DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648–XE705]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Construction of the Alaska Liquefied Natural Gas Project in Prudhoe 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 the Alaska Gasline Development Corporation (AGDC) for authorization to take marine mammals incidental to construction of the Alaska Liquefied Natural Gas (AK LNG) Project in Prudhoe 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, 1-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 May 19, 2025.

ADDRESSES: Comments should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service and should be submitted via email to *ITP.Jacobus@noaa.gov.* 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-other-energy-activities-renewable.* In case of problems accessing these documents, please call the contact listed below.

Instructions: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments, including all attachments, must not exceed a 25-megabyte file size. All comments received are a part of the public record and will generally be posted online at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act* without change. All personal identifying information (*e.g.,* name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: Kristy Jacobus, 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 monitoring and reporting of the takings. The definitions of all applicable MMPA statutory terms cited above are included in the relevant sections below and can be found in section 3 of the MMPA (16 U.S.C. 1362) and NMFS regulations at 50 CFR 216.103.

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. NMFS participated as a cooperating agency on the 2020 Alaska LNG Project Environmental Impact Statement (EIS), which was finalized on March 6, 2020, and is available at *https://www.ferc.gov/industries-data/natural-gas/environment/final-environmental-impact-statement-feis.*

When acting as a cooperating agency, as is the case with this project, NMFS may satisfy its independent NEPA obligations by either preparing a separate NEPA analysis for its issuance of an incidental take authorization or, if appropriate, by adopting the NEPA analysis prepared by the lead agency. NMFS independently reviewed and evaluated the 2020 Alaska LNG Project EIS and determined that was adequate and sufficient to meet our responsibilities under NEPA for the issuance of the 2020 Prudhoe Bay IHA (86 FR 10658, February 22, 2021). NMFS therefore adopted the 2020 Alaska LNG Project EIS on February 16, 2021.

Summary of Request

On June 21, 2024, NMFS received a request from AGDC for an IHA to take marine mammals incidental to construction activities in Prudhoe Bay, Alaska. The application was deemed adequate and complete on February 11, 2025. AGDC's request is for take of six species of marine mammals by Level B harassment and ringed seal, spotted seal, and bearded seal, by Level A harassment. Neither AGDC nor NMFS expect serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

NMFS previously issued an IHA to AGDC for the same activities (86 FR 10658; February 22, 2021). However, no work was conducted under that IHA.

This proposed IHA would authorize incidental take during one year of the larger AK LNG project. The larger project involves a pipeline that will span approximately 807 miles (mi) (1,299 kilometers (km)) from a gas treatment facility on Alaska's North Slope, which holds 35 trillion cubic feet (991 billion cubic meters) of proven gas reserves, to a liquefaction and export facility in southcentral Alaska.

Description of Specified Activity

Overview

AGDC plans to construct an integrated liquefied natural gas (LNG) project with interdependent facilities to liquefy supplies of natural gas from Alaska, in particular from the Point Thomson Unit and Prudhoe Bay Unit production fields on the Alaska North Slope (North Slope), for export in foreign commerce and for in-state deliveries of natural gas. AGDC plans to construct an AK LNG Gas Treatment Plant (GTP), which they would construct with large, pre-fabricated modules that can only be transported to the North Slope with barges (sealifts).

AGDC is proposing to modify the existing West Dock causeway and associated dock heads in Prudhoe Bay, Alaska in order to facilitate offloading modular construction components and transporting them to the GTP construction site. Vibratory and impact pile driving associated with the work at West Dock would introduce underwater sound that may result in take by Level A and Level B harassment of marine mammals in Prudhoe Bay, Alaska. AGDC proposes to conduct pile driving up to 24 hours per day on approximately 123 days from July through October during the open water (*i.e.,* ice-free) season.

Dates and Duration

The proposed IHA would be effective for one year beginning June 1, 2027 or June 1, 2028, depending on the project schedule indicated by the applicant. Work that may result in the take of marine mammals is expected to occur during the open water season, between July and October, and would be conducted up to 24 hours per day, six days a week.

Several communities on the North Slope of Alaska engage in subsistence hunting activities at varying times and in varying locations. These subsistence hunts are further described below in the Effects of Specified Activities on Subsistence Uses of Marine Mammals section. The proposed construction activities would occur closest to the marine subsistence use area used by the Native Village of Nuiqsut. Their whaling season typically occurs August 25th to September 15th, although the exact dates may change. AGDC will cease pile driving during the Nuiqsut whaling season.

AGDC conservatively calculated that in-water construction would last 164 days. However, they expect that different pile types would be installed on the same day, which should reduce the overall number of construction days to approximately 123 days of in-water work considering the open water period, and the break in construction during the whaling season. If AGDC is not able to complete the work during the open water season construction period as planned, they will complete the work during a contingency period from late February to April.

Specific Geographic Region

The specified activity (*i.e.,* AK LNG construction activities) will occur at West Dock in Prudhoe Bay, Alaska, on Alaska's North Slope (see figure 1). West Dock is a multipurpose facility, commonly used to offload marine cargo to support Prudhoe Bay oilfield development. West Dock extends out from the shoreline 2.7 mi (4.3 km) and is within shallow waters less than 14.2 feet (ft, 4.3 meters (m)) deep.

