recedes, some of the bearded seals that overwintered in the Bering Sea migrate northward through the Bering Strait to the Chukchi and Beaufort seas. During the summer, bearded seals are found near the fragmented margin of multi-year ice that covers the continental shelf of the Chukchi Sea and in nearshore areas of the central and western Beaufort Sea (Ireland *et al.* 2016).

Aerial surveys conducted in the Beaufort Sea indicated that bearded seals preferred water depths between 25–75 m (82–246 ft) and areas of open ice cover (Cameron *et al.* 2010). ASAMM commonly observe bearded seals offshore in the Beaufort Sea; however, no sightings have been observed in the west Harrison Bay. Based on bearded seal water depth and ice coverage preferences, survey observations in the Prudhoe Bay region, and the normal level of ongoing industrial activity in the project area, only very small numbers of bearded seals are expected near the project area.

Critical habitat for the bearded seal was designated in May 2022 and includes marine waters off the coast of Harrison Bay, Alaska (87 FR 19180; April 1, 2022). Essential features established by NMFS for conservation of the bearded Beringia Distinct Population Segment (DPS) and the U.S. portion of the Beringia stock include (1) Sea ice habitat suitable for whelping and nursing, which is defined as areas with waters 200 m or less in depth containing pack ice of at least 25 percent concentration and providing bearded seals access to those waters from the ice; (2) Sea ice habitat suitable as a platform for molting, which is defined as areas with waters 200 m or less in depth containing pack ice of at least 15 percent concentration and providing bearded seals access to those waters from the ice, and (3) Primary prey resources to support bearded seals: Waters 200 m or less in depth containing benthic organisms, including epifaunal and infaunal invertebrates, and demersal fishes. Narwhal's proposed project would not overlap with bearded seal critical habitat and therefore, not have any potential effects to that habitat.

In summary, bearded seals may occur in the project area during the open water season as the sea ice recedes in the Harrison Bay area. NMFS expects that some individuals would inhabit the coastal areas of west Harrison Bay and have the potential to be disturbed by seismic surveys. Bearded seals could potentially occur in the project area during the remainder of the year; however, given the shallow waters of west Harrison Bay, NMFS expects bearded seals to mainly occur offshore in pack ice during the ice covered periods.

Ringed Seal

Ringed seals are distributed in all seasonally ice-covered seas of the Northern Hemisphere (Lang *et al.* 2021, Muto *et al.* 2020). Five subspecies of ringed seals are currently recognized, with only the Arctic stock occurring in U.S. waters of the Arctic Ocean and Bering Sea (Rice and Society for Marine Mammalogy 1998). Although Conn *et al.* (2014) calculated an abundance estimate of 171,418 using a subset of aerial survey data collected in 2012 by Moreland *et al.* (2013) that covered the entire ice-covered portions of the Bering Sea, this estimate is considered to be low and was multiplied by a factor of two (Young *et al.* 2023).

They are year-round residents of the Chukchi and Beaufort seas and are generally the most encountered seal in the U.S. Arctic. While other ice seals, such as spotted and bearded seals, may be present in the Beaufort Sea during the open-water season, only ringed seals are expected to be in the nearshore environment during the ice-covered months and, therefore, are the only species expected to be affected by Narwhal's activities, such as ice trail construction and operation, during the ice covered season (see Detailed Description of Specified Activities section).

Ringed seals are abundant in the winter and spring on shorefast and pack ice in the northern Bering Sea, Norton Sound, Kotzebue Sound, Chukchi Sea, and Beaufort Sea, where they utilize sea ice for pupping and nursing as well as resting. Landfast ice has been shown to be the best habitat for ringed seal pupping (Kelly 1988). Moulton *et al.* (2002) found the highest concentrations of ringed seals on stable, shorefast ice over water depths of about 10–20 m in late May and early June; but waters less than 5 m deep are not preferred wintering areas for ringed seals (Frost *et al.* 2004, Moulton *et al.* 2002). In the summer months, they use sea ice as a platform for molting and resting, although ringed seals can remain pelagic in productive foraging areas for long periods of time. In the fall, ringed seals utilize sea ice as a platform for resting, and rarely haul out in terrestrial habitats.

During the winter, ringed seals excavate and maintain breathing holes in the ice and occupy lairs in accumulated snow (Smith and Stirling 1975). Ringed seals give birth in lairs from mid-March through April, nurse their pups in the lairs for 5 to 8 weeks, and mate in late April and May (Smith 1973; Hammill *et al.* 1991; Lydersen and Hammill 1993; as cited in (Ireland *et al.* 2016)). Seal mothers continue to forage throughout lactation and move young pups between a network of four to six lairs (Ireland *et al.* 2016). Arctic ringed seals generally prefer landfast ice along the shoreline for pupping. Frost *et al.* (2004) conducted aerial surveys over the Beaufort Sea coast from Utqiaġvik to Kaktovik and determined that ringed seal density was greatest in water depths between 16 and 115 ft (5 and 35 m), and in relatively flat ice close to the fast ice edge. Aerial surveys conducted in association with construction near the Northstar facility found ringed seal annual densities ranged from 0.39 to 0.83 seals per km^2 (Moulton *et al.* 2005).

The ringed seal diet is composed predominantly of pelagic fish such as cod (Crain *et al.* 2021) but also includes shrimp and planktonic crustaceans; the relative importance of each type of prey depends on local availability and season (Lowry *et al.* 1998, as cited in (Ireland *et al.* 2016)). They have been shown to dive to depths of up to 46 m or more while foraging. Ringed seals are hunted by killer whales and polar bears. Spatial distributions and population fluctuations of ringed seals and polar bears appear to be tightly correlated in some areas (Stirling and Øritsland 1995 as cited in (Ireland *et al.* 2016)).

Optimal overwintering areas for ringed seals in the Beaufort Sea occur in waters between 10 and 35 m deep, preferably in the landfast ice along the shoreline close to lead systems. In May 2022, two trained wildlife-detection dogs were used to survey an area in Prudhoe Bay near Northstar Island. A total of 61 ringed seal structures (47 breathing holes and 14 lairs) were identified in an 88.2 km^2 area resulting in a density of 0.68 structures/km2. Lair density was higher in water deeper than 5m; however, seal structures were found in all water depths (Quakenbush *et al.*

2022). Ringed seal movements during winter and spring are typically quite limited, especially where ice cover is extensive (Kelly *et al.* 2010a).

During spring (*i.e.,* May and June in the Arctic), ringed seals spend time basking on the ice. Based on a tagging study in the mid-2000s between Pt. Barrow and Peard Bay along the Chukchi Sea coast, tagged seals (n=43) spent an average of 3 percent (95 percent Confidence Level (CL): 1–4 percent) of their time in lairs and an average of 37 percent (95 percent CL: 32–41 percent) of their time basking after the first emergence from the subnivean lair. Basking duration (median) on the ice increased to nine hours before ice melt during the course of the study (Kelly *et al.*2010a).

On April 1, 2022, NMFS designated critical habitat for the Arctic subspecies of ringed seals (87 FR 19232). The critical habitat designation covers areas of marine habitat in the Bering, Chukchi, and Beaufort seas. During the designation, NMFS considered their primary biological features: (1) snow covered sea ice suitable for subnivean birth lair formation and maintenance defined as waters 3 m or more in-depth containing area of shorefast ice or dense stable pack ice that contain snow drifts at least 54 cm deep to maintain lairs; (2) sea ice suitable for basking and molting defined as waters 3 m or more in depth with 15 percent or higher concentrations of sea ice; and primary prey resources to support ringed seals defined as small, schooling fish and small crustaceans. Narwhal's proposed project would not overlap with ringed seal critical habitat and therefore, not have any potential effects to that habitat.

Ringed seals were the most common pinniped observed during marine mammal monitoring for installation of an offshore fiber optic cable in the Beaufort and Chukchi seas; 57 groups (77 individuals) were recorded (Green *et al.* 2018). All but three of the seals were recorded during operations offshore of Oliktok Point. Four of the ringed seals were identified as juveniles. Figure 4–6 of Narwhal's application depicts observations of ringed seals during summer and fall from industry-sponsored vessels over the period 2006–2012, including detections in eastern Harrison Bay and the area around Oliktok. NMFS expects that ringed seals would be the most common pinniped observed during the project during the open-water period and the only species during the ice-covered months.

Spotted Seal

In U.S. waters, spotted seals from the Bering stock are distributed along the continental shelf of the Bering, Chukchi, and Beaufort seas (Muto *et al.* 2021). They are present in the Beaufort Sea from July through late August (Ireland *et al.* 2016); they sometimes haul out on land but also spend extended periods at sea and are rarely seen on the pack ice. During the spring when pupping, breeding, and molting, spotted seals are found along the southern edge of the sea ice in the Okhotsk and Bering seas (Rugh *et al.* 1997). As the ice cover thickens at the onset of winter, spotted seals leave the northern portions of their range and move into the Bering Sea (Lowry *et al.* 1998; Von Duyke *et al.* 2016; as cited in Ireland *et al.* (2016)).

Historically, the Colville and Sagavanirktok rivers deltas supported up 600 spotted seals; however, by the late 1900s, fewer than 20 seals were been seen at either location (Johnson *et al.* 1999; as cited in (Ireland *et al.* 2016)). Johnson *et al.* (1999) stated that while specific surveys for spotted seals were not conducted in 1998, known haulouts were checked opportunistically during aerial surveys for other species. An estimated 16 seals were hauled out on a small island in the East Channel off the mouth of the Kachemach River, on August 25, 1998. Four seals were observed hauled out at a consistently used site at the southwest end of Anachlik Island on September 14, 1998. In 1997, during eight aerial surveys, small groups of spotted seals were seen on four occasions, hauled out on sand spits or in adjacent shoals in these same two locations. Seals were not seen elsewhere on the delta, nor were any seen on or around the Jones Islands or Pingok Island in 1997 (Johnson *et al.* 1999).

In 2014, visual and passive acoustic monitoring was undertaken from August 25–September 30 in an approximately 30-km^2 survey area between the Spy Islands and Oliktok Point near Simpson Lagoon (*i.e.,* near the Colville River Delta) (Lomac-MacNair *et al.* 2018). An Inupiat hunter also conducted vessel-based visual surveys for spotted seal haulout sites in the area. A total of 90 marine mammals were observed during visual surveys including 40 spotted seals, five ringed seals, 28 seals identified as either spotted or ringed, two bearded seals, and two beluga whales (Lomac-MacNair *et al.* 2018).

During oil exploration projects from 1996 to 2001, 12 spotted seals were positively identified near a seismic source vessel during open-water in the central Alaskan Beaufort Sea (Moulton and Lawson 2002; as cited in (Moulton *et al.* 2005)). Bisson *et al.* (2013) recorded 38 sightings of spotted seals during 2012 operations in the Beaufort Sea, and 46 spotted seal sightings were reported during barge operations between West Dock and Cape Simpson (Green *et al.* 2007; as cited in Ireland *et al.* (2016)). Most sightings occurred from WHB to Cape Simpson, with only one sighting occurring offshore of the Colville River Delta.

Sighting data indicate that spotted seals could be present in the project area during the summer months; however, we do not expect spotted seals to occur in the project area during the ice-covered portion of the project activities. Since spotted seals are not listed as threatened or endangered under the ESA, there is no designated critical habitat. No BIAs have been designated for spotted seals.

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.*). Generalized hearing ranges were chosen based on the ~65 decibel (dB) threshold from composite audiograms, previous analyses in NMFS (2018), and/or data from Southall *et al.* (2007) and Southall *et al.* (2019). We note that the names of two hearing groups and the generalized hearing ranges of all marine mammal hearing groups have been recently updated (NMFS 2024) as reflected below in table 2.

TABLE 2—MARINE MAMMAL HEARING GROUPS

[NMFS, 2024]

Hearing group	Generalized hearing range *
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 36 kHz.
High-frequency (HF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz.
Very High-frequency (VHF) cetaceans (true porpoises, *Kogia,* river dolphins, Cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*).	200 Hz to 165 kHz.
Phocid pinnipeds (PW) (underwater) (true seals)	40 Hz to 90 kHz.
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 68 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 may not be as broad. Generalized hearing range chosen based on ~65 dB threshold from composite audiogram, previous analysis in NMFS 2018, and/or data from Southall *et al.* 2007; Southall *et al.* 2019. Additionally, animals are able to detect very loud sounds above and below that ''generalized'' hearing range.

The pinniped functional hearing group was modified from Southall *et al.* (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al.,* 2006; Kastelein *et al.,* 2009; Reichmuth and Holt, 2013).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2024) for a review of available information (*https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance-other-acoustic-tools*).

Potential Effects of Specified Activities on Marine Mammals and Their Habitat

This section provides a discussion of the ways in which components of the specified activity may impact marine mammals and their habitat. The Estimated Take of Marine Mammals section later in this document includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The Negligible Impact Analysis and Determination section considers the content of this section, the Estimated Take of Marine Mammals section, and the Proposed Mitigation section, to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and whether those impacts are reasonably expected to, or reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

Background on Active Acoustic Sound Sources and Acoustic Terminology

This section contains a brief technical background on sound, the characteristics of certain sound types, and metrics used in this proposal inasmuch as the information is relevant to the specified activity and to the discussion of the effects of the specified activity on marine mammals in this document. For general information on sound and its interaction with the marine environment, please see Au and Hastings (2008); Richardson *et al.* (1995); Urick (1983).

Sound travels in waves, the basic components of which are frequency, wavelength, velocity, and amplitude. Frequency is the number of pressure waves that pass by a reference point per unit of time and is measured in hertz or cycles per second. Wavelength is the distance between two peaks or corresponding points of a sound wave (length of one cycle). Higher frequency sounds have shorter wavelengths than lower frequency sounds, and typically attenuate (decrease) more rapidly, except in certain cases in shallower water. Amplitude is the height of the sound pressure wave or the ''loudness'' of a sound and is typically described using the relative unit of the decibel. A sound pressure level (SPL) in dB is described as the ratio between a measured pressure and a reference pressure (for underwater sound, this is 1 microPascal (μPa)), and is a logarithmic unit that accounts for large variations in amplitude. Therefore, a relatively small change in dB corresponds to large changes in sound pressure. The source level (SL) represents the SPL referenced at a distance of 1 m from the source (referenced to 1 μPa), while the received level is the SPL at the listener's position (referenced to 1 μPa).

Sound exposure level (SEL; represented as dB re 1 μPa2–s) represents the total energy in a stated frequency band over a stated time interval or event and considers both intensity and duration of exposure. The per-pulse SEL is calculated over the time window containing the entire pulse (*i.e.,* 100 percent of the acoustic energy). SEL is a cumulative metric; it can be accumulated over a single pulse, or calculated over periods containing multiple pulses. Cumulative SEL represents the total energy accumulated by a receiver over a defined time window or during an event. Peak sound pressure (also referred to as zero-to-peak sound pressure or 0–pk) is the maximum instantaneous sound pressure measurable in the water at a specified distance from the source and is represented in the same units as the rms sound pressure.

When underwater objects vibrate or activity occurs, sound-pressure waves are created. These waves alternately compress and decompress the water as the sound wave travels. Underwater sound waves radiate in a manner similar to ripples on the surface of a pond and may be either directed in a beam or beams or may radiate in all directions (omnidirectional sources), as is the case for sound produced by the shallow water hazard survey considered here. The compressions and decompressions associated with sound waves are detected as changes in pressure by aquatic life and man-made sound receptors such as hydrophones.

Even in the absence of sound from the specified activity, the underwater environment is typically loud due to ambient sound, which is defined as environmental background sound levels lacking a single source or point (Richardson *et al.,* 1995). The sound level of a region is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g.,* wind and waves, earthquakes, ice, atmospheric sound), biological (*e.g.,* sounds produced by marine mammals, fish, and invertebrates), and anthropogenic (*e.g.,* vessels, dredging, construction) sound. A number of sources contribute to ambient sound, including wind and waves, which are a main source of naturally occurring ambient sound for frequencies between 200 hertz (Hz) and 50 kilohertz (kHz) (Mitson, 1995). In general, ambient sound levels tend to increase with increasing wind speed and wave height. Precipitation can become an important

component of total sound at frequencies above 500 Hz, and possibly down to 100 Hz during quiet times. Marine mammals can contribute significantly to ambient sound levels, as can some fish and snapping shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz. Sources of ambient sound related to human activity include transportation (surface vessels), dredging and construction, oil and gas drilling and production, geophysical surveys, sonar, and explosions. Vessel noise typically dominates the total ambient sound for frequencies between 20 and 300 Hz. In general, the frequencies of anthropogenic sounds are below 1 kHz and, if higher frequency sound levels are created, they attenuate rapidly.

The sum of the various natural and anthropogenic sound sources that comprise ambient sound at any given location and time depends not only on the source levels (as determined by current weather conditions and levels of biological and human activity) but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor, and is frequency-dependent. As a result of the dependence on a large number of varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Sound levels at a given frequency and location can vary by 10–20 dB from day to day (Richardson *et al.,* 1995). The result is that, depending on the source type and its intensity, sound from the specified activity may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals. Details of source types are described in the following text.

Sounds are often considered to fall into one of two general types: pulsed and non-pulsed (defined in the following). The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g.,* Ward, 1997 in Southall *et al.,* 2007). Please see Southall *et al.* (2007) for an in-depth discussion of these concepts. The distinction between these two sound types is not always obvious, as certain signals share properties of both pulsed and non-pulsed sounds. A signal near a source could be categorized as a pulse, but due to propagation effects as it moves farther from the source, the signal duration becomes longer (*e.g.,* Greene and Richardson, 1988).

Pulsed sound sources (*e.g.,* airguns, explosions, gunshots, sonic booms, impact pile driving) produce signals that are brief (typically considered to be less than one second), broadband, atonal transients (ANSI, 1986, 2005; Harris, 1998; NIOSH, 1998; ISO, 2003) and occur either as isolated events or repeated in some succession. Pulsed sounds are all characterized by a relatively rapid rise from ambient pressure to a maximal pressure value followed by a rapid decay period that may include a period of diminishing, oscillating maximal and minimal pressures, and generally have an increased capacity to induce physical injury as compared with sounds that lack these features.

Non-pulsed sounds can be tonal, narrowband, or broadband, brief or prolonged, and may be either continuous or intermittent (ANSI, 1995; NIOSH, 1998). Some of these non-pulsed sounds can be transient signals of short duration but without the essential properties of pulses (*e.g.,* rapid rise time). Examples of non-pulsed sounds include those produced by vessels, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems. The duration of such sounds, as received at a distance, can be greatly extended in a highly reverberant environment.

Airgun arrays produce pulsed signals with energy in a frequency range from about 10–2,000 Hz, with most energy radiated at frequencies below 200 Hz. The amplitude of the acoustic wave emitted from the source is equal in all directions (*i.e.,* omnidirectional), but airgun arrays do possess some directionality due to different phase delays between guns in different directions. Airgun arrays are typically tuned to maximize functionality for data acquisition purposes, meaning that sound transmitted in horizontal directions and at higher frequencies is minimized to the extent possible.

Potential Effects on Marine Mammals

The effects of sounds from airgun and sparker pulses may include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, and auditory injury (permanent) or temporary hearing impairment or non-auditory effects (Richardson *et al.,* 1995). The effects of noise on marine mammals are highly variable, often depending on species and contextual factors (based on Richardson *et al.,* 1995).

Tolerance: Numerous studies have shown that pulsed sounds from air guns are often readily detectable in the water at distances of many kilometers. Numerous studies have also shown that marine mammals at distances more than a few kilometers from operating survey vessels often show no apparent response. That is often true even in cases when the pulsed sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. In general, pinnipeds and small odontocetes (toothed whales) seem to be more tolerant of exposure to air gun pulses than baleen whales. Although various toothed whales and, less frequently, pinnipeds have been shown to react behaviorally to airgun pulses under some conditions; at other times, mammals of both types have shown no overt reactions. Weir (2008) observed marine mammal responses to seismic pulses from a 24 airgun array firing a total volume of either 5,085 in^3 or 3,147 in^3 in Angolan waters between August 2004 and May 2005. Weir recorded a total of 207 sightings of humpback whales (n = 66), sperm whales (n = 124), and Atlantic spotted dolphins (n = 17) and reported that there were no significant differences in encounter rates (sightings/hr) for humpback and sperm whales according to the airgun array's operational status (*i.e.,* active versus silent).

Behavioral Disturbance: Marine mammals may behaviorally react to sound when exposed to anthropogenic noise. These behavioral reactions are often shown as: Changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where noise sources are located; and/or flight responses (*e.g.,* pinnipeds flushing into water from haulouts or rookeries).

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences of behavioral modification have the potential to be biologically significant if the change affects growth, survival, or reproduction. Examples of behavioral modifications that could impact growth, survival or reproduction include:

- Drastic changes in diving/surfacing/swimming patterns that could lead to stranding;
- Habitat abandonment (temporary or permanent) due to loss of desirable acoustic environment; and

• Disruption of feeding or social interaction resulting in significant energetic costs, inhibited breeding, or cow-calf separation.

The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography) and is also difficult to predict (Southall *et al.,* 2007).

Cerchio *et al.* (2014) used passive acoustic monitoring to document the presence of singing humpback whales off the coast of northern Angola and to opportunistically test for the effect of seismic survey activity on the number of singing whales. Two recording units were deployed between March and December 2008 in the offshore environment; numbers of singers were counted every hour. Generalized Additive Mixed Models were used to assess the effect of survey day (seasonality), hour (diel variation), moon phase, and received levels of noise (measured from a single pulse during each ten minute sampled period) on singer number. The number of singers significantly decreased with increasing received level of noise, suggesting that humpback whale communication was disrupted to some extent by the survey activity.

Castellote *et al.* (2012) reported acoustic and behavioral changes by fin whales in response to shipping and airgun noise. Acoustic features of fin whale song notes recorded in the Mediterranean Sea and northeast Atlantic Ocean were compared for areas with different shipping noise levels and traffic intensities and during an airgun survey. During the first 72 hours of the survey, a steady decrease in song received levels and bearings to singers indicated that whales moved away from the acoustic source and out of the study area. This displacement persisted for a time period well beyond the 10-day duration of airgun activity, providing evidence that fin whales may avoid an area for an extended period in the presence of increased noise. The authors hypothesize that fin whale acoustic communication is modified to compensate for increased background noise and that a sensitization process may play a role in the observed temporary displacement.

Seismic pulses at average received levels of 131 dB re 1 μPa^2-s caused blue whales to increase call production (Di Iorio and Clark, 2010). In contrast, McDonald *et al.* (1995) tracked a blue whale with seafloor seismometers and reported that it stopped vocalizing and changed its travel direction at a range of 10 km from the acoustic source vessel (estimated received level 143 dB pk-pk). Blackwell *et al.* (2013) found that bowhead whale call rates dropped significantly at onset of airgun use at sites with a median distance of 41–45 km from the survey. Blackwell *et al.* (2015) expanded this analysis to show that whales actually increased calling rates as soon as airgun signals were detectable before ultimately decreasing calling rates at higher received levels (*i.e.,* 10-minute cumulative sound exposure level (cSEL) of ~127 dB). Overall, these results suggest that bowhead whales may adjust their vocal output in an effort to compensate for noise before ceasing vocalization effort and ultimately deflecting from the acoustic source (Blackwell *et al.,* 2013, 2015). These studies demonstrate that even low levels of noise received far from the source can induce changes in vocalization and/or behavior for mysticetes.

Avoidance is the displacement of an individual from an area or migration path as a result of the presence of a sound or other stressors, and is one of the most obvious manifestations of disturbance in marine mammals (Richardson *et al.,* 1995). For example, gray whales are known to change direction—deflecting from customary migratory paths—in order to avoid noise from airgun surveys (Malme *et al.,* 1984). Humpback whales showed avoidance behavior in the presence of an active airgun array during observational studies and controlled exposure experiments in western Australia (McCauley *et al.,* 2000a). Avoidance may be short-term, with animals returning to the area once the noise has ceased (*e.g.,* Bowles *et al.,* 1994; Goold, 1996; Stone *et al.,* 2000; Morton and Symonds, 2002; Gailey *et al.,* 2007). Longer-term displacement is possible, however, which may lead to changes in abundance or distribution patterns of the affected species in the affected region if habituation to the presence of the sound does not occur (*e.g.,* Bejder *et al.,* 2006; Teilmann *et al.,* 2006).

Stone (2015a) reported data from at-sea observations during 1,196 airgun surveys from 1994 to 2010. When large arrays of airguns (considered to be 500 in^3 or more) were firing, lateral displacement, more localized avoidance, or other changes in behavior were evident for most odontocetes. However, significant responses to large arrays were found only for the minke whale and fin whale. Behavioral responses observed included changes in swimming or surfacing behavior, with indications that cetaceans remained near the water surface at these times. Cetaceans were recorded as feeding less often when large arrays were active. Behavioral observations of gray whales during an airgun survey monitored whale movements and respirations pre-, during-, and post-seismic survey (Gailey *et al.,* 2016). Behavioral state and water depth were the best 'natural' predictors of whale movements and respiration and, after considering natural variation, none of the response variables were significantly associated with survey or vessel sounds.

Pinnipeds are not likely to show a strong avoidance reaction to the airgun sources proposed for use. Visual monitoring from seismic vessels has shown only slight (if any) avoidance of airguns by pinnipeds and only slight (if any) changes in behavior. Monitoring work in the Alaskan Beaufort Sea during 1996–2001 provided considerable information regarding the behavior of Arctic ice seals exposed to seismic pulses (Harris *et al.,* 2001; Moulton and Lawson, 2002). These seismic projects usually involved arrays of 6 to 16 airguns with total volumes of 560 to 1,500 in^3. The combined results suggest that some seals avoid the immediate area around seismic vessels. In most survey years, ringed seal sightings tended to be farther away from the seismic vessel when the airguns were operating than when they were not (Moulton and Lawson, 2002). However, these avoidance movements were relatively small, on the order of 100 m (328 ft) to a few hundreds of meters, and many seals remained within 100–200 m (328–656 ft) of the trackline as the operating airgun array passed by. Seal sighting rates at the water surface were lower during airgun array operations than during no-airgun periods in each survey year except 1997. Similarly, seals are often very tolerant of pulsed sounds from seal-scaring devices (Mate and Harvey, 1987; Jefferson and Curry, 1994; Richardson *et al.,* 1995a). However, initial telemetry work suggests that avoidance and other behavioral reactions by two other species of seals to small airgun sources may at times be stronger than evident to date from visual studies of pinniped reactions to airguns (Thompson *et al.,* 1998). Even if reactions of the species occurring in the present study area are as strong as those evident in the telemetry study, reactions are expected to be confined to relatively small distances and durations, with no long-term effects on pinniped individuals or populations.

Behavioral disturbance of marine mammals is the most likely acoustic effect expected from Narwhal's single airgun and sparker operation during the

shallow water hazard survey. As described above, the effects would be temporary in nature and take during the seismic operation would likely only result in Level B harassment of cetaceans and pinnipeds.

Masking: Masking is the obscuring of sounds of interest by other sounds, often at similar frequencies. Marine mammals are highly dependent on sound, and their ability to recognize sound signals amid other noise is important in communication; predator and prey detection; and, in the case of toothed whales, echolocation. Although some degree of masking is inevitable when high levels of human-made broadband sounds are introduced into the ocean, marine mammals have evolved systems and behaviors that function to reduce the impacts of masking. Structured signals, such as the echolocation click sequences of small, toothed whales, may be readily detected even in the presence of strong background noise because their frequency content and temporal features usually differ strongly from those of the background noise (Au and Moore 1988, 1990). The components of background noise that are similar in frequency to the sound signal in question primarily determine the degree of signal masking. Masking effects of underwater sounds from Narwhal's proposed activities on marine mammal calls and other natural sounds are anticipated to be limited. There is little concern regarding masking from the airgun in this case due to the brief duration of these pulses and relatively longer silence between airgun shots near the sound source.

Auditory Injury and Permanent Threshold Shift (PTS)—NMFS defines auditory injury as ''damage to the inner ear that can result in destruction of tissue . . . which may or may not result in PTS'' (NMFS, 2024). NMFS defines PTS as a permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2024). Available data from humans and other terrestrial mammals indicate that a 40-dB TS approximates PTS onset (Ward *et al.,* 1958, 1959; Ward, 1960; Kryter *et al.,* 1966; Miller, 1974; Ahroon *et al.,* 1996; Henderson *et al.,* 2008). PTS levels for marine mammals are estimates, as with the exception of a single study unintentionally inducing PTS in a harbor seal (Kastak *et al.,* 2008), there are no empirical data measuring PTS in marine mammals largely due to the fact that, for various ethical reasons, experiments involving anthropogenic noise exposure at levels inducing PTS are not typically pursued or authorized (NMFS, 2018).