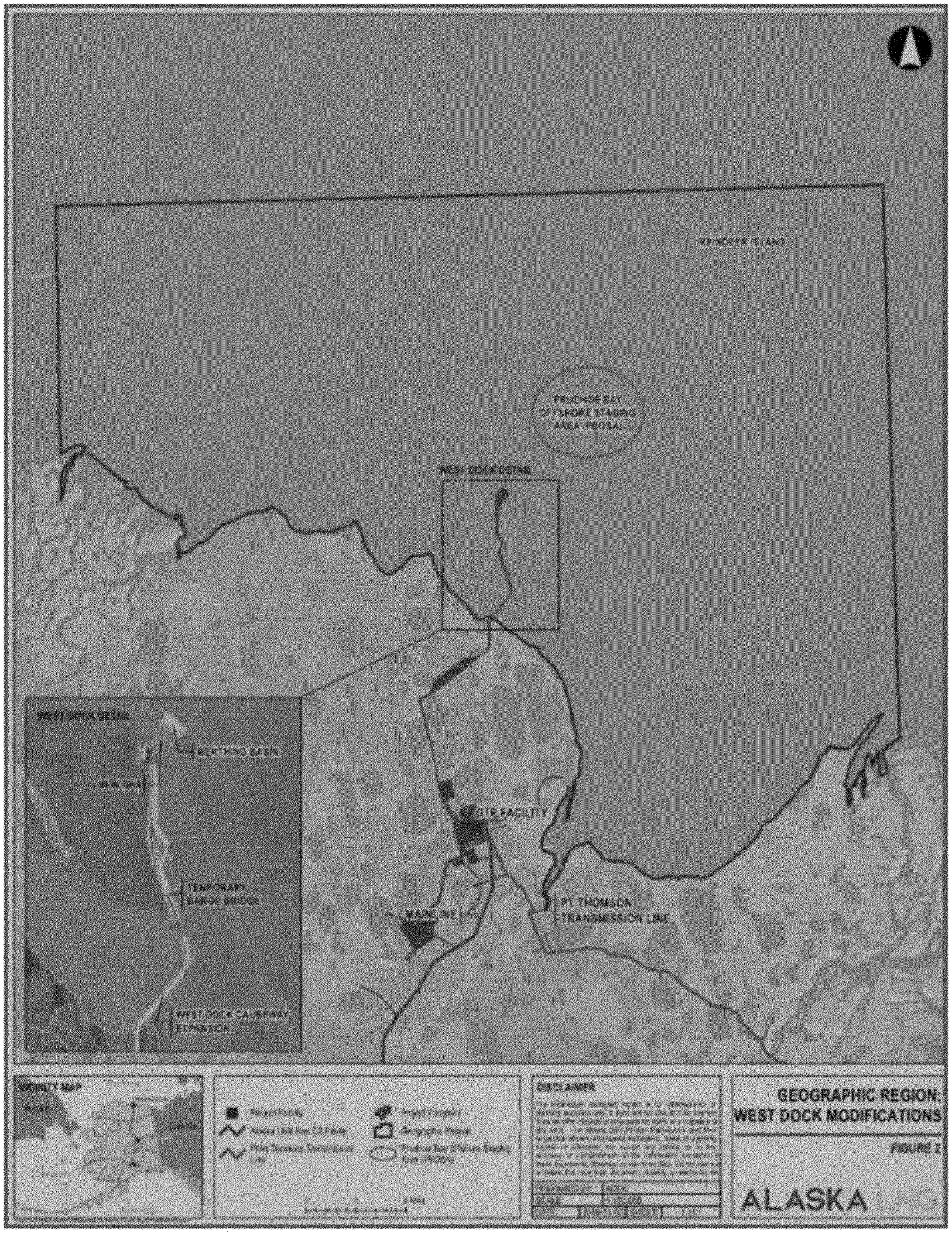

Figure 1. Map of Project Location

Detailed Description of the Specified Activity

Below, we discuss the proposed activities in Prudhoe Bay, a portion of the larger AK LNG project (which extends from the North Slope to Cook Inlet). For information on other AK LNG project components, please refer to Volume I, Chapter 2 of the Alaska LNG Project Final EIS.

AGDC is proposing to further develop the West Dock facility in Prudhoe Bay, AK. West Dock is a multipurpose facility, commonly used to offload marine cargo to support Prudhoe Bay oilfield development. The West Dock causeway, which extends approximately 2.5 mi (4 km) into Prudhoe Bay from the shoreline, is a solid-fill gravel causeway structure. There are two existing loading docks along the causeway, referred to as Dock Head 2 (DH2) and Dock Head 3 (DH3), and a seawater treatment plant (STP) at the seaward terminus of the structure. A 650-ft (198-m) breach with a single lane bridge was installed in the causeway between DH2 and DH3 during 1995 and 1996 due to concerns that the solid causeway was affecting coastal circulation and marine resources.

Development of the dock facility would require constructing a new dock head referred to as Dock Head 4 (DH4), widening the gravel causeway between the proposed DH4 site and the onshore road system, and installation of a temporary barge bridge parallel to the existing bridge over the aforementioned breach to accommodate transport of the modules over the breach. The following describes these activities in detail.

DH4 Work Area and Bulkhead—AGDC will construct a new dock head (DH4). DH4 would be a gravity-based structure, with a combi-wall (sheet piles connected by H-piles) bulkhead or dock face back-filled with gravel. The gravel dock head would provide a working area of approximately 31 acres (0.13 km^2) and would have five cargo berths. Gravel would be hauled in by truck and deposited in place by shore-based heavy equipment. Hauling and placement of gravel for construction of DH4 would occur from June–September. Gravel requirements are quantified in table 3 of AGDC's application.

Construction of DH4 would require the installation of over 1,080 linear ft (329 m) of combi-wall forming a bulkhead at the dock face, and will require vibratory and impact pile driving. Noise generated by pile driving is expected to result in the take of marine mammals. Other margins of the dock head would be sloped and armored with sand bags. Table 1 indicates the planned numbers and types of piles proposed for installation, and the proposed installation method for DH4 work, including the work area and bulkhead.

TABLE 1—PILES PLANNED FOR INSTALLATION AT DH4

Pile type/size	Installation method	Number of piles
11.5-inch (29 cm [a]) Steel H-Pile	Impact	212
48-inch (122 cm) Steel Pipe Pile	Impact	12
25-inch (64 cm) Steel Sheet Pile	Vibratory	422
14-inch (36 cm) Steel H-Pile (temporary)	Vibratory	48

[a] cm = centimeter.

AGDC plans to construct DH4 from June–October (open water season). Hauling and placing of the gravel will take place first. AGDC plans to install the combi-wall mid-September–October (after the whaling season and before ice). In the unlikely event AGDC is not able to complete the DH4 construction during the open water season, they plan to complete construction during a contingency period from February to April, working off the ice. AGDC stated that it is highly motivated to complete work during the open-water season, as work during the ice-covered winter/spring contingency period would require additional equipment and include other constraints. NMFS expects that if AGDC works during the contingency period, it would be because of lost construction days on which they were unable to work during their planned open water work season.

DH4 Mooring Dolphins—AGDC plans to install twelve mooring dolphins in the cargo berths at the proposed DH4 to hold the ballasted barges in place. Figure 5 of AGDC's application shows the locations of the proposed mooring dolphins. AGDC plans to install four temporary spuds (14-inch (36 cm) steel H-piles) for support prior to the construction of each mooring dolphin using a vibratory hammer. AGDC would extract these piles immediately after completion of the dolphin. Noise generated by pile driving is expected to result in the take of marine mammals. Table 1 lists the proposed pile types, numbers, and driving methods for DH4 work, including the mooring dolphins.

AGDC plans to install the mooring dolphins from September–October (after the Nuiqsut whaling season and before ice cover). If AGDC is not able to complete mooring dolphin construction during this time, they plan to complete construction during a contingency period from late February to April of the following year.

Barge Bridge Abutments—AGDC plans to construct a temporary barge bridge, and NMFS does not expect take as a result of its construction (see description of Barge Bridge installation below). AGDC plans to construct approach abutments (gravel filled open-cell sheet pile bulkheads) along the east side of the existing causeway on both ends of the barge bridge, and take is expected as a result of this construction. AGDC would place gravel bags for erosion control in locations where there is no bulkhead. The bulkheads would be approximately 420 ft (128 m) long (along the causeway) and 120 ft (36.6 m) across.

Much of the abutment sheet pile is for the tail walls that run from the bulkhead into the gravel fill and terminate at an anchor pile (H-pile). Noise generated by pile driving is expected to result in the take of marine mammals. A large portion of this tail wall piling and many of the tail wall anchor piles would be driven into dry ground and are not included in the analysis for assessing in-water noise impacts on marine mammals. Table 2 lists the numbers and types of pilings planned for in-water installation for the barge bridge abutments.

TABLE 2—PILES PLANNED FOR IN-WATER INSTALLATION AT THE NORTH AND SOUTH BARGE BRIDGE ABUTMENT BULKHEADS

	Pile type and installation method	Number of piles
South Abutment	19.69-inch (50.01 cm) Steel Sheet Pile (Vibratory)	695
	14-inch (36 cm) Steel H-Pile (Impact)	4
North Abutment	19.69-inch (50.01 cm) Steel Sheet Pile (Vibratory)	609
	14-inch (36 cm) Steel H-Pile (Impact)	4

AGDC plans to install the sheet piles from land or barges on open water, and potentially from the ice if the contingency period is necessary.

Construction of the barge bridge abutments is scheduled for July–August with a break in pile driving during the Nuiqsut whaling season (approximately August 25–September 15) if activities overlap. If AGDC is unable to complete construction during the open water period, they plan to complete the work during the contingency period from February to April.

Barge Bridge Mooring Dolphins—AGDC plans to install four mooring dolphins at the barge bridge site to protect the current bridge from the barges and hold the ballasted barges in place. Each mooring dolphin consists of one 48-inch diameter (122 cm), 100 ft (30.5 m) long steel pipe pile that AGDC will drive with an impact hammer to a minimum of 65 ft (19.8 m) into the seabed. As described above for the DH4 mooring dolphins, AGDC plans to install four temporary spuds (14.5-inch (37 cm) steel H-piles) with a vibratory hammer for support prior to the construction of each barge bridge mooring dolphin. AGDC would extract these temporary spuds immediately after completion of the dolphin. Noise generated by pile driving is expected to result in the take of marine mammals. Table 3 summarizes installation method and number of piles.

AGDC plans to construct the barge bridge abutments, including the mooring dolphins, in July and August, with a break in pile driving during the Nuiqsut whaling season (approximately August 25–September 15). If AGDC is not able to complete the work during that period, they will complete the dolphin installation during the contingency period from February to April.

Table 4 summarizes the total number of piles by hammer type for all project components.

TABLE 3—PILES PLANNED FOR MOORING DOLPHIN INSTALLATION AT THE BARGE BRIDGE ABUTMENTS

Pile type	Installation method	Number of piles
48-inch (122 cm) Steel Pipe Pile	Impact	4
14-inch (36 cm) Steel H-Pile (Temporary)	Vibratory	[a] 16

[a] Each of these piles will be installed and later removed after installation of mooring dolphin.

TABLE 4—TOTAL NUMBER OF PILES AMONG ALL PRUDHOE BAY PROJECT COMPONENTS

Pile size and type	Hammer type	Number of piles
11.5-inch (29.2 cm) H-Pile	Impact	212
14.5-inch (35.8 cm) H-Pile	Impact	8
	Vibratory	64
48-inch (122 cm) Pipe Pile	Impact	16
Sheet Piles (19.69-inch (50.01 cm) and 25-inch (63.5 cm))	Vibratory	1726

AGDC will only operate one hammer at a time during all pile driving.