Temporary Threshold Shift (TTS)—It's a temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2018). Based on data from cetacean TTS measurements (Southall *et al.,* 2007, 2019), a TTS of 6 dB is considered the minimum TS clearly larger than any day-to-day or session-to-session variation in a subject's normal hearing ability (Schlundt *et al.,* 2000; Finneran *et al.,* 2000, 2002). As described in Finneran (2015), marine mammal studies have shown the amount of TTS increases with cumulative sound exposure level (SELcum) in an accelerating fashion. At low exposures with lower SELcum, the amount of TTS is typically small and the growth curves have shallow slopes. At exposures with higher SELcum, the growth curves become steeper and approach linear relationships with the noise SEL.

Depending on the degree (elevation of threshold in dB), duration (*i.e.,* recovery time), frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious (similar to those discussed in the Masking section, above). For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that takes place during a time when the animal is traveling through the open ocean, where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts. We note that reduced hearing sensitivity as a simple function of aging has been observed in marine mammals, as well as humans and other taxa (Southall *et al.,* 2007), so we can infer that strategies exist for coping with this condition to some degree, though likely not without cost.

Many studies have examined noise-induced hearing loss in marine mammals (see Finneran (2015) and Southall *et al.* (2019) for summaries). TTS is the mildest form of hearing impairment that can occur during exposure to sound (Kryter, 2013). While experiencing TTS, the hearing threshold rises, and a sound must be at a higher level in order to be heard. In terrestrial and marine mammals, TTS can last from minutes or hours to days (in cases of strong TTS). In many cases, hearing sensitivity recovers rapidly after exposure to the sound ends. For cetaceans, published data on the onset of TTS are limited to captive bottlenose dolphin (*Tursiops truncatus*), beluga whale, harbor porpoise, and Yangtze finless porpoise (*Neophocoena asiaeorientalis*) (Southall *et al.,* 2019). For pinnipeds in water, measurements of TTS are limited to harbor seals (*Phoca vitulina*), elephant seals (*Mirounga angustirostris*), bearded seals and California sea lions (*Zalophus californianus*) (Kastak *et al.,* 2007; Kastelein *et al.,* 2019b, 2019c, 2021, 2022a, 2022b; Reichmuth *et al.,* 2019; Sills *et al.,* 2020). TTS was not observed in spotted and ringed seals exposed to single airgun impulse sounds at levels matching previous predictions of TTS onset (Reichmuth *et al.,* 2016). These studies examine hearing thresholds measured in marine mammals before and after exposure to intense or long-duration sound exposures. The difference between the pre-exposure and post-exposure thresholds can be used to determine the amount of threshold shift at various post-exposure times.

The amount and onset of TTS depends on the exposure frequency. Sounds at low frequencies, well below the region of best sensitivity for a species or hearing group, are less hazardous than those at higher frequencies, near the region of best sensitivity (Finneran and Schlundt, 2013). At low frequencies, onset-TTS exposure levels are higher compared to those in the region of best sensitivity (*i.e.,* a low frequency noise would need to be louder to cause TTS onset when TTS exposure level is higher), as shown for harbor porpoises and harbor seals (Kastelein *et al.,* 2019a, 2019c). Note that in general, harbor seals and harbor porpoises have a lower TTS onset than other measured pinniped or cetacean species (Finneran, 2015). In addition, TTS can accumulate across multiple exposures, but the resulting TTS will be less than the TTS from a single, continuous exposure with the same sound exposure level (SEL) (Mooney *et al.,* 2009; Finneran *et al.,* 2010; Kastelein *et al.,* 2014, 2015). This means that TTS predictions based on the total, cumulative SEL will overestimate the amount of TTS from intermittent exposures, such as sonars and impulsive sources. Nachtigall *et al.* (2018) describe measurements of hearing sensitivity of multiple odontocete species (bottlenose dolphin, harbor porpoise, beluga, and false killer whale (*Pseudorca crassidens*)) when a relatively loud sound was preceded by a warning

sound. These captive animals were shown to reduce hearing sensitivity when warned of an impending intense sound. Based on these experimental observations of captive animals, the authors suggest that wild animals may dampen their hearing during prolonged exposures or if conditioned to anticipate intense sounds. Another study showed that echolocating animals (including odontocetes) might have anatomical specializations that might allow for conditioned hearing reduction and filtering of low-frequency ambient noise, including increased stiffness and control of middle ear structures and placement of inner ear structures (Ketten *et al.,* 2021). Data available on noise-induced hearing loss for mysticetes are currently lacking (NMFS, 2018). Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species.

Relationships between TTS and PTS thresholds have not been studied in marine mammals, and there is no PTS data for cetaceans, but such relationships are assumed to be similar to those in humans and other terrestrial mammals. PTS typically occurs at exposure levels at least several decibels above that inducing mild TTS (*e.g.,* a 40-dB threshold shift approximates PTS onset (Kryter *et al.,* 1966; Miller, 1974), while a 6-dB threshold shift approximates TTS onset (Southall *et al.,* 2007, 2019). Based on data from terrestrial mammals, a precautionary assumption is that the PTS thresholds for impulsive sounds (such as impact pile driving pulses as received close to the source) are at least 6 dB higher than the TTS threshold on a peak-pressure basis and PTS cumulative sound exposure level thresholds are 15 to 20 dB higher than TTS cumulative sound exposure level thresholds (Southall *et al.,* 2007, 2019). Given the higher level of sound or longer exposure duration necessary to cause PTS as compared with TTS, it is considerably less likely that PTS could occur.

The single airgun and sparker source Narwhal proposes to use for this project is a mobile source being towed by a vessel moving approximately 2 m/second. Effects on marine mammals from the operation of the sparker are expected to be similar to the operation of the single airgun (*e.g.,* impulsive noise). When considering the impacts to marine mammals, the effects described above for airguns would be expected with sparkers. Also, the water depth where these surveys are expected to occur are shallow and animals are expected to only spend brief periods, if any, in the ensonified area. Given the movement of the sound source and the fact that many marine mammals are likely moving through the project areas and not remaining for extended periods of time, the potential for PTS or TTS declines is unlikely.

Vessel Strike

Vessel collisions with marine mammals, or vessel strikes, can result in death or serious injury of the animal. These interactions are typically associated with large whales, which are less maneuverable than are smaller cetaceans or pinnipeds in relation to large vessels. The severity of injuries typically depends on the size and speed of the vessel, with the probability of death or serious injury increasing as vessel speed increases (Knowlton and Kraus, 2001; Laist *et al.,* 2001; Vanderlaan and Taggart, 2007; Conn and Silber, 2013). Impact forces increase with speed, as does the probability of a strike at a given distance (Silber *et al.,* 2010; Gende *et al.,* 2011). The chances of a lethal injury decline from approximately 80 percent at 15 kn to approximately 20 percent at 8.6 kn. At speeds below 11.8 kn, the chances of lethal injury drop below 50 percent (Vanderlaan and Taggart, 2007).

Ship strikes generally involve commercial shipping, which is much more common in both space and time than is geophysical survey activity and barge transports which typically involves larger vessels moving at faster speeds. Jensen and Silber (2004) summarized ship strikes of large whales worldwide from 1975–2003 and found that most collisions occurred in the open ocean and involved large vessels (*e.g.,* commercial shipping). Commercial fishing vessels were responsible for 3 percent of recorded collisions, while no such incidents were reported for geophysical survey vessels during that time period.

For vessels used in geophysical survey activities, vessel speed while towing gear is typically only 4–5 knots. At these speeds, both the possibility of striking a marine mammal and the possibility of a strike resulting in serious injury or mortality are so low as to be discountable. However, the likelihood of a strike actually happening is low given the smaller size of these vessels, generally slower speeds, and the coastal route vessels would take to the survey area. We anticipate that vessel collisions involving seismic data acquisition vessels towing gear, while not impossible, represent unlikely, unpredictable events for which there are no preventive measures. Given the required mitigation measures, the relatively slow speeds of vessels towing gear, the presence of bridge crew watching for obstacles at all times (including marine mammals), the presence of protected species observers, and the small number of seismic survey cruises relative to commercial ship traffic, we believe that the possibility of ship strike is discountable and, further, that were a strike of a large whale to occur, it would be unlikely to result in serious injury or mortality. No incidental take resulting from ship strike is anticipated or proposed for authorization, and this potential effect of the specified activity will not be discussed further in the following analysis.

The potential effects of Narwhal's shallow hazards survey activity are expected to be limited to Level B harassment consisting of behavioral harassment and/or temporary auditory effects and, for bowhead whales and three species pinnipeds only. No permanent auditory effects for any species belonging to other hearing groups are expected.

Ice Trails

Ringed seals could be adversely affected by exposure to visual and acoustic disturbances during ice trail construction and operation. The majority of impacts are likely to occur from visual exposure by machinery and vehicles used for ice roads and ice trails construction and from human presence. The associated noise from the machinery and vehicles could also cause pinniped behavioral modification and temporary displacement within the vicinity of the action area if the noise levels are high enough. These activities are not expected to result in serious injury or mortality given the proposed mitigation measures (see Proposed Mitigation section) for construction and operation of the ice trails.

A series of reports from the Northstar development provide evidence of ringed seal reactions to human activity during ice road construction beginning in 1999. As summarized in Richardson and Williams (2000), approximately 6.6 km^2 (2.5 mi^2) were surveyed for ringed seals prior to initiation of ice road construction activities. Though much of the ice was flat and not optimal for seal lairs, surveys were conducted by biologists and Inupiat hunters who used avalanche probes to identify potential breathing holes and lairs. No breathing holes or lairs were documented during this survey. A follow-up survey for ringed seal breathing holes and lairs was conducted in using trained dogs. The follow-up survey did locate at least two, possibly three, open breathing holes within the area previously surveyed.

The following year, a subsequent survey was undertaken using dog-based searches which found numerous seal structures within about 1 km (0.6 mi) of Northstar facilities before and after intensive construction activities in early and late winter. This may indicate that the survey method using avalanche probes and Inupiat hunters was not effective or that ringed seals were unaffected by ice road/trail construction to such extent that it prevented them from establishing breathing holes in the project area (Richardson and Williams 2000).

During two replicate aerial surveys conducted in 1999, ringed seals were observed within approximately 0.64 km (0.4 mi) of ice roads (Richardson and Williams 2000). These six seals were not assumed to be the only seals located within that 0.64 km (0.4 mi) area. Using seal densities in similar water depths approximately 4 to 10 km (about 2 to 6.2 mi) from the ice roads, about 12 ringed seals would be expected to occur within 0.64 km (0.4 mi), and 110 ringed seals within 4 km (2.5 mi), during 1999. Seal behavior within 0 to 0.64 km (0.4 mi) of the road may have been affected in some subtle way; however, the observation of seals within that area suggests that effects of the ice roads were minor and localized. As summarized in Williams *et al.* (2006), several factors influence the rate of abandonment of seal lairs, making it challenging to attribute abandonment to any specific factor. Of 181 seal structures located within 11 to 3,500 m of Northstar during surveys conducted in 2001, 118 (65 percent) were still actively used in late May (the end of ice road season).

The effect of underwater noise on ringed seals is dependent on the ability of the seal to perceive or hear the sounds. Due to the overall relatively low noise levels associated with the ice trails construction and that most of these noises are airborne, it is highly unlikely seals in the vicinity of the construction site would suffer hearing damages (*i.e.,* PTS or TTS). Temporary short-term changes in behavior or avoidance of the affected area as a result of disturbance is the most common response of marine mammals to increased noise levels (Richardson *et al.* 1995). Nonetheless, some minor disturbance due to in-air or underwater (ice-covered) conditions may occur as a result of ice trail activities. The types of impacts to ringed seals exposed to low-level noise may include masking and temporary displacement. Increased levels of natural and artificial sounds can disrupt behavior by masking. The masking of communication signals by anthropogenic noise may reduce the communication space of animals (Clark *et al.* 2009). Factors other than received sound level such as the activity state of animals exposed can affect the probability of a behavioral response (Ellison *et al.* 2012).

Southall *et al.* (2007) assessed relevant studies, found considerable variability among pinnipeds, and determined exposures between approximately 90 and 140 dB generally do not induce strong behavioral responses of pinnipeds in water, but an increasing probability of avoidance and other behavioral effects exists in the 120 to 160 dB range. The use of the Ditchwitch to cut ice or from pumping at Northstar did not exceed 120 dB at 100 m (328 ft) (Greene *et al.* 2008). Despite the potential exposure to such noise levels, it is highly unlikely the disturbance would result in biologically significant effects on the seals (individually or to the population) as evident from Northstar research (Richardson and Williams 2000). In addition, Kelly *et al.* (1986) report that some ringed seals temporarily departed their lairs when sound sources were within 97 to 3,000 m (0.06 to 1.9 mi) but did return to their lairs later. Haul outs with and without disturbance were not significantly different, and time spent in the water versus hauled out was not significantly different.

Displacement of seals from ice trail construction is considered unlikely but could occur. As described in Williams *et al.* (2006), during three surveys conducted in November/December, March and May of 2001 during Northstar construction activities, 181 ringed seal structures were located and 118 (65 percent) were still actively used by late May 2001. Active ringed seal structures appeared to be evenly distributed across the Northstar study area in relation to the facility. The noise heard through snow and ice, and into the subnivean lair or den location of the animal should be considerably weaker than at source due to sound being attenuated in the ice and snow. In March 2002, sounds and vibrations from vehicles traveling along an ice road along Flaxman Island (a barrier Island east of Prudhoe Bay) were recorded in artificially constructed polar bear dens. Sounds were attenuated strongly by the snow cover of the artificial dens; broadband vehicle traffic noise was reduced by 30–42 dB. Due to attenuation of noise through ice and snow, it is less likely that seals in lairs would be exposed to levels exceeding 120 dB re 1 µPa underwater and that such exposure would result in displacement.

In air noise associated with ice trail activities is not expected to cause disturbance to ringed seals, as construction noise is not likely to exceed 100 dB re 20 µPa at the source. During the winter of 2000, background unweighted in air noise levels from various machineries measured in the vicinity of Northstar ranged from 59 to 84 dB re 20 µPa, and this background noise level was related to wind speed (Greene *et al.* 2008). Similar levels were reported during the winter of 2001 and 2002 by Blackwell *et al.* (2004a, b) with minimum background unweighted in air noise levels of 44 to 52 dB re 20 µPa measured in ice-covered conditions with low wind up to 10 km (6 mi) from Northstar in Prudhoe Bay. As a result of the expected low levels, in air noise during Narwhal's construction and operation of the sea ice trails is not expected to result in harassment of seals.

The probability that acoustic noise associated with ice trail construction would result in masking any acoustic signals of ringed seals during construction is very low. Ice trail construction activities would be initiated prior to March 1st when animals begin constructing dens prior to pupping and during pupping when seals are minimally vocal in the dens to prevent predation (Ireland *et. al.* 2016). The probability that the noise producing activities associated with Narwhal's proposed project would result in masking acoustic signals important to the behavior and survival of marine mammal species in the project area is low.

Potential Effects on Marine Mammal Habitat

Experimental studies have shown that sounds from non-explosive survey devices, such as airguns, are generally not lethal to fish (Sharp 2011). The characteristics of airgun sounds are such that the zone of potential injury to fish and invertebrates would be limited to a few meters from the source (Buchanan *et al.* 2004, Sharp 2011). Adult fish near seismic operations are likely to avoid the immediate vicinity of the sound source and thus avoid injury. Sound pulses at levels of 180 dB have been documented to cause noticeable changes in behavior (Pearson *et al.* 1992). While underwater sounds from airgun survey activities may reach these levels, the areas ensonified to 160 dB are not expected to exceed 3,188 m from the source and would be temporary (*i.e.,* up to 12 hours per day over an intermittent period of 30 days). The operation of the sparker would be expected to have similar potential habitat effects as use of

the airgun, but over a smaller area. Underwater sound levels from seismic activities in WHB are not expected to result in measurable effects to prey fish species populations.

The proposed vibracoring would minimally and briefly impact physical habitat features, such as substrates and/or water quality. Vibracoring would be used to obtain shallow cores of the seafloor sediment within the footprint of the winter exploratory drilling location, the few samples collected would be expected to have only a slight, temporary effect on benthic habitat. Vibracoring would occur over a very short duration at each of the drilling site. Therefore, impacts on habitat from proposed activities during open-water activities would be limited to potential impacts on prey species of bowhead whales and ice seals.

The construction and maintenance of ice trails is not expected to cause significant impacts on habitat used by ringed seals or on their food sources. Landfast ice near the shoreline is the best habitat for ringed seal pupping (Kelly 1988), with water depth strongly dictating whether ringed seals overwinter in a given area. Depths greater than about 3 m (10 ft) are typically the minimum depth suitable for successful lair construction (Miller *et al.* 1998, Link *et al.* 1999) although more shallow areas with open leads or cracks can be attractive to seals as described for the ice trail across the Colville River Delta.

While ringed seals may be present in the proposed project areas during winter, the number of seals is generally expected to be relatively low during ice trail activities. Ice trail construction would be a short-term activity expected to result in minor disruptions to habitat. Ringed seals feed on fish and a variety of benthic species including crabs and shrimp. There should be no impact on the distribution of fish or zooplankton as a result of ice trail construction within the proposed project areas. The trails melt each year and do not affect water circulation, substrate, fish presence or use of the area, or benthic populations.

Disturbance associated with construction, operation and maintenance of ice trails is unlikely to have long-term effects on the availability of sea ice habitat identified in the critical habitat features 1 and 2. Disturbances due to ice trail construction and maintenance activities are not expected to have any effect on critical habitat feature 3, because these activities would not cause injury or mortality to fish species, nor would it displace food resources of ringed seals.

NMFS does not expect impacts to marine mammal habitat, including prey, from the proposed activities of Narwhal in west Harrison Bay.

Estimated Take of Marine Mammals

This section provides an estimate of the number of incidental takes proposed for authorization 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).

Authorized takes would be by Level B harassment only, in the form of disruption of behavioral patterns and/or TTS for individual marine mammals resulting from exposure to noise resulting from use of airguns and sparkers (*i.e.,* geophysical survey) and the construction and operation of ice trails. Based on the nature of the activity and the anticipated effectiveness of the mitigation measures (*i.e.,* shutdown zones and ice trails specific measures) discussed in detail below in the Proposed Mitigation section, Level A harassment (auditory injury) is neither anticipated nor proposed to be authorized.

As described previously, no serious injury or mortality is anticipated or proposed to be authorized for these activities. Below we describe how the proposed 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 proposed 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 auditory injury 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 recommends use of 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 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.

Narwhal's proposed activities include the use of impulsive (single airgun and sparker) sources, and therefore, the RMS SPL threshold of 160 dB re 1 μPa is applicable. Narwhal's proposed activities also include the use of construction equipment while building ice trials, which would produce continuous sounds, for which use of the RMS SPL threshold of 120 dB re 1 μPa is applicable. However, as noted in the Marine Mammal Effects section, that threshold is not expected to be met for the construction equipment that will be used by Narwhal and, in general, disturbance of seals due to ice trails activities may be attributable broadly to a suite of potential sources of disturbance, including acoustic or visual disturbance.

Level A harassment—NMFS' Updated Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0) (NMFS, 2024) identifies dual criteria to assess Auditory Injury (AUD INJ) (Level A harassment) to five different underwater marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). Narwhal's proposed activity includes the use of impulsive (*i.e.,* single airgun and sparker) sources, and no take of marine mammals is expected to result from exposure to continuous noise produced by Narwhal's activities (*e.g.,* ice trail construction).

The 2024 Updated Technical Guidance criteria include both updated thresholds and updated weighting functions for each hearing group. The thresholds are provided in table 3. The references, analysis, and methodology used in the development of the criteria are described in NMFS' 2024 Updated Technical Guidance, which may be accessed at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance-other-acoustic-tools.*

TABLE 3—THRESHOLDS IDENTIFYING THE ONSET OF PERMANENT THRESHOLD SHIFT

Hearing group	AUD INJ Onset Thresholds * (Received Level)	
	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	*Cell 1:* $L_{p,0\text{-pk,flat}}$: 222 dB; $L_{E,p,LF,24h}$: 183 dB	*Cell 2:* $L_{E,p,LF,24h}$: 197 dB.
High-Frequency (HF) Cetaceans	*Cell 3:* $L_{p,0\text{-pk,flat}}$: 230 dB; $L_{E,p,HF,24h}$: 193 dB	*Cell 4:* $L_{E,p,HF,24h}$: 201 dB.
Very High-Frequency (VHF) Cetaceans	*Cell 5:* $L_{p,0\text{-pk,flat}}$: 202 dB; $L_{E,p,VHF,24h}$: 159 dB	*Cell 6:* $L_{E,p,VHF,24h}$: 181 dB.
Phocid Pinnipeds (PW) (Underwater)	*Cell 7:* $L_{p,0\text{-pk.flat}}$: 223 dB; $L_{E,p,PW,24h}$: 183 dB	*Cell 8:* $L_{E,p,PW,24h}$: 195 dB.
Otariid Pinnipeds (OW) (Underwater)	*Cell 9:* $L_{p,0\text{-pk,flat}}$: 230 dB; $L_{E,p,OW,24h}$: 185 dB	*Cell 10:* $L_{E,p,OW,24h}$: 199 dB.
IN–AIR		
Phocid Pinnipeds (PA)	*Cell 11:* $L_{p,0\text{-pk.flat}}$: 162 dB; $L_{E,p,PA,24h}$: 140 dB	*Cell 12:* $L_{E,p,PA,24h}$: 154 dB.
Otariid Pinnipeds (OA)	*Cell 13:* $L_{p,0\text{-pk,flat}}$: 177 dB; $L_{E,p,OA,24h}$: 163 dB	*Cell 14:* $L_{E,p,OA,24h}$: 177 dB.

* Dual metric thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating AUD INJ onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds are recommended for consideration.

Note: Peak sound pressure level ($L_{p,0\text{-pk}}$) has a reference value of 1 μPa, and weighted cumulative sound exposure level ($L_{E,p}$) has a reference value of 1μPa^2s. In this table, thresholds are abbreviated to be more reflective of International Organization for Standardization standards (ISO 2017). The subscript "flat" is being included to indicate peak sound pressure are flat weighted or unweighted within the generalized hearing range of marine mammals (*i.e.,* 7 Hz to 165 kHz). The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, HF, and VHF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The weighted 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 thresholds will be exceeded.

Ensonified Area for the Single Airgun

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.

Sound propagation and the distances to the sound isopleths for marine mammal hearing groups are defined by NMFS for Level A harassment of marine mammals under the 2024 Technical Acoustic Guidance. To assess the potential for exposure to underwater sounds that might exceed relevant threshold criteria during seismic surveys, Narwhal conducted noise modeling of the single 105 cu. in. (1,721 cc) airgun at a proposed survey site to determine sound source levels that are shown in table 4 based on Gundalf Designer software, which is a seismic source modelling software package that may be used to estimate source levels of active acoustic sources. The estimated distances discussed in this section are used for estimating potential exposures to noise exceeding relevant harassment criteria.

TABLE 4—ESTIMATED UNDERWATER SOUND SOURCE LEVELS FOR THE SINGLE AIRGUN

Source level type (measured at site 10)	Source levels
Peak sound pressure level (Pk SPL) (dB re 1 μPa @1 m)	231
Root-mean-square sound pressure level (rms SPL) (dB re 1 μPa @1 m with a 90%-energy pulse duration of 12.5 milliseconds)	204
Sound exposure level (SEL) (dB re μPa2·s @1 m)	193

Estimated Level A harassment zone distances were modeled for the single 105-cu. in. (1,721 cc) airgun, which is an impulsive, mobile source. Estimated distances to Level A harassment thresholds for weighted SEL_{24hr} are

presented here and in greater detail in Appendix B of the Narwhal application. Shallow hazard surveys will be conducted one site at a time. Each survey block is approximately 2,400 m (7,874 ft) by 2,400 m in area. The airgun will fire every 12.5 m (41 ft) along a track line (*i.e.,* every 6 or 7 seconds traveling at a speed of 2 m/s). Therefore, there will be an estimated 192 shots per track line. The area of ensonification for the seismic survey was calculated by multiplying the estimated distances (in km) to the harassment thresholds by the distance of the seismic track line (in km) to be surveyed each day. A single track line is approximately 2 km (1 mi) in length, which will take approximately 20 minutes to shoot assuming a vessel speed of 2 m/s. In a 24-hour period, assuming no delays, the survey team will be able to collect data for approximately 10 km within a site over a period of 12 hours.

Level A harassment zones were calculated using the source levels modeled from the Gundalf software. A fluid parabolic equation modelling algorithm (RAMGeo) was used to calculate the propagation of noise form the airgun source. The noise source was assumed to be omnidirectional and modelled as a point source. Only low frequency acoustic energy (<1 kHz *e.g.,* single airgun) was modeled. Greater detail on the modeling methods used by Narwhal are available in Section 6.2.3.1 and Appendix B of Narwhal's application. Modeling results estimated Level A harassment zone distances for LF cetaceans as 1,076 m (3,530 ft) and for phocids as 322 m (1,056 ft) from the seismic source vessel while the airgun is operating.

The following equation is used to estimate the ensonified area:

Mobile Ensonification Area (km2) Equation = Distance*(2*Threshold Value/1000) + (Pi*(Threshold Value/1000)∧2)

Following the same process, with additional procedures described in Appendix B of Narwhal's application to convert modeled SEL values to RMS SPLs, Narwhal estimated the distance to the 160 dB re 1 µPa Level B harassment threshold to be 3,188 m (10,459 ft). Narwhal then used the mobile ensonification equation above to calculate the total area of the Level B harassment, which resulted in an area of 337.98 km² (210 mi²). It should be noted that since the study area is in close proximity to shore, some sound is likely to be truncated by land to a certain extent.

Ensonified Area for the Sparker

Using data from Crocker and Fratantonio (2016), NMFS estimated source levels for the sparker to be 213 db RMS while operating at 1000 joules of energy across 240 active tips.

Take by Level A harassment is not expected during the use of the sparker given the small injury zone sizes expected with the sparker use and likelihood that marine mammals will avoid the sound source before incurring auditory injury. Using the source levels above, NMFS calculated the estimated distance to the 160 dB re 1 µPa Level B harassment threshold to be 447 m (1,467 ft). NMFS then used the same mobile ensonification equation to calculate the total area of the Level B harassment zone which resulted in an area of 43.54 km² (27 mi²).

Disturbance Area for the Ice Trails on the Colville River Delta

Ringed seals are the only marine mammal expected to be present in the project area during winter activities. To estimate incidents of disturbance that may constitute a take, the total area of potential disturbance (*i.e.,* ice trails) associated with construction and maintenance of specific portions of the coastal sea ice trail are included in the estimate. As noted in the Description of Marine Mammals in the Area of Specified Activities section, ground sea ice (occurring >3 m of water depth) is not considered suitable habitat for ringed seals. The coastal sea ice trail will be on grounded ice; however, the Colville River Delta is included in the take estimate to account for the possibility that ringed seals may occur in that section of the route given the potential for open leads or cracks in the sea ice, which could provide habitat for ringed seals. For the offshore sea ice trails/roads in west Harrison Bay, water depths at planned pad locations are less than 3 m (average); therefore, the majority of ice trails/roads in west Harrison Bay will be on grounded ice or limited portions of floating ice in water depths between 1.6 m (5 ft) and 3 m (10 ft) and not expected to provided suitable ringed seal habitat.

The width of the coastal sea ice trail across the Colville River Delta is defined as 170 m (558 ft) on either side of the ice trail centerline, or a total width of 340 m (1,115 ft). The total width (340 m or 0.34 km (.21 mi)) is then multiplied by the portion of the total length of trail/roads transiting ringed seal habitat, as described above. The linear distance of the coastal sea ice trail across the Colville River Delta is 57.8 km (36 mi). To calculate the potential exposure area, linear distance is multiplied by the total width (*i.e.,* 57.8 km * 0.34 km = 19.65 km² (12.2 mi²). The calculated area of disturbance (19.65 km²) is applied to activity associated with Narwhal's construction, operation, and demobilization phases.

Marine Mammal Density Estimates

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

Narwhal and NMFS used a variety of data sources to estimate appropriate marine mammal densities for evaluation of potential take incidental to the proposed activities. Neither NMFS nor Narwhal relied on data available from Cañadas *et al.* 2020 (Duke University Arctic Study Area Models; see *https://seamap.env.duke.edu/models/Duke/Arctic/*). For bowhead whales, more recent data (through 2021) is available in the ASAMM dataset, opposed to the Arctic Study Area Models where data through 2019 was used. For bearded seal, estimates of density are available but, as noted in Cañadas *et al.* (2020), there is a high degree of observer bias, which leads to uncertainty in species identification and, therefore, uncertainty in model outputs and resultant densities. Therefore, data from previous, site-specific vessel surveys (Funk *et al.* 2010) provide the best estimates of species proportions in Harrison Bay during the open water period. Neither spotted seal nor ringed seal density estimates are available from Cañadas *et al.* (2020).