The below described activities are not expected to result in the take of marine mammals.

Causeway Widening—AGDC will build a parallel causeway approximately 100–125 ft (31–38 m) wide and 5,000 ft long (1,524 m) on the east side of the existing causeway from DH 3 to DH 4. AGDC will upgrade the other two existing segments of West Dock causeway to a width of approximately 100–125 ft from the current width of 40–80 ft (12–24 m). AGDC will conduct the widening on the east side of the causeway because there is a pipeline along the west side. The widening would occur along approximately 4,500 ft (1,372 m) from DH3 to DH2, and 3,800 ft (1,158 m) from DH2 to land. This causeway widening work would be conducted during the summer (July–August). Gravel would be hauled in by truck and deposited in place by shore-based heavy equipment. Expected gravel requirements are indicated in table 2 of AGDC's application. Gravel fill deposition would produce a continuous sound of a relatively short duration, does not require seafloor penetration, and would affect a very small portion of habitat for marine mammals and their prey. Placement would occur in a controlled manner so as not to compromise the newly installed piles. Gravel deposition is not expected to result in marine mammal harassment and it is not discussed further. Further, a portion of the gravel deposition will occur behind sheet piles, which will act as an acoustic barrier which further supports the conclusion that take from gravel deposition is unlikely to occur.

Berthing Basin—The proposed location of the DH4 bulkhead is approximately 1,000 ft (305 m) beyond the end of the existing causeway at the STP. This location was selected as it provides an existing nominal water depth of −12 ft (−4 m) mean lower low water (MLLW) across the length of the bulkhead, allowing for berthing of cargo barges at their intended transit draft of 10 ft (3 m) without the exchange of ballast water.

AGDC plans to conduct screeding over the seafloor within the berthing area to a depth of −12 ft (−4 m) MLLW. Screeding would redistribute the seabed materials to provide a flat and even surface on which the module cargo barges can be grounded. The berthing area encompasses approximately 13.7 acres (0.06 km^2). In the screeding process, a tug and/or barge pushes or drags a beam or blade across the seafloor, removing high spots and filling local depressions. The screeding operation is not intended to increase or decrease overall seabed elevation so there would be no excavated materials requiring disposal.

AGDC would conduct screeding in the summer immediately prior to arrival of each sealift and as soon as sea ice conditions allow mobilization of the screeding barge. Based on historical ice data, AGDC anticipates screeding during July for a period of up to 14 days. AGDC would conduct a multi-beam hydrographic survey to identify high and low spots in the seabed prior to each season with equipment emitting sound at frequencies above 200 kilohertz (kHz). Therefore, we do not expect these surveys to take marine mammals, as marine mammals are unlikely to hear the surveys, much less respond to them, and we do not discuss it further in this notice. Additionally, we do not expect screeding to result in take of marine mammals, given that it is a continuous noise source comparable to other general construction activities. Further, this proposed IHA requires AGDC to shut down at 215 m during screeding operations, consistent with the 2020 Alaska LNG Biological

Opinion. AGDC has not requested, and NMFS does not propose to authorize take incidental to the proposed screeding.

Barge Bridge—The existing bridge over the aforementioned 650 ft (198 m) breach in the causeway is too narrow for module transport and incapable of supporting the weight of the project modules. Therefore, AGDC plans to construct a temporary barge bridge to accommodate transport of the modules over the breach and to the onshore road system. The first two barges to offload materials would be used to form the temporary bridge, paralleling the existing weight-limited bridge, and spanning the breach. AGDC would move these barges into place against the mooring dolphins with tugs where they would be ballasted and fastened to the causeway abutments and each other. The two ballasted barges would be placed bow-to-bow when resting on the seafloor. The barge rakes would angle upward and touch at their adjoining point, leaving an approximately 52.5-ft (16-m) gap at the seafloor between the barges. The stern of each barge would angle sharply upward at each end of the bridge, leaving an additional 10-ft (3.1-m) gap at the seafloor at each end.

Ramps would be installed to accommodate smooth transit of the self-propelled module transporters (SPMTs) over the bridge. Modules would be transported by SPMTs down the causeway and over the temporary bridge to a staging pad at the base of West Dock. From there, they would be moved southward over approximately 6 mi (9.7 km) of new and existing roads to the GTP construction site.

AGDC expects construction of the temporary barge bridge will last 3 days. The temporary bridge would be held in place by the mooring dolphins. AGDC expects the temporary bridge to be in place for 21 to 39 days, depending on weather conditions and logistics. At the conclusion of each year's sealift, AGDC would de-ballast the barges and remove them from the breach. Upon the subsequent summer season and the next sealift, AGDC would position the barges back in the breach and re-ballast them onto the barge pad for module transport operations. NMFS does not expect placement or removal of the barge bridges to result in take of marine mammals, and we do not discuss it further.

AGDC plans to leave West Dock modifications in place after modules are offloaded, as their removal would result in greater disturbance to the surrounding environment. AGDC also plans to leave the piling and infrastructure forming the offshoot and ramp to the temporary barge bridge in place, as removing it may result in erosion or weakening of the existing causeway. AGDC would cut the mooring pilings below the sediment surface, remove them, and cover the area with surrounding sediment.

Sealifts—AGDC has proposed six sealifts, consisting of two preliminary sealifts (NEG1 and NEG2) transporting materials (smaller modules, equipment, and supplies) and four primary sealifts (Sealifts 1–4) carrying the GTP modules. AGDC identified the timing, numbers of vessels, and numbers of modules associated with each of these six sealifts in their application (See Tables 8 and 9 of AGDC's application).