Bowhead Whale

Bowhead whale sighting data from ASAMM aerial survey Block 3, which includes Harrison Bay, for the period 2012–2021 were used to estimate bowhead density near the project area. For reference, Harrison Bay is approximately 250 km² relative to the larger total area of ASAMM survey Block 3. Harrison Bay also is not preferred habitat of bowhead whales given the lack of observations from within the bay as noted above in the Description of Marine Mammals in the Area of Specified Activities Section. Therefore, the density estimates presented here could be slightly higher than would be expected in the project area. Densities were calculated by Narwhal using a two-step approach. First, a sighting rate is calculated based on whales per km, then transect length (km) is multiplied by the effective strip width of the transect using the modeled effective strip width for bowhead whales observed during aerial surveys

conducted from an Aero Commander airplane (1.15 km (CV = 0.08)) (Ferguson and Clarke 2013). Therefore, whales per km² = whales per km/(2*1.15 km). For survey Block 3, the average density estimate in summer is 0.009 bowhead whales per km² (table 5). The average fall density was calculated at 0.017 bowhead whales per km²; however, since the shallow water hazard survey work is proposed to be completed in the summer, NMFS used the summer density for calculating take estimates.

As noted in the Description of Marine Mammals in the Area of Specified Activities section, we do not expect bowhead whales to be present during Narwhal's winter or spring activities.

TABLE 5—BOWHEAD WHALE SIGHTING DATA FROM 2012 THROUGH 2020 AND RESULTING DENSITIES

Survey year	Survey time period	On transect distance (km)	Bowhead whale sightings on transect	Bowhead whales per km	Bowhead whales per km²
2012 Summer	Jul–Aug	1,742	1	0.001	0.004
2012 Fall	Sep–Oct	1,388	26	0.019	0.083
2013 Summer	Jul–Aug	950	8	0.009	0.0039
2013 Fall	Sep–Oct	1,217	7	0.006	0.0026
2014 Summer	Jul–Aug	1,290	0	0.000	0.000
2014 Fall	Sep–Oct	1,927	1	0.001	0.0004
2015 Summer	Jul–Aug	1,570	0	0.000	0.000
2015 Fall	Sep–Oct	1,949	66	0.034	0.0148
2016 Summer	Jul–Aug	1,845	259	0.141	0.0613
2016 Fall	Sep–Oct	1,959	61	0.032	0.0139
2017 Summer	Jul–Aug	2,188	6	0.003	0.0013
2017 Fall	Sep–Oct	2,269	35	0.016	0.0070
2018 Summer	Jul–Aug	2,049	7	0.004	0.0017
2018 Fall	Sep–Oct	2,390	32	0.014	0.0061
2019 Summer	Jul–Aug	2,822	7	0.003	0.0013
2019 Fall	Sep–Oct	3,853	8	0.003	0.0013
2020 Fall	Sep–Oct	654	32	0.049	0.0213
2021 Fall	Sep–Oct	1,637	58	0.035	0.0154
Summer Average					0.009
Fall Average					0.017

Bearded and Spotted Seals

Spring aerial surveys conducted as part of industry monitoring for the Northstar production facility provide limited sighting numbers of bearded seals from 1999–2002 (Richardson and Williams, 2002 and 2003). Given the lack of bearded seal data in Harrison Bay, NMFS reviewed survey data from Funk *et al.* (2010). This information represents a compilation of monitoring data gathered during vessel-based seismic operations in the Beaufort Sea from 2006–2008. NMFS considers this the best available data to derive a density estimate for bearded seals and spotted seals (see below). This survey observed ringed seals, bearded seals, spotted seals, ribbon seals, and some unidentified seals. Narwhal proposed to base the percentage of seals present in the survey area as a percentage of the total identified seals and multiplying that percentage by the ringed seal summer/fall density. The density that Narwhal proposed in their application was 0.03 bearded seals/km². NMFS expects that relying on this method to calculate the percentage of bearded and spotted seals may result in underestimation of potential seal occurrence.

Therefore, NMFS modified this approach and calculated the bearded seal percentage as a proportion of the observed ringed seals in the Funk *et al.* (2010) survey. NMFS took this approach because the bearded seal density was being derived from the ringed seal summer/fall density, and such does not utilize the best available scientific information and likely underestimates the potential for bearded seal take. Percentages calculated using NMFS method are found in table 6 and differ from the Narwhal application. Based on this ratio NMFS expects that the bearded seal density would be 21.3 percent of the summer/fall ringed seal density (0.213 * 0.32 = 0.07 bearded seals/km²).

Similar to the method used for bearded seals, NMFS derived the density of spotted seals by first determining the ratio of the number spotted seals observed to the number of ringed seals observed from Funk *et al.* (2010) (table 6). Based on this ratio, NMFS expects that the spotted seal density would be 34.8 percent of the summer/fall ringed seal density (0.348 * 0.32 = 0.11 spotted seals/km²).

TABLE 6—BEARDED SEAL AND SPOTTED SEAL RATIOS BASED ON THE OBSERVED RINGED SEALS FROM FUNK *ET AL.* (2010)

Species	Percentage of ringed seal
Bearded Seal	21.3
Spotted Seal	34.8

Ringed Seal

Winter/Spring Density—Narwhal originally proposed in their application the use of data from a number of on-ice surveys and aerial surveys for ringed seal density estimates for on-ice periods. These included site-specific surveys for ringed seals along the Beaufort Sea coast that were conducted in association with industry activities in the late 1980s and continued into the 2020s (Kelly *et al.* 1986; Frost and Burns 1989; Frost and Lowry 1987; Richardson and Williams 2001, 2002, and 2004; Frost *et al.* 2004; Moulton *et al.* 2005; and Quakenbush *et al.* 2022 and 2023). Several of these studies estimated approximate seal densities by considering the detection by trained dogs of seal structures such as breathing holes, haulout lairs, or pupping lairs. Aerial surveys were also included in the density estimate that

was completed in the spring of the year. Narwhal proposed a ringed seal density estimate for the winter/spring season of 0.49 seals/km² (see table 6–3 in Narwhal's application).

However, NMFS determined that a different approach to use of these data for calculating the ringed seal density would be more appropriate, as several of the papers used by Narwhal included inconsistent correction factors for seal abundance (Quakenbush 2022 and 2023), some of the data Narwhal proposed for use was approximately 40 years old, and because NMFS assumed that aerial surveys provide a more accurate density calculation than on-ice surveys given they are actual seal counts rather than counts of potential seal structures. NMFS relied only on spring aerial surveys conducted in 1997–2002 (Moulton *et al.* 2005) and 1996–1999 (Frost *et al.* 2004), which included a broad section of the total survey area. Densities reported by Moulton *et al.* (2005) were lower than those estimated by Frost *et al.* (2004) for that same area: 0.43 vs. 0.73 seals/km² in 1997, 0.39 vs. 0.64 seals/km² in 1998, and 0.63 vs. 0.87 seals/km² in 1999. Narwhal had noted that the differences in density were mainly because of differences in ice composition (fast ice vs. pack ice) between Frost *et al.* (2004) and Moulton *et al.* (2005). Since these observed densities are for the same area and years, NMFS does not believe the higher observed densities reported by Frost *et al.* (2004) are due to differences in the composition of sea ice surveyed between the two studies. Further, Frost *et al.* (2004) noted that the two studies were similar in timing and methods. For these reasons, NMFS calculated an average density (without trimming to calculate the average density) of 0.63 seals/km² using these two data sources (table 7).

TABLE 7—RINGED SEAL AERIAL SURVEY DENSITIES FOR WINTER/SPRING

Source	Year	Observed density (seals/km²)
Moulton *et al.* (2005)	1997	0.43
Moulton *et al.* (2005)	1998	0.39
Moulton *et al.* (2005)	1999	0.63
Moulton *et al.* (2005)	2000	0.47
Moulton *et al.* (2005)	2001	0.54
Moulton *et al.* (2005)	2002	0.83
Frost *et al.* (2004)	1996	0.81
Frost *et al.* (2004)	1997	0.73
Frost *et al.* (2004)	1998	0.64
Frost *et al.* (2004)	1999	0.87
Average	.....	0.63

Summer/Fall Density—Hauser *et al.* (2008) summarized sighting data from a 2008 seismic survey (inside and outside the barrier islands) near Thetis Island north and east of the action area. Hauser *et al.* (2008) found that most seal sightings were observed in waters seaward of the barrier islands (~76 percent of 38 sightings). Sightings of ringed seals in the shallow waters shoreward of the barrier islands were substantially lower. Narwhal's action area is most similar to what Hauser *et al.* (2008) defined as shallow waters. Hauser *et al.* (2008) reported a seal density for all species combined of 0.11 seals/km² for shallow waters during open-water conditions.

While this average seal density based on actual observations do not reflect seals that may not have been visible to observers, several publications acknowledge that during open-water months, ringed seals are more abundant farther offshore (Harwood and Stirling 1992, Kelly *et al.* 2010b, McLaren 1958, Von Duyke *et al.* 2020). For example, 1999 aerial surveys conducted over 8 days near Prudhoe Bay reported that the density of seals visible near shore decreased compared to the density offshore (Richardson and Williams 2000b). Narwhal estimated a summer density for ringed seals by using a 50 percent conversion factor of the winter/spring densities (table 8). NMFS agrees with this methodology and estimated the summer/fall density to be 0.32 seals/km² (*i.e.,* 50 percent of 0.63 seals/km² the winter/spring density).

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 proposed for authorization.

For all marine mammal species, NMFS does not expect or propose to authorize take by Level A harassment during any activities. Narwhal proposes to implement an 1,100 m (3,608 ft) shutdown zone for LF cetaceans and a 350 m (1,148 ft) shutdown zone for phocids during the operation of the single 105 cu. in. (1,721 cc) airgun. These zones are larger than the respective Level A harassment zones and therefore, would reduce the already low likelihood of take by Level A harassment. Take by Level A harassment is unlikely because Narwhal would shutdown the single airgun before a marine mammal would enter the Level A harassment zone. Take by Level A harassment is also unlikely because animals will avoid the area of active acoustic sources.

Summer/Fall Take Estimates—As described above, the estimated Level B harassment area for the seismic airgun is 337.98 km² and for the sparker 43.54 km². Given that the Level B harassment zone of 447 m for the sparker, it is expected that Narwhal would implement a shutdown zone of 500 m for bowhead whales and no take of bowhead whales would occur during sparker use. Similar to the single airgun, Narwhal would shutdown the sparker before a marine mammal would enter the Level A harassment zone and therefore prevent take by Level A harassment. This area was used to determine the number of take based on the densities of marine mammals as described above multiplied by the number of days (*i.e.,* 12 days of seismic survey and sparker use) of activity. NMFS expects the number of take for each species as outlined in table 8.

TABLE 8—ESTIMATED LEVEL B HARASSMENT OF MARINE MAMMALS DURING SHALLOW HAZARD SURVEY ACTIVITY

Species	Density (animal/km^2)	Ensonified area of the airgun (km^2)	Ensonified area of the sparker (km^2)	Days of activity	Total take estimate by Level B harassment
Bowhead Whale	0.009	337.98	N/A for take calculation	12	37
Ringed Seal	0.320	337.98	43.54	12	1,465
Bearded Seal	0.070	337.98	43.54	12	320
Spotted Seal	0.110	337.98	43.54	12	504

Winter/Spring Take Estimate—NMFS estimated the take estimates based on the total construction and operation area that would be affected during the winter period. As discussed previously, the total potential disturbance area of the Colville River Delta sea ice trail is estimated to be 19.65 km. NMFS multiplied the area of the sea ice trail with the winter/spring density of ringed seals for the construction, operation, and demobilization activities to determine the total number of potential takes by Level B harassment for ringed seals (table 9).

TABLE 9—ESTIMATED LEVEL B HARASSMENT OF RINGED SEALS DURING COLVILLE RIVER DELTA COASTAL SEA ICE TRAIL ACTIVITIES

Sea ice trail activity	Area of disturbance (km^2)	Density (animal/km^2)	Days of activity	Total take estimate by Level B harassment
Construction	19.65	0.63	25	300
Operation	19.65	0.63	40	480
Demobilization	19.65	0.63	22	264
Total	.....	.....	.....	1,044

The total number of take estimated for Narwhal's specified activity is available in table 10.

TABLE 10—SUMMARY OF ALL MARINE MAMMAL EXPOSURES REQUESTED BY SPECIES

Species	Stock	Total take by Level B harassment during the shallow water hazard survey	Total take by Level B harassment during ice trail construction and operation	Total take by Level B harassment	Population estimate	Take as a percentage of the population
Bowhead Whale	Western Artic	37	0	37	15,277	0.2
Ringed Seals	Artic	1,465	1,044	2,509	[a] 342,836	0.7
Bearded Seals	Beringia	320	0	320	[b] 301,836	0.1
Spotted Seals	Bering	504	0	504	461,625	0.1

[a] Conn *et al.* (2014) calculated an abundance estimate of 171,418 using a subset of aerial survey data collected in 2012 by Moreland *et al.* (2013) that covered the entire ice-covered portions of the Bering Sea. This estimate is consider to be low and was multiplied by a factor of two (Young *et al.* 2023).

[b] Conn *et al.* (2014), using a sub-sample of the data collected from the U.S. portion of the Bering Sea in 2012, calculated an abundance estimate of 301,836 bearded seals (Young *et al.* 2023).

Potential Effects of Specified Activities on Subsistence Uses of Marine Mammals

The availability of the affected marine mammal stocks or species for subsistence uses may be impacted by this activity. The subsistence uses that may be affected and the potential impacts of the activity on those uses are described below. Measures included in this IHA to reduce the impacts of the activity on subsistence uses are described in the Proposed Mitigation section. Last, the information from this section and the Proposed Mitigation section is analyzed to determine whether the necessary findings may be made in the Unmitigable Adverse Impact Analysis and Determination section.

The communities of Nuiqsut, Utqiaġvik and Kaktovik engage in subsistence harvests off the North Slope of Alaska. Alaska Native communities have harvested bowhead whales for subsistence and cultural purposes with oversight and quotas regulated by the International Whaling Commission (IWC). The NSB Department of Wildlife Management has been conducting bowhead whale subsistence harvest research since the early 1980's to collect the data needed by the IWC to set harvest quotas. Impacts to bowhead whales and ice seals would include limited, temporary behavioral disturbances only. Level A harassment, serious injury, or mortality of marine mammals is not anticipated from the proposed activities, and the activities are not expected to have any impacts on

reproductive or survival rates of any marine mammal species at any of the locations where subsistence harvest is occurring.

These communities also engage in subsistence harvest of beluga and gray whales. NMFS is not proposing to authorize take of these species in this IHA (*see* Description of Marine Mammals in the Area of Specified Activities section), and therefore, the specified activities are not expected to affect the availability to access belugas and gray whales for subsistence use. Additional information on subsistence harvest of these species is included below. Most of the Beaufort Sea population of beluga whales migrate from the Bering Sea into the Beaufort Sea in April or May. The spring migration routes through ice leads are similar to those of the bowhead whale. Fall migration through the western Beaufort Sea is in September or October. Surveys of the fall distribution strongly indicate that most belugas migrate offshore along the pack ice front beyond the reach of subsistence harvesters. Beluga whales are harvested opportunistically during the bowhead harvest and throughout ice-free months. No beluga whale harvests were reported in 2006 survey interviews conducted by Stephen R. Braund & Associates (SRBA) in any community (SRBA 2010). Beluga harvests were also not reported in Nuiqsut and Kaktovik, although households did report using beluga whale, likely through sharing from other communities (Brown *et al.,* 2016). Gray whale harvests were not reported by any of the communities surveyed by ADF&G in any of the survey years.

Nuiqsut

The proposed oil and gas exploration activities would occur closest to the marine subsistence use area used by the Native Village of Nuiqsut. Nuiqsut is located on the west bank of the Nechelik Channel on the lower Colville River, about 25 mi (40 km) from the Arctic Ocean and approximately 150 mi (242 km) southeast of Utqiaġvik. Nuiqsut subsistence hunters utilize an extensive search area, across the central Arctic Slope (Brown *et al.,* 2016). Marine mammal hunting is primarily concentrated in two areas: (1) Harrison Bay, between Atigaru Point and Oliktok Point, including a northward extent of approximately 50 mi (80 km) beyond the Colville River Delta (Brown *et al.,* 2016); and (2) east of the Colville River Delta between Prudhoe and Foggy Island bays, which includes an area of approximately 100 square mi surrounding the Midway Islands, McClure Island and Cross Island (Brown *et al.,* 2016).

Ringed, spotted and bearded seals are also harvested by the community of Nuiqsut. Seal hunting typically begins in April and May with the onset of warmer temperatures. Many residents continue to hunt seals after spring breakup as well (Brown *et al.,* 2016). The most important seal hunting area for Nuiqsut hunters is off the Colville Delta, an area extending as far west as Fish Creek and as far east as Pingok Island. Seal hunting search areas by Nuiqsut hunters also include Harrison Bay, and a 30-mi (48-km) stretch northeast of Nuiqsut between the Colville and Kuparuk rivers, near Simpson Lagoon and Jones Islands (Brown *et al.,* 2016). Cross Island is a productive area for seals, but is too far from Nuiqsut to be used on a regular basis.

Nuiqsut residents commonly harvest ringed seal in the Beaufort Sea during the summer months (SRBA 2010). There are a higher number of use areas extending east and west of the Colville River delta. Residents reported traveling as far as Cape Halkett to the west and Camden Bay to the east in search of ringed seal. Survey respondents reported traveling offshore up to 30 mi (48 km; SRBA 2010). Residents reported hunting ringed seals throughout the late spring, summer, and early fall with a higher number of use areas reported in June, July, and August (SRBA 2010). In 2006, 12 people (36 percent of survey respondents) indicated that they had recently hunted for ringed seals in Nuiqsut (SRBA 2010).

Nuiqsut bearded seal hunting areas extend as far west as Cape Halkett, as far east as Camden Bay, and offshore up to 40 mi (64 km). In 2006, 12 people (69 percent of survey respondents) indicated that they had recently hunted for bearded seals in Nuiqsut (SRBA 2010). Nuiqsut hunters reported hunting bearded seal during the summer season in open water as the seals are following the ice pack. Residents reported hunting bearded seal between June and September, although a small number of use areas were reportedly used in May and October (SRBA 2010). The number of reported bearded seal use areas peak in July and August, when the majority of seals are available along the ice pack (SRBA 2010).

Nuiqsut's bowhead whale hunt occurs in the fall at Cross Island, a barrier island located approximately 90 mi (144 km) east of west Harrison Bay. Nuiqsut whalers base their activities from Cross Island (Galginaitis 2014), and the whaling search and the harvest areas typically are concentrated north of the island. Hunting activities between 1997 and 2006 occurred almost as far west as Thetis Island, as far east as Barter Island (Kaktovik), and up to approximately 50 mi (80 km) offshore (SRBA 2010). Harvest locations in 1973–2011 and GPS tracks of 2001–2020 whaling efforts are shown in figure 4–7 of Narwhal's application.

Bowhead whales are harvested by Nuiqsut whalers during the fall whaling season. Nuiqsut residents typically hunt bowhead whales in September, although a small number of use areas were reported in August and extending into October (SRBA 2010). While seismic operations would occur during Nuiqsut whaling season, the proposed project area is at a distance that would not affect whaling operations. The distance to whaling grounds used by Nuiqsut residents is approximately 100 mi (155 km) east of the project area and further than expected acoustic effects of the shallow hazard survey.

Nuiqsut subsistence hunting crews operating from Cross Island have typically harvested three to four bowhead whales per year (Bacon *et al.,* 2009; Galginaitis 2014; Suydam *et al.* 2020). In 2014, the AEWC allocated Nuiqsut a quota of four bowhead whales each year; however, through transfers of quota from other communities, in 2015 Nuiqsut was able to harvest five whales (Brown *et al.,* 2016). In 2006, 10 people (30 percent of survey respondents) in Nuiqsut indicated that they had recently hunted for bowhead whales (SRBA 2010). In 2016, Nuiqsut whaling crews harvested four bowhead whales (Suydam *et al.,* 2017). In 2019, Nuiqsut whaling crews harvested three bowhead whales (Suydam *et al.,* 2020).

Narwhal plans to sign a Conflict Avoidance Agreement (CAA) with Nuiqsut to reduce any impacts to Nuiqsut whaling season (see Proposed Mitigation section). Narwhal has consulted with AEWC and NSB on mitigation measures to limit impacts and has continued to provide formal and informal project updates to these groups, as recently as April 2025.

The proposed activities are not expected to impact marine mammals in numbers or locations that would affect the availability for subsistence harvest given the short-term, temporary, and localized nature of seismic operations and ice trials construction, and the proposed mitigation measures. Impacts to marine mammals would mostly include limited, temporary behavioral disturbances of bowhead whales and seals. Serious injury or mortality of marine mammals is not anticipated from the proposed activities, and the activities are not expected to have any

impacts on reproductive or survival rates of any marine mammal species.

In summary, impacts to subsistence hunting are not expected due to the distance between Narwhal activities and primary seal hunting areas and proposed mitigation for subsistence activities below during the Nuiqsut bowhead whale hunt.

Utqiaġvik

Utqiaġvik (formerly known as Barrow) is the northernmost community on the North Slope and the United States and is approximately 179.6 km (111.6 mi) northwest of Harrison Bay. According to Brown *et al.* (2016), 71 percent of households reported using marine mammals as a resource. Of the marine mammals harvested, bowhead whale made up the largest composition of marine mammals harvested at 54 percent by weight while bearded seals represented 30 percent, ringed seals 2 percent, and beluga whale 2 percent of total marine mammal weight harvested (Brown *et al.,* 2016). Bowhead whale was reported as a resource used in 70 percent of households, bearded seal in 44 percent of households, ringed seal in 19 percent of households, beluga whale in 15 percent of households, and spotted seals in 5 percent.

The spring hunt of bowhead whales occurs while bowheads are making their migration east toward the eastern Beaufort Sea. Crews begin to camp on the ice in mid- to late-April and stay out on the edge of the ice for about 2–6 weeks, depending on the condition of the ice (Brown *et al.,* 2016). During the fall bowhead migration west, crews travel on open boat, making day trips from the community. During the summer months of July and August, bearded seals and ringed seals are targeted offshore near ice floes (Brown *et al.,* 2016).

The community of Utqiaġvik's subsistence activities occur outside of the specified geographical region. We do not expect impacts to Utqiaġvik's subsistence activities, and they are not discussed further beyond the explanation provided here. Impacts to marine mammals from the planned oil and gas exploratory activities would mostly include limited, temporary behavioral disturbances of seals. Additionally, a small number of takes of bowhead whales, by Level B harassment only, are predicted to occur in the vicinity of Narwhal's activity. Even if some subset of taken individuals deflected farther offshore near the project site, it is reasonable to predict that most individuals would likely resume a more typical migration path by the time they reach the Utqiaġvik hunting area, and therefore, significant impacts to the Utqiaġvik hunt would be unlikely.

The planned activities and associated harassment of marine mammals are not expected to impact marine mammals in numbers or locations sufficient to render them unavailable for Utqiaġvik subsistence harvest given the short-term, temporary, and localized nature of survey and ice trail construction and operation activities and the planned mitigation measures. Additionally, no serious injury or mortality of marine mammals is expected or proposed for authorization.

Kaktovik

Kaktovik is the easternmost village in the NSB. Kaktovik is located on the north shore of Barter Island, situated between the Okpilak and Jago rivers on the Beaufort Sea coast. Kaktovik's subsistence-harvest areas are to the east of the project area and target marine mammal species migrating eastward during spring and summer. This migration occurs seaward of the project area and westward in the fall.

Kaktovik bowhead whale hunters reported traveling between Camden Bay to the west and Nuvagapak Lagoon to the east (SRBA 2010). This range does not include the project area impacted by the activities analyzed for this proposed IHA. The small number of takes of bowhead whales, by Level B harassment only, predicted to occur in the vicinity of Narwhal's activity are not expected to have any impacts on the fitness of any bowhead whales. Further, we do not expect Narwhal's activities to deflect the bowhead whale migration offshore in the Kaktovik hunting area, given the distance from the western extent of the hunting area (Camden Bay) to Narwhal's proposed project area. Even if some subset of taken individuals deflected farther offshore near the project area, it is reasonable to predict that most individuals would likely resume a more typical migration path by the time they reach the Kaktovik hunting area during the eastbound migration, and during the westbound migration, a bowhead exposed to project noise would have already passed the hunting area prior to exposure. Significant impacts to the Kaktovik hunt would be unlikely, and Kaktovik bowhead whale hunting is not discussed further.

Ringed, spotted and bearded seals are harvested by the community of Kaktovik. Residents hunt seals in rivers during ice-free months, primarily July-August. Ringed seals are an important subsistence resource for Alaska Natives living in communities along the Beaufort Sea coast. Kaktovik hunters travel by boat to look for ringed seals on floating ice (often while also hunting for bearded seal) or sometimes along the ice edge by snow machine before break-up during the spring (SRBA 2010). In 2006, 7 people (18 percent of survey respondents) indicated that they had recently hunted for ringed seals in Kaktovik (SRBA 2010). Residents reported looking for ringed seal, usually while also searching for bearded seal, offshore between Prudhoe Bay to the west and Demarcation Bay to the east (SRBA 2010). Ringed seal hunting typically peaks between March and August but continues into September (SRBA 2010). Although residents reported hunting ringed seals up to approximately 30 mi (48 km) from shore, the most overlapping use areas generally occur within a few miles from shore (SRBA 2010). Harvest of ringed seals by Kaktovik hunters does not typically occur to the west of Prudhoe Bay and therefore, is not expected to be affected by Narwhal's proposed activities. Additionally, impacts to ringed seals are expected to include temporary behavioral disturbances only. Level A harassment, serious injury, or mortality of ringed seals is not anticipated from the proposed activities, and the activities are not expected to have any impacts on ringed seal reproductive or survival rates, or to impact availability of ringed seals. Therefore, Narwhal's proposed activities are not expected to impact Kaktovik ringed seal harvests.

Kaktovik bearded seal hunting occurs along the coast as far west as Prudhoe Bay and as far east as the United States/Canada border (SRBA 2010). Residents reported looking for bearded seal as far as approximately 30 mi (48 km) from shore but generally hunt them closer to shore, up to 5 mi (8 km; SRBA 2010). Between 1994 and 2003, 29 bearded seals were taken in Kaktovik. In 2006, 7 people (18 percent of survey respondents) indicated that they had recently hunted for bearded seals in Kaktovik (SRBA 2010). Bearded seal hunting activities, like ringed seal, begin in March, peaking in July and August, and then conclude in September (SRBA 2010). Kaktovik hunters harvested 126 pounds (57.15 kilograms) of spotted seals in 1992 (ADF&G Community Subsistence Information System; retrieved and analyzed August 15, 2018). Spotted seals were not reported harvested in 2006 survey interviews conducted in Nuiqsut (SRBA 2010).

The community of Kaktovik is approximately 200 (direct) mi (320 km) from the proposed project in west Harrison Bay; subsistence activities for these communities occur outside of the

project area and associated Level A and Level B harassment zones. The proposed oil and gas exploration would occur in west Harrison Bay, which is in an area that is not typically used for subsistence hunting by residents of Kaktovik.

Because of the distance from Kaktovik, it is unlikely that the planned activities would have any effects on the use of marine mammals for subsistence by residents of Kaktovik. Further, the proposed activities are not expected to impact marine mammals in numbers or locations sufficient to render them unavailable for subsistence harvest given the short-term, temporary, and localized nature of project activities, and the proposed mitigation measures. Therefore, we do not discuss Kaktovik's subsistence activities further.

Proposed Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to 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. 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, as well as subsistence uses. 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.

Mitigation for Shallow Water Hazard Surveys

Vessels used during the surveys will not allow lines to remain in the water unless both ends are under tension and affixed to vessels or gear. No materials capable of becoming entangled around marine mammals will be discarded into marine waters.