The barges will transport the modules from the manufacturing site (likely in Asia) with first call being Dutch Harbor to clear customs. The barges would then proceed to a designated Marine Transit Staging Area (MTSA), with Port Clarence being the preferred location for the MTSA at this time. The tug and barge will wait in a secure anchorage there until sea ice conditions have improved to 3/10 ice cover or better. The tow spread would be accompanied by a light aircraft which would repeatedly fly along the tow route to give a detailed report on sea and ice conditions. When such conditions are favorable, the tug and barge would proceed to the Prudhoe Bay Offshore Staging Area (PBOSA) located south (shoreward) of Reindeer Island and approximately 5 mi (8 km) north of DH4 to await berthing at DH4.

The sealift barges would be moved from the PBOSA to DH4 with the shallow draft assist tugs. Offloading operations at DH4 would occur 24 hours a day during periods of favorable metocean and weather conditions. Current North Slope sealift practices limit operations to wind speed below 20 knots. The barges would be butted up against the dock face and then ballasted down until they rest on the prepared barge bearing pad. Ramps would be placed to connect the barge deck with the dock so that the SPMTs are able to roll under the modules, lift them, then roll out and transport them to the onshore module staging area.

The barges would be demobilized from the PBOSA by ocean-going tugs using standard marine shipping routes. The barges would transit individually through the Beaufort and Chukchi seas rather than in groups, as occurred during their arrival into Prudhoe Bay. They would be demobilized from Prudhoe Bay on or about mid-September. NMFS does not expect take to occur associated with regular vessel transit, and therefore the use of sealifts is not discussed further.

Sealifts and barge bridge installation and removal would occur each of six consecutive years to accommodate the modules required for the project. AGDC would construct the approach abutments and mooring dolphins (as described above) in the first season, and would prepare the seabed before installation of the barge bridge for the first sealift. The barge bridge would be installed annually each sealift year at the beginning of the open-water season, and would be removed each fall prior to freeze-up. Seabed Preparation at the Barge Bridge- AGDC will construct a level and stable barge pad to support the ballasted barge at the proper horizontal and vertical location for successful transit of modules across the breach. The pad would be designed to support the fully loaded weight of the barge and the heaviest modules.

Pad construction would begin in February and would include an initial through-ice bathymetric survey within the breach. AGDC would conduct the through-ice survey by drilling or augering holes through the ice and measuring the bottom elevations by a survey rod tied to the local Global Positioning System—Real Time Kinematic (GPS–RTK) system to provide the needed level of accuracy of horizontal positions and vertical elevations. A grid of survey holes would be established over the 710 ft (216 m) by 160 ft (48.8 m) dimensions (2.6 acres; 0.01 km^2) of the breach barge pad to allow for determination of the bottom bathymetry such that a plan can be developed accordingly to prepare the barge pad surface. Cetaceans are not predicted to be present in the area during these activities (Quakenbush et al., 2018, Citta et al., 2017) and while ringed seals likely will be present, few, if any, spotted or bearded seals are likely to be present during that time (Bengston et al., 2005; Lowry et al., 1998; Simpkins et al., 2003). Therefore, take of cetaceans from drilling/augering is not expected, and take of spotted or bearded seals is so low as to be discountable. Given that drilling/augering is expected to occur in February, prior to ringed seals establishing lairs, we would not expect ringed seals to build their lairs close enough to the project so as to be disturbed by the drilling/augering during the activity. Although there is potential that a seal might build its lair in an alternate location due to drilling/augering, this disturbance is accounted for in the takes by Level B harassment, which have considered all likely take by behavioral disturbance, including that which could influence lair location. Therefore, NMFS did not conduct any further analysis of Level B harassment of ringed seals during the drilling/augering.

Seabed preparation would consist of smoothing the seabed within the pad area as necessary to level the seabed across the pad at an elevation grade of approximately −7 ft (−2.1 m) MLLW. Some gravel fill may be required at scour holes. Rock filled marine mattresses or gabions approximately 1 ft (0.3 m) thick would then be placed across the graded pad to provide a stable and low maintenance surface at −6 ft (−1.8 m) MLLW on which the barges would be grounded. These mattresses are gravel-filled containers constructed of high-strength geogrid, with the geogrid panels laced together to form mattress-shaped baskets.

AGDC would conduct the seabed preparations through the ice during winter using excavation equipment and ice excavation methods. Equipment required for the grading work includes ice trenchers, excavators, front-end loaders, man-lifts, haul trucks, survey equipment, and other ancillary equipment necessary to support the operation. An equipment spread includes a trencher for cutting ice, an excavator for removing ice, a second excavator, and haul units. AGDC would initiate through-ice grading efforts by cutting through the ice with trenchers. Excavators would then proceed to remove the ice to expose the seafloor bottom. Once a section has been exposed to the seafloor, the bottom will be graded to −7 ft (−2.1 m) MLLW using the excavation equipment. AGDC would then install marine mattresses on the graded pad, likely requiring use of a crane. Grounded ice conditions are expected to occur at the breach on or before February 1 of each year at the latest. AGDC expects to conduct through-ice surveying and grading work immediately after, if not sooner. AGDC expects the total construction duration will be 45 to 60 days with construction complete by the end of March and demobilization from the breach area in early April. NMFS expects these activities to produce continuous noise similar to other standard construction noise and does not expect seabed preparation to result in take of marine mammals.

AGDC may conduct some screeding right before the barges are placed in summer in an effort to achieve a surface that is near flush with adjacent subsurface elevations. Any screeding at the barge bridge site would be expected to take 14 days or less. As discussed previously, NMFS does not expect screeding to result in marine mammal harassment, therefore, screeding is not discussed further in this document.

NMFS is carrying forward impact and vibratory pile driving and removal activities (piles indicated in table 4) for further analysis because these activities are likely to result in the take of marine mammals.