Vessel-Visual Based Mitigation Monitoring—Visual monitoring requires the use of trained observers (herein referred to as visual protected species observers (PSOs)) to scan the ocean surface visually for the presence of marine mammals. PSOs shall establish and monitor a pre-start clearance zone (shutdown zones in table 11) and, to the extent practicable, a Level B harassment zone (table 11). These zones shall be based upon the radial distance from the edges of the acoustic source (rather than being based around the vessel itself). The shutdown zones are based off the size of the Level A harassment zone with slightly larger areas to ensure shutdown before the animal enters the harassment zone. During pre-start clearance (*i.e.,* before ramp-up begins), the pre-start clearance zone is the area in which observations of marine mammals within the zone would prevent airgun and sparker operations from beginning (*i.e.,* ramp-up). The pre-start clearance zone would encompass the shutdown zones.

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 during the operation of the airgun and a minimum of one PSO during the operation of the sparker 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 must begin no less than 15 minutes prior to use of the acoustic source and must continue until 1 hour after use of the acoustic source ceases or until 30 minutes past sunset. Visual PSO(s) must coordinate to ensure 360 degree 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.

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 acoustic source is not operating for comparison of sightings rates and behavior with and without use of the acoustic source 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.

Pre-Start Clearance and Ramp-Up—A ramp-up procedure, involving a gradual increase in source level output, is not required for use of the airgun but would be required at the start of the activation of the sparker when technically feasible. Operators should ramp up sparker source to half power for 5 minutes and then proceed to full power. A 15-minute pre-start clearance observation period must occur prior to the start of ramp-up. The intent of pre-start clearance observation (15 minutes) is to ensure no marine mammals are within the shutdown zones prior to the beginning of ramp-up. The intent of ramp-up is to warn marine mammals of pending operations and to allow sufficient time for those animals to leave the immediate vicinity. A 15 minute pre-start clearance period is proposed for all species for this project due to the quick succession of track lines and in general the shallow water of the project area. All sound source 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 shutdown zones for 15 minutes prior to the initiation of ramp-up (pre-start clearance). During this 15 minute pre-start clearance period, the entire applicable shutdown zones must be visible, except as indicated in below.
- Source use shall be scheduled so as to minimize the time spent with the source activated prior to the start of acquisition.
- A visual PSO 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.
- Any PSO on duty has the authority to delay the start of survey operations if a protected species is detected within the applicable pre-start clearance zone.

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

• Ramp-up may not be initiated if any marine mammal is within the applicable shutdown zone. If a marine mammal is observed within the applicable shutdown zone during the 15 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 all marine mammals).

• PSOs must monitor the shutdown zones 15 minutes before and during ramp-up, and ramp-up must cease and the source must be shut down upon observation of a marine mammal within the applicable shutdown zone.

• Ramp-up may occur at times of poor visibility, including nighttime, if appropriate visual monitoring has occurred with no detections of protected species in the 15 minutes prior to beginning ramp-up.

• If the acoustic source 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 observation and no detections of protected species have occurred within the applicable shutdown zone. For any longer shutdown, pre-start clearance observation and ramp-up are required.

Shutdown Procedures

Any PSO on duty will have the authority to call for shutdown of the acoustic sources, as appropriate. The operator must also establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the acoustic sources to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch. Narwhal 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 B harassment zone. If the seismic activity is halted due to the presence of a marine mammal, the activity may not resume until either the animal has voluntarily exited and been visually confirmed beyond the shutdown zone indicated in table 11, or 15 minutes have passed without re-detection of any marine mammal.

TABLE 11—SHUTDOWN ZONES AND LEVEL B HARASSMENT ZONES FOR EACH ACTIVITY

Activity	Shutdown zone radius (m)		Level B harassment zone radius (m)
	Low-frequency cetaceans	Phocid pinnipeds	
Single Airgun	1,100	350	3,188
Sparker	500	N/A	447

Vessel Strike Avoidance

Crew and supply vessel personnel should use an appropriate reference guide that includes identifying information on all marine mammals and other marine aquatic protected species 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.

• 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 single protected species 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 (species-specific distances detailed 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 as a whale, seal, or other marine mammals.

• Vessel speed within west Harrison Bay must generally be restricted to 15 knots (kn) or less, must be reduced to 5 kn if within 300 yds (274 m) of a whale and must be reduced to 10 kn or less when weather conditions reduce visibility to 1.6 km or less;

• All vessels must maintain a minimum separation distance of 100 m from bowhead whales. If a bowhead whale is sighted within the relevant separation distance, the vessel must steer a course away at 10 knots or less until the 100-m separation distance has been established.

• All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 100 yds (91 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), and;

• 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, reduce speed and shift the engine to neutral). This does not apply to any vessel towing gear or any vessel that is navigationally constrained

Mitigation for the Sea Ice Trail Crossing the Colville River Delta

Unless otherwise noted, these measures apply to ringed seals and the portion of the sea ice trail crossing the Colville River Delta. Take is only expected for this section of trail because this is the only suitable ringed seal habitat the ice trails will cross. These mitigation measures are organized into the following categories: (1) general mitigation measures (implemented throughout the ice trail season, which occurs generally from December through May) and (2) mitigation measures that begin after March 1st.

General Ice Trail Mitigation Measures

Ice trail mitigation measures are based on the following assumptions: ice trail construction occurs from approximately December 1st to mid-February (or as soon as sea ice conditions allow safe access and permit such activity); operations and maintenance generally occur from approximately mid-January through mid- to late May. Ringed seals

begin to establish birth lairs in late March. Therefore, ice trail construction should be initiated no later than March 1st (*i.e.,* surface-disturbing activities such as clearing or packing of snow or grading to be completed for the full spatial extent of the ice trails prior to March 1st) to reduce the potential for disturbance to ringed seal birth lairs/dens; and disturbance associated with construction prior to March 1st may deter pregnant seals from establishing birth lairs in the disturbed areas.

The following mitigation measures will be implemented throughout the entire ice trail season, including during construction, maintenance, active use, and decommissioning:

- Personnel shall not approach or interact with any wildlife.
- Personnel must follow directions of Security and posted signs when traveling the ice trail.
- Workers must notify appropriate personnel if a seal is observed within 50 meters, or if a seal structure (*i.e.,* breathing hole or lair) is observed within 150 m, of the centerline of the ice trail.
- Workers must stay in the vehicle and continue traveling at a constant speed if a seal is observed near the trail. Do not slow down, stop, or exit the vehicle.
- Transport vehicles (passenger vehicles and trucks hauling goods) will not stop within 50 m (164 ft) of observed seals or 150 m (about 500 ft) of known seal lairs. Instead, they will continue travelling at a constant speed.
- Ice trail speed limits will be 45 miles per hour (mph) or less, based on environmental, road conditions, and ice trail longevity considerations.
- Delineators will mark the roadway in a minimum of ¼-mile increments on both sides of the portions of ice trails in west Harrison Bay to delineate the path of vehicle travel and areas of planned on-ice activities (*e.g.,* emergency response exercises). Delineators may also be used to mark the centerline of the roadway.
- Corners of rig mats, steel plates, and other materials used to bridge sections of hazardous ice will be clearly marked or mapped using GPS coordinates of the locations.
- Any seal structures (*i.e.,* breathing holes and lairs) observed will be avoided by a minimum of 150 meters (about 500 feet) during ice testing and new trail construction and their locations will be reported and physically marked.
- Personnel will be instructed that approaching or interacting with seals is prohibited.
- If a seal is observed within 50 meters (164 feet) or if a seal structure (*i.e.,* breathing hole or lair) is detected within 150 meters (about 500 feet) of the centerline of an ice trail, the project proponent's Environmental Specialist or Project Manager will be informed of the observation, who will then carry out the notification protocol and implement the procedures described in the General Monitoring Measures for Ice Trails section (below). The following procedures will also be followed:
  - The location of the seal or seal structure will be physically marked (*e.g.,* at its position along the axis of the ice trail) by placing a readily visible marker (*e.g.,* pole and flag) within 15 meters (50 feet) of the edge of the ice trail, while maintaining a distance of at least 15 meters (50 feet) from the seal/seal structure.
  - Construction, maintenance, or decommissioning work will not occur within 50 meters (164 feet) of the seal, but may proceed as soon as the seal, of its own accord, moves farther than 50 meters distance away from the activities or has not been observed within that area for at least 24 hours. Transport vehicles may continue their route within the designated trail if they can do so without stopping.
  - During the period in which a seal structure is periodically monitored as described in the General Monitoring Measures for Ice Trails section (below), maintenance work will proceed in a manner that minimizes impacts or disturbance to the area.

Ice Trail Mitigation Measures That Begin After March 1st

After March 1st and continuing until decommissioning of ice trails is completed, on-ice activities can occur anywhere on sea ice where water depth is less than 3 meters (10 feet) (*i.e.,* habitat less suitable for ringed seal lairs and breathing holes). However, after March 1st on those sections of the ice trails where water depth is greater than 3 meters (10 feet), all activities will occur within the boundaries of the driving lane or shoulder area of the ice trail and other previously disturbed areas (*e.g.,* spill and emergency response areas, snow push areas), as long as personnel safety is ensured.

- If safety concerns due to unstable ice trail conditions warrant the creation of workaround route after March 1st, the route will be surveyed for seal structures using a trained observer in a tracked vehicle approximately 2 days prior to establishing the route, weather permitting. Surveys must occur following improved weather conditions before establishing the workaround route. The following protocol will be used for these surveys:
  - During daylight hours with good visibility, a trained wildlife observer will survey the route 2 days prior to route construction to search for potential seal structures. The observer will be dedicated to monitoring for seal structures while the driver operates the tracked vehicle. Ringed seal structures will be avoided by a minimum of 150 m during ice testing and new route construction.
  - If a suspected seal structure is observed within 150 m of either edge of the proposed new or workaround route, a marker will be placed 15 m from the location and GPS coordinates will be recorded. The new route must avoid any suspected seal structures by a 150 m distance.
- Ice trail construction and maintenance activities will remain at least 50 meters (164 feet) from a seal and 150 meters (about 500 feet) from a known seal structure (*i.e.,* breathing hole or lair) except under emergency conditions when blading or snow blowing is necessary. If snow blowing must occur within 50 meters (164 feet) of a seal or 150 meters (about 500 feet) of a seal structure, the snow will first be pushed so that it can subsequently be blown downwind of the animal or seal structure.

Mitigation Measures for Aircraft

- Except during takeoff and landing and in emergency situations, all aircraft will transit at an altitude of at least 457 meters (1,500 feet) while maintaining Federal Aviation Administration flight rules (*e.g.,* avoidance of cloud ceiling, *etc.*). If flights must occur at altitudes less than 457 meters (1,500 feet), aircraft will make course adjustments, as needed, to maintain at least a 457 meters (1,500 feet) horizontal separation from all observed marine mammals.
- Aircraft will not hover or circle over marine mammals.
- Aircraft will not land on ice within 1 nautical mile (1.9 kilometers) of hauled-out seals.

Mitigation for Subsistence Uses of Marine Mammals or Plan of Cooperation

Regulations at 50 CFR 216.104(a)(12) further require IHA applicants conducting activities in or near a traditional Arctic subsistence hunting area and/or that may affect the availability of a species or stock of marine mammals for Arctic subsistence uses to provide a Plan of Cooperation (POC) or information that identifies what measures have been taken and/or will be taken to minimize adverse

effects on the availability of marine mammals for subsistence purposes. A plan must include the following:

- A statement that the applicant has notified and provided the affected subsistence community with a draft plan of cooperation;
- A schedule for meeting with the affected subsistence communities to discuss proposed activities and to resolve potential conflicts regarding any aspects of either the operation or the plan of cooperation;
- A description of what measures the applicant has taken and/or will take to ensure that proposed activities will not interfere with subsistence whaling or sealing; and
- What plans the applicant has to continue to meet with the affected communities, both prior to and while conducting the activity, to resolve conflicts and to notify the communities of any changes in the operation.

After withdrawing its original request, Narwhal resubmitted its application on November 1, 2024, which included a draft POC for NMFS. The POC outlines Narwhal's extensive coordination with subsistence communities that may be affected by the oil and gas exploration project. It includes a brief description of the project, community outreach that has already been conducted, as well as the concerns raised in those discussions and how they were addressed, and project mitigation measures. Narwhal has agreed to continue coordination with subsistence communities throughout the project duration and maintain constant communication with subsistence groups, as described below and in the POC. The POC is a living document and has been updated during the proposed IHA process. The proposed IHA includes a requirement stating that Narwhal must conduct the communication and coordination as described in the POC, which is available on our website at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable.*

Narwhal continues to document its communications with the North Slope subsistence communities, as well as the substance of its communications with subsistence stakeholder groups, and Narwhal will continue to routinely engage with local communities and subsistence groups. Multiple user groups are often consulted simultaneously as part of larger coalition meetings such as the AEWC and Ice Seal Committee meetings. Local communities and subsistence groups identified by Narwhal are listed in Section 5 of the POC. Narwhal has developed an POC and will implement this plan before initiating construction operations to coordinate activities with local subsistence users and stakeholders to eliminate the risk of interfering with subsistence hunting activities and keep current as to the timing and status of the bowhead whale hunt and other subsistence hunts. Narwhal will utilize in person, video conferencing, telephonic, written, and email communication formats depending upon stakeholder representative locations, schedule availability, meeting location preferences and other factors. All stakeholder engagement activities and communications will be documented in the Narwhal Stakeholder Communication Log. The proposed IHA requires that Narwhal must coordinate with local subsistence communities, notify the communities of any changes in the operation, and take action to avoid or mitigate impacts to subsistence harvests.

The AEWC works annually with industry partners to develop a CAA. This agreement implements mitigation measures that allow industry to conduct their work in or transiting the vicinity of active subsistence hunters, in areas where subsistence hunters anticipate hunting, or in areas that are in sufficient proximity to areas expected to be used for subsistence hunting where the planned activities could potentially adversely affect the subsistence bowhead whale hunt through effects on bowhead whales, while maintaining the availability of bowheads for subsistence hunters. Narwhal has stated that they will enter the CAA for the project year.

Narwhal will continue to coordinate with Alaska Native villages and subsistence organizations to identify and avoid potential impacts to subsistence hunting.

As described above in the Potential Effects of Specified Activities on Subsistence Uses of Marine Mammals section, Narwhals activities do not overlap with the areas where subsistence hunters typically harvest ice seals and given the extent of impacts to seals described in that section, these activities are not expected to impact subsistence hunts of ice seals. Therefore, NMFS does not propose to include mitigation measures for subsistence harvest of ice seals; however, Narwhal will continue to meet with subsistence groups, including the Ice Seal Committee, as described in its POC.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means 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, and on the availability of such species or stock for subsistence uses.

Proposed Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present 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.