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*). Additional information may be found in the Aerial Survey of Arctic Marine Mammals (ASAMM) reports, which are available online at *https://www.fisheries.noaa.gov/alaska/marine-mammal-protection/aerial-surveys-arctic-marine-mammals,* with the exception of the 2020 and 2021 reports, which are available in the NMFS repository (*https://repository.library.noaa.gov/*).

Table 5 lists all species or stocks for which take is expected and proposed to be authorized for this activity and summarizes information related to the population or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) and potential biological removal (PBR), where known. PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS' SARs). While no serious injury or mortality is anticipated or 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. Pacific and Alaska SARs. All values presented in table 5 are the most recent available at the time of publication (including from the 2023 SARs) and are available online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments.*

TABLE 5—MARINE MAMMAL SPECIES [1] LIKELY IMPACTED BY THE SPECIFIED ACTIVITIES

Common name	Scientific name	Stock	ESA/MMPA status; strategic (Y/N) [2]	Stock abundance (CV, Nmin, most recent abundance survey) [3]	PBR	Annual M/SI [4]
Order Artiodactyla—Cetacea—Mysticeti (baleen whales)						
Family Eschrichtiidae:						
Gray Whale	*Eschrichtius robustus*	Eastern N Pacific	-, -, N	26,960 (0.05, 25,849, 2016).	801	131
Family Balaenidae:						
Bowhead whale	*Balaena mysticetus*	Western Arctic	E, D, Y	15,227 (0.165, 13,263, 2019).	133	57

TABLE 5—MARINE MAMMAL SPECIES [1] LIKELY IMPACTED BY THE SPECIFIED ACTIVITIES—Continued

Common name	Scientific name	Stock	ESA/MMPA status; strategic (Y/N) [2]	Stock abundance (CV, Nmin, most recent abundance survey) [3]	PBR	Annual M/SI [4]
Odontoceti (toothed whales, dolphins, and porpoises)						
Family Monodontidae (white whales):						
Beluga Whale	*Delphinapterus leucas*	Beaufort Sea	-, -, N	39,258 (0.229, N/A, 1992).	UND	104
Beluga Whale	*Delphinapterus leucas*	Eastern Chukchi	-, -, N	13,305 (0.51, 8,875, 2017).	178	56
Order Carnivora—Pinnipedia						
Family Phocidae (earless seals):						
Bearded Seal	*Erignathus barbatus*	Beringia	T, D, Y	UND (UND, UND, 2013) [5].	UND	6,709
Ringed Seal	*Pusa hispida*	Arctic	T, D, Y	UND (UND, UND, 2013) [6].	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/;* Committee on Taxonomy (2022)).
[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's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.,* commercial fisheries, vessel strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.
[5] Reliable population estimate for the entire stock not available. PBR is based upon the negatively biased Nmin for bearded seals in the U.S. portion of the stock.
[6] A reliable population estimate for the entire stock is not available. Using a sub-sample of data collected from the U.S portion of the Bering Sea, an abundace estimate of 171,418 ringed seals has been calculated, but this estimate does not account for availability bias due to seals in the water or in the shorefast ice zone at the time of the survey. The actual number of ringed seals in the U.S. portion of the Bering Sea is likely much higher. Using the Nmin based upon this negatively biased population estimate, the PBR is calculated to be 4,755 seals, although this is also a negatively biased estimate.

As indicated above, all 6 species (with 7 managed stocks) in table 5 temporally and spatially co-occur with the activity to the degree that take is reasonably likely to occur. While a harbor porpoise (*Phocoena phocoena*) was sighted in the 2017 ASAMM survey (Clarke *et al.,* 2018) the spatial occurrence of harbor porpoise is such that take is not expected to occur, and they are not discussed further beyond the explanation provided here. Harbor porpoise are considered to be extremely rare in the Beaufort Sea, particularly in the project area (Megan Ferguson, pers. comm., November 2019).

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

Gray Whale

During the summer and fall, most whales in the Eastern North Pacific (ENP) stock feed in the Chukchi, northwestern Bering Sea, and extreme western Beaufort Sea (west of 155 degrees W) (Muto *et al.,* 2021, Clarke *et al.,* 2015b). In the fall, ENP gray whales migrate south to their wintering and calving grounds off the coast of Baja California, Mexico. While gray whales are occasionally seen in the Beaufort Sea, their occurrence there is considered extralimital, and they are rarely seen east of 155 degrees West (Clarke *et al.,* 2015b). We expect that gray whales could occur within the project area during the open water season, though occurrence is not likely. We would not expect gray whales to be present during AGDC's winter/spring contingency pile driving period.

Bowhead Whale

Bowhead whales belonging to the Western Arctic stock 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 (Young *et al.,* 2023). The majority of the Western Arctic stock migrates annually from wintering areas (December to March) in the central and northwestern Bering Sea, north through the Chukchi seas (December to April), through the Chukchi Sea and Beaufort Sea in the spring (April through May), to the eastern Beaufort Sea where they spend much of the late spring and summer (May through September). During late summer and fall (September through December), individuals from this stock migrate back to the Chukchi Sea and then to the Bering Sea (Young *et al.,* 2023, Citta *et al.,* 2021)

NMFS was petitioned in 2000 to consider designating the nearshore areas from Utqiaġvik east to the U.S.-Canada border as critical habitat for the Western Arctic stock. In 2002, NMFS determined that a critical habitat designation was not necessary as the population was increasing and approaching the pre-commercial whaling size, there were no known habitat issues slowing the population growth, and activities that occurred in the petitioned area were already being managed to minimize impacts to the population (67 FR 55767).