PSO Requirements for Shallow Water Hazard Surveys

Vessel-Based Visual Monitoring

As described above, PSO observations would take place during daytime airgun operations. During shallow water hazard survey operations, two visual PSOs would be on duty at all times during daytime hours. 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. Narwhal must use dedicated, trained, and NMFS-approved PSOs. At least one visual PSO 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. 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. Monitoring shall be conducted in accordance with the following requirements:

- PSOs shall have successfully completed an approved PSO training course appropriate for their designated task.
- 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.
- 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; (3) previous work experience as a PSO; the PSO should demonstrate good standing and consistently good performance of PSO duties; or (4) PSOs may also substitute Alaska native traditional knowledge for experience.

Sea Ice Trails Observer/Environmental Specialist Requirements

- Qualified observers for ice trail monitoring activities need not be trained PSOs, but they will have received the training described in the Wildlife Training in this section. In addition, they will be capable of detecting, observing, and monitoring ringed seal presence and behaviors, and accurately and completely recording data.
- Prior to initiation of sea ice trail construction activities, project personnel associated with ice trail construction, maintenance, or use (*i.e.,* construction workers, surveyors, vehicle operators, security personnel, and the environmental team) will receive annual training on seal avoidance mitigation measures appropriate for the work that they will perform (*e.g.,* ice trial maintenance). The annual training for all such personnel will include reviewing applicable portions of Narwhal's Wildlife Interaction Plan, which include the following measures:
- In addition to reviewing the mitigation measures, wildlife training for personnel involved in ice trail construction/maintenance or seal monitoring will include:
- how to identify ringed seal adults and pups;
- seal life history;
- habitat and diet;
- presence in project area;
- importance of lairs, breathing holes, and basking;
- potential effects of disturbance; and
- applicable laws and regulatory requirements.

Monitoring for Shallow Water Hazard Surveys

During the operation of the single airgun, one PSO will conduct monitoring duties from the source vessel and a second PSO will conduct monitoring from a support vessel. PSOs must record all observations of marine mammals, regardless of distance from the single airgun or sparker, as well as the additional data as required in the proposed reporting requirements.

Monitoring During Ice Trail Construction and Operation

If a seal is observed within 50 meters (164 feet) or if a seal structure (*i.e.,* breathing hole or lair) is observed within 150 meters (about 500 feet) of the centerline of the ice trail the location of the seal or seal structure will be reported to the Environmental Specialist or Project Manager, who will then relay the observation location information to all personnel using the ice trail.

- As soon as practicable after the initial seal observation, the Environmental Specialist or qualified observer will observe the seal for approximately 15 minutes to document the animal's location relative to the trail.
- Qualified observers for ice trail monitoring activities need not be trained PSOs, but they will have received the training described in the sea ice trails observer/environmental specialist requirements section above. In addition, they will be capable of detecting, observing, and monitoring ringed seal presence and behaviors, and accurately and completely recording data.
- All work that is occurring when the seal is observed and the behavior of the seal during this observation period will be documented for an initial 15 minute observation period and every six hours thereafter during daylight hours until the animal moves more than 50 meters (164 feet) from the center of the road/trail or is no longer observed.
- If a ringed seal breathing hole or lair is observed within 150 m of the sea ice trail within the Colville River Delta, the location of the structure will be documented to the extent possible from the sea ice trail using GPS and reported to the Narwhal Permitting and Compliance Manager.
  - At least one ATV driver from a traveling group will monitor the breathing hole/lair from the trail for 15 minutes in daylight conditions on the day of the initial sighting to determine whether a ringed seal is present; and

○ Observations by an ATV driver for a seal near the breathing hole/lair will occur for 15 minutes each day while the trail is traveled unless it is determined the structure is not actively being used (*i.e.,* a seal is not sighted at that location during monitoring).

Monitoring measures that begin after March 1st:

• If an ice trail is being actively used, under daylight conditions with good visibility, a dedicated observer (not the vehicle operator) must conduct a survey along the sea ice trail to observe if any ringed seals are within 150 m (500 ft) of the roadway corridor. The following survey protocol must be implemented:

○ Surveys will be conducted every other day during daylight hours. Survey protocol consists of driving the ice trail and stopping every ½ mile to observe the area within 150 meters (about 500 feet) of the roadway corridor for approximately 5 minutes on each side of the corridor to check for the presence of seals or structures.

○ When performing observations, qualified observers will have no other primary duty than to watch for and report observations related to ringed seals during this survey. If the observer is driving a vehicle, then the survey will be performed when the driver stops, at periodic intervals sufficient to complete a thorough assessment of the area, given visibility conditions. If weather conditions become unsafe, the monitoring activity will be discontinued.

Narwhal will engage subsistence hunters for monitoring recommendations:

• Narwhal will engage local hunters through the Ice Seal Committee point of contact to gather recommendations on methods for ringed seal detection within the exposure areas along the Colville River Delta; and

• Narwhal will incorporate recommendations, as appropriate, into training materials provided to personnel responsible for monitoring for ringed seals along the sea ice trail.

Narwhal is required to submit a draft report on all monitoring conducted under the IHA within 90 calendar days of the completion of marine mammal monitoring or 60 days prior to the issuance of any subsequent IHA for this project, whichever comes first. A final report shall be prepared and submitted within 30 days following resolution of comments on the draft report from NMFS. This report shall include:

For Shallow Water Hazard Surveys:

For data collection purposes, PSOs must 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 (GMC)/ Coordinated Universal 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; BSS).

For Ice Trails:

• Date and time of each observation event (*e.g.,* initial observation of a seal or seal structure) and subsequent monitoring;

• Environmental conditions during each observation event;

• Number of animals per observation event; and number of adults/juveniles/pups per observation event;

• Behaviors of seals during each observation event; and

• Geographic coordinates of the observed animals or structure (breathing hole or lair), with the position recorded by using the most precise coordinates practicable (coordinates will be recorded in decimal degrees, or similar standard, and defined coordinate system).

Reporting Dead or Injured Marine Mammals—In the event that personnel involved in the project activities covered by the authorization discover an injured or dead marine mammal, the IHA-holder shall report the incident to the Office of Protected Resources (OPR), NMFS (*PR.ITP.MonitoringReports@noaa.gov* and *ITP.cockrell@noaa.gov*) and to the Alaska regional stranding coordinator (907–586–7209) 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, Narwhal shall report the incident to OPR, NMFS, and the Alaska regional stranding coordinator (907–586–7209) 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).

Monitoring Plan Peer Review

The MMPA requires that monitoring plans be independently peer reviewed where the proposed activity may affect the availability of a species or stock for taking for subsistence uses (16 U.S.C. 1371(a)(5)(D)(ii)(III)). Regarding this requirement, NMFS' implementing regulations state that upon receipt of a complete monitoring plan and at its discretion, NMFS will either submit the plan to members of a peer review panel for review or within 60 days of receipt of the proposed monitoring plan, schedule a workshop to review the plan (50 CFR 216.108(d)).

NMFS established an independent peer review panel to review the Monitoring Measures in Narwhal's application in April 2025. NMFS will provide the panel with a copy of Narwhal's application and a list of considerations to guide their discussion of the monitoring plan. The panel will provide a final report to NMFS containing recommendations for Narwhal's monitoring plan, and NMFS will summarize the Peer Review Panel's recommendations and how they are addressed in the **Federal Register** notice announcing the final IHA, if issued.

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 majority of our analysis applies to all the species listed in table 10, given that many of the anticipated effects of the specified activities t on different marine mammal stocks are expected to be relatively similar in nature. Where there are meaningful differences between species or stocks or groups of species, in anticipated individual responses to activities, impact of expected take on the population due to differences in population status, or impacts on habitat, they are described independently in the analysis below.

The shallow water hazard survey (single seismic airgun and sparker) and the construction and operation of coastal sea ice trails have the potential to disturb or temporarily displace marine mammals. Specifically, the specified activities may result in take, in the form of Level B harassment only, from use of the acoustic source during shallow water hazard surveys or through disturbance incidental to the construction and operation of coastal sea ice trails. No mortality or serious injury is anticipated given the nature of the activity. The potential for Level A

harassment from the shallow water hazard survey is minimized through the implementation of the required mitigation measures (see Mitigation Measures section). The applicant would implement shutdowns of acoustic sources during the shallow water hazard survey before marine mammals enter the Level A harassment zones. Take by Level A harassment is not expected during the construction and operation of the sea ice trails.

The shallow water hazard survey has the potential to overlap with bowhead whale BIAs identified as important for feeding and migration. The three of the four BIAs (Alaska Beaufort Parent, Harrison Bay Child, and West Alaska Beaufort Child) for feeding occur for the months of August and September (during the shallow water hazard survey) and are of moderate to high importance and intensity with high data support and boundary certainty. Only a very small portion of the shoreward boundary of the three feeding BIAs would overlap with the proposed project area and only 12 days of active acoustic sources during the shallow water hazard surveys would occur. The relative size and timing of remaining available feeding habitat for bowheads does not suggest the activity would result in decreased fitness of feeding bowhead whales. One of the two migratory BIAs (Beaufort) also occurs during August and September (during the shallow water hazard survey) and is of high importance and intensity with high data support and boundary certainty. Only small portions of the entire BIA would overlap with the shallow water hazard survey when compared to the entire available area. The shallow water hazard survey also would only occur over 12 days, therefore, reducing the potential for long-term effects. Given the small portion of overlap and the short-term effects of this activity, it is not expected to impact reproduction or survivorship of any individuals using the BIAs.

As described above, the project does not overlap with critical habitat for ringed seals or bearded seals. There are no anticipated effects from this project on designated critical habitat for these species. While some ice trail activities (operation and demobilization) may occur during pupping season for ringed seals, Narwhal plans to construct the entirety of their expected ice trails prior to March 1st when the ringed seal pupping season begins. The additional proposed mitigation measures required after March 1st would mitigate any potential disturbances to seals that are actively pupping. During the construction of the ice trail, behavioral disturbance of ringed seals may occur but is expected to be limited given the proposed mitigation and monitoring measures.

In summary and as described above, the following factors primarily support our preliminary determination that the impacts resulting from this activity are not expected to adversely affect 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 anticipated incidents of Level B harassment would consist of, at most, temporary modifications in behavior that would not result in fitness impacts to individuals;
- The area impacted by the specified activities is very small relative to the overall habitat ranges of all species;
- While impacts would occur within areas that are important for feeding and migration for bowhead whales, because of the small footprint of the activity relative to the area of these important use areas and the scope and nature of the anticipated impacts of shallow water hazard survey, we do not expect impacts to the reproduction or survival of any individuals.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total marine mammal take from the specified activities 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 section 101(a)(5)(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 number of takes NMFS proposes to authorize is below one-third of the modeled abundance for all relevant populations (specifically, take of individuals is less than 0.7 percent of the most appropriate abundance estimate for each stock, see table 10). This is conservative because this approach assumes all takes are of different individual animals, which is likely not the case. Some individuals may be encountered multiple times in a day, but PSOs would count them as separate individuals if they cannot be identified.

Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds that small numbers of marine mammals would be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

In order to issue an IHA, NMFS must find that the specified activity will not have an ''unmitigable adverse impact'' on the subsistence uses of the affected marine mammal species or stocks by Alaskan Natives. NMFS has defined ''unmitigable adverse impact'' in 50 CFR 216.103 as an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) That cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

Given the nature of the activity and the required mitigation measures, serious injury and mortality of marine mammals is not expected to occur. Impacts to marine mammals would be limited to temporary behavioral disturbances of seals and bowhead whales. As described above, the required mitigation measures, such as implementation of shutdown zones, are expected to reduce the frequency and severity of takes of marine mammals.

Project activities could deter target species from west Harrison Bay. However, much of the project season avoids traditional ice seal harvest windows. (As noted in the Potential Effects of Specified Activities on Subsistence Uses of Marine Mammals section above, Nuiqsut residents typically harvest ice seals in the highest numbers in June, July, and August, and Narwhal's project would not begin until mid-August.) While some hunting

continues throughout the early fall, we do not anticipate that there would be impacts to seals that would make them unavailable for subsistence hunters. As noted in the Potential Effects of Specified Activities on Subsistence Uses of Marine Mammals section, subsistence use of bowhead whales is limited in this area, as it is not within the preferred and frequented hunting areas. The authorized takes are not expected to affect the fitness of any bowhead whales, or cause significant deflection outside of the typical migratory path in areas where subsistence hunts occur. Narwhal will continue to coordinate with local communities and subsistence groups to minimize impacts of the project, as described in the POC, which the IHA requires Narwhal to abide by.

Based on the description of the specified activity, the measures described to minimize adverse effects on the availability of marine mammals for subsistence purposes, and the proposed mitigation and monitoring measures, NMFS has preliminarily determined that there will not be an unmitigable adverse impact on subsistence uses from Narwhal's proposed activities.

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 OPR consults internally whenever we propose to authorize take for endangered or threatened species, in this case with the NMFS Alaska Regional Office (AKR).

OPR is proposing to authorize take of bowhead whale, bearded seal (Beringia DPS), and ringed seal (Arctic subspecies), which are listed under the ESA. OPR has requested initiation of section 7 consultation with AKR for the issuance of this IHA. NMFS will conclude the ESA consultation prior to reaching a determination regarding the proposed issuance of the authorization.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to Narwhal for conducting oil and gas exploration activities in and around west Harrison Bay, Alaska, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. A draft of the proposed IHA can be found at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-oil-and-gas.*

Request for Public Comments

We request comment on our analyses, the proposed authorization, and any other aspect of this notice of proposed IHA for the proposed oil and gas exploration activities. We also request comment on the potential renewal of this proposed IHA as described in the paragraph below. Please include with your comments any supporting data or literature citations to help inform decisions on the request for this IHA or a subsequent renewal IHA.

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 as described in the *Description of Proposed Activity* section of this notice is planned or (2) the activities as described in the *Description of Proposed Activity* section of this notice would not be completed by the time the IHA expires and a renewal would allow for completion of the activities beyond that described in the *Dates and Duration* section of this notice, provided all of the following conditions are met:

- A request for renewal is received no later than 60 days prior to the needed renewal IHA effective date (recognizing that the renewal IHA expiration date cannot extend beyond one year from expiration of the initial IHA).
- 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 under the initial IHA, are a subset of the activities, or include changes so minor (*e.g.,* reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take).

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

Upon review of the request for renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings in the initial IHA remain valid.

Dated: May 12, 2025.

Kimberly Damon-Randall,

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

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