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, 2020; Brower *et al.* 2022a, 2022b). 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 66–197 ft (11–60 m deep (Moore *et al.* 1989; Moore and Reeves 1993; Monnett and

Treacy 2005; Treacy *et al.* 2006). Waters less than 15 ft. (4.5 m) deep are considered too shallow to support these whales, and in three decades of aerial surveys by BOEM (ASAMM), no bowhead whale has been recorded in waters less than 16.4 ft (5 m) deep (Clarke and Ferguson 2010).

Monitoring surveys have been conducted annually since 2001 at the Northstar offshore oil and gas facility located just offshore of West Dock. Over 95 percent of the bowheads observed during these fall surveys occurred more than 13.9 mi (22.3 km) offshore in 2001, 14.2 mi (22.9 km) in 2002, 8.4 mi (13.5 km) in 2003, and 10.1 mi (16.3 km) in 2004 (Blackwell *et al.* 2007). West Dock extends out from the shoreline 2.7 mi (4.3 km) and is within shallow waters less than 14.2 ft (4.3 m) deep. The proposed project activities would occur primarily along the West Dock causeway in an area developed for oil and gas with existing vessel traffic. While a small number of bowhead whales have been seen or heard offshore near Prudhoe Bay in late August (LGL and Greenridge 1996; Greene *et al.* 1999; Blackwell *et al.* 2007; Goetz *et al.* 2008), bowheads are not likely to occur in the immediate vicinity of the proposed activities.

Clarke *et al.* (2023) identify and score biologically important areas (BIAs) in the Arctic, including areas of importance for migration, reproduction, and feeding. However, none of these BIAs overlap with the Level B harassment zones of the project. For example, some of the feeding areas lie just north of the project area, the spring (April-May) migratory corridor BIAs for bowheads are far offshore from the Level B harassment zones for the project, and the fall (August-October) migratory corridor BIAs are further inshore and closer to the project site.

In summary, we expect that whales could occur within the project area during the open water season. We would not expect bowhead whales to be present during AGDC's winter/spring contingency pile driving period.

Beluga Whale

Individuals of both the Beaufort Sea stock and the Eastern Chukchi stock of beluga whale occur in the waters around the project area. Beluga whales from the two stocks migrate between the Bering and Beaufort Seas and are closely associated with open leads and polynyas. The Beaufort Sea stock departs the Bering Sea in early spring, migrating through the Chukchi Sea and into the Canadian Beaufort Sea where they spend the summer and most of the fall, returning to the Bering Sea in the late fall. The Eastern Chukchi stock remains in the Bering Sea slightly longer, departing in the late spring and early summer for the Chukchi Sea and western Beaufort Sea where they spend the summer before returning to the Bering Sea in the fall (Muto *et al.,* 2021).

O'Corry-Crowe *et al.* (2018) studied genetic marker sets in 1,647 beluga whales. The data set was from over 20 years and encompassed all of the whales' major coastal summering regions in the Pacific Ocean. The genetic marker analysis of the migrating whales revealed that while both the wintering and summering areas of the eastern Chukchi Sea and eastern Beaufort Sea subpopulations may overlap, the timing of spring migration differs such that the whales hunted at coastal sites in Chukotka, the Bering Strait (*i.e.,* Diomede), and northwest Alaska (*i.e.,* Point Hope) in the spring and off of Alaska's Beaufort Sea coast in summer were predominantly from the eastern Beaufort Sea population. Earlier genetic investigations and recent telemetry studies show that the spring migration of eastern Beaufort whales occurs earlier and through denser sea ice than eastern Chukchi Sea belugas. The discovery that a few individual whales found at some of these spring locations had a higher likelihood of having eastern Chukchi Sea ancestry or being of mixed-ancestry, indicates that the Bering Strait region is also an area where the stocks mix in spring. Citta *et al.* (2017) also observed that tagged eastern Beaufort Sea whales migrated north in the spring through the Bering Strait earlier than the eastern Chukchi belugas, so they had to pass through the latter's primary wintering area. Therefore, the Eastern Chukchi stock is unlikely to be present in the action area at any time in general, particularly during summer and fall, when most beluga takes would be anticipated for this project. However, we conservatively assume that beluga whale takes during AGDC's project could occur to either stock.

Most belugas recorded during aerial surveys conducted in the Alaskan Beaufort Sea in the last two decades were found over 40 mi (65 km) from shore (Miller *et al.* 1999; Funk *et al.* 2008; Christie *et al.* 2010; Clarke and Ferguson 2010; Brandon *et al.* 2011). ASAMM 2016 surveys reported belugas along the continental slope with few sightings nearshore in the western Beaufort Sea, and Clarke *et al.* (2017) reported that distribution was similar to that documented in previous years with light sea ice cover.

Surveys have recorded belugas close to shore and in the vicinity of the activity area. Green and Negri (2005) reported small beluga groups nearshore Cape Lonely (August 26) and in Smith Bay (September 4). Funk *et al.* (2008) reported a group just offshore of the barrier islands near Simpson Lagoon. Aerts *et al.* (2008) reported summer sightings of three groups of eight animals inside the barrier islands near Prudhoe Bay; and Lomac-MacNair (2014) recorded 15 beluga whales offshore of Prudhoe Bay between July and August. While it is possible for belugas to occur in the project area, nearshore sightings are unlikely.

Whales from both the Beaufort Sea and eastern Chukchi Sea stocks overwinter in the Bering Sea. Belugas of the eastern Chukchi may winter in offshore, although relatively shallow, waters of the western Bering Sea (Richard *et al.,* 2001), and the Beaufort Sea stock may winter in more nearshore waters of the northern Bering Sea (R. Suydam, pers. comm. 2012).

Clarke *et al.* (2023) designated feeding and migratory BIAs for Beaufort Sea beluga whales, however, none of these BIAs overlap the project area. The migratory corridors are far offshore from the project area, while the West Beaufort North Chukchi feeding BIA lies just to the north of the project area and extends from Cape Bathurt, Canada in the east to north of Wrangel Island, Russia in the west. In summary, we expect that beluga whales from either the Beaufort or Chukchi Sea stock may occur within the project area during the open water season. We would not expect belugas to be present during AGDC's winter/spring contingency pile driving period.

Bearded Seal

The Beringia stock of bearded seals occur seasonally in the shallow shelf waters of the Beaufort, Chukchi, and Bering Seas (Cameron *et al.,* 2010). Bearded seals are closely associated with ice and their migration coincides with the sea ice retreat and advancement. Some seals are found in the Beaufort Sea year-round; however, most prefer to winter in the Bering Sea and summer in areas with high ice coverage (70–90 percent) in the Chukchi and Beaufort seas (Simpkins *et al.,* 2003, Bengtson *et al.,* 2005).

Aerial surveys conducted in the Beaufort Sea indicated that bearded seals preferred water depths between 82–246 ft (25–75 m) and areas of open ice cover (Cameron *et al.* 2010). ASAMM commonly observes bearded seals offshore in the Beaufort Sea; however, no sightings have been observed in the West Dock activity area. 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 Beringia DPS of the bearded seal was designated in May 2022 (87 FR 19180). Essential features for conservation designated by NMFS 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 seal 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. This critical habitat is designated in specific areas of the Bering, Chukchi, and Beaufort Seas. The Beaufort Sea section of the critical habitat is relatively narrow band that lies to the north of the project area and does not overlap with the project area. Notwithstanding an earlier court decision vacating NMFS's critical habitat designation, the underlying information regarding the importance of the area and associated features to bearded seals and their habitat remains relevant to the discussion here.

In summary, bearded seals may occur in the project area during the open water season. Bearded seals could potentially occur in the project area during AGDC's winter/spring contingency period; however, we would expect very few, if any, bearded seals to be present during this time.

Ringed Seal

Ringed seals have a circumpolar distribution and are found in all seasonally ice-covered seas of the Northern Hemisphere (Muto *et al.,* 2021). Ringed seals rely on the sea ice for key life history functions and remain associated with the ice most of the year. They are well adapted to inhabiting both shorefast and pack ice, and diminishing sea ice and snow resulting from climate change is the primary concern for this population. The ice provides a platform for pupping and nursing in late winter and early spring, for molting in late spring to early summer, and for resting during other times of the year. When sea ice is at its maximal extent during the winter and early spring in Alaska waters, ringed seal numbers are high in the northern Bering Sea, and throughout the Chukchi and Beaufort Seas. The species is generally not abundant south of Norton Sound, but animals have occurred as far south as Bristol Bay in years of extensive ice coverage (Muto *et al.,* 2021).

Seasonal movements have not been thoroughly documented; however, most ringed seals that overwinter in the Bering and Chukchi seas are thought to migrate north as the ice retreats in the spring. During the summer, ringed seals feed in the pack ice of the northern Chukchi and Beaufort seas, and in nearshore ice remnants of the Beaufort Sea. As the ice advances with freeze-up in the fall, many seals move west and south and disperse throughout the Chukchi and Bering seas while some remain in the Beaufort Sea (Muto *et al.,* 2021).

Critical habitat for the ringed seal was designated in May 2022 and includes marine waters within one specific area in the Bering, Chukchi, and Beaufort Seas (87 FR 19232, April 1, 2022). Essential features established by NMFS for conservation of ringed seals are (1) snow-covered sea ice habitat suitable for the formation and maintenance of subnivean birth lairs used for sheltering pups during whelping and nursing, which is defined as waters 3 m (9.8 ft) or more in depth (relative to MLLW) containing areas of seasonal land-fast (shore-fast) ice or dense, stable pack ice, that have undergone deformation and contain snowdrifts of sufficient depth to form and maintain birth lairs (typically at least 54 cm (21.3 in) deep); (2) sea ice habitat suitable as a platform for basking and molting, which is defined as areas containing sea ice of 15 percent or more concentration in waters 3 m (9.8 ft) or more in depth (relative to MLLW); and (3) primary prey resources to support Arctic ringed seals, which are defined to be small, often schooling, fishes, in particular Arctic cod (*Boreogadus saida*), saffron cod (*Eleginus gracilis*), and rainbow smelt (*Osmerus dentex*); and small crustaceans, in particular, shrimps and amphipods. The project area overlaps a very small portion of this large critical habitat area. Notwithstanding an earlier court decision vacating NMFS's critical habitat designation, the underlying information regarding the importance of the area and associated features to ringed seals and their habitat remains relevant to the discussion here.

Historically, ringed seal occurrence in or near the activity area has been minimal, and large concentrations of seals are not expected near West Dock during project operations. However, ringed seals may occur in the project area during the open-water season or during AGDC's winter/spring contingency period.

Spotted Seal

The Bering stock of the spotted seal is found along the continental shelf of the Bering, Chukchi, and Beaufort Seas (Muto *et al.,* 2020). During the late fall through spring, when seals are hauled out on sea ice, whelping, nursing, breeding, and molting occurs. After the sea ice has melted, most spotted seals haul out on land in the summer and fall (Boveng *et al.,* 2009). Pupping occurs along the Bering Sea ice front during March and April, followed by mating and molting in May and June (Quakenbush, 1988). During the summer, the seals follow the retreating ice north into the Chukchi and Beaufort seas, and haul out on lagoon and river delta beaches during the open water period. The migration back to the Bering Sea wintering grounds begins with sea ice advancement, usually in October (Lowry *et al.,* 1998).

Spotted seals were recorded during barging activities in the summer and early fall of 2005 and 2007 between Prudhoe Bay and Cape Simpson (Green *et al.,* 2007, Green and Negri, 2006). Lomac-MacNair *et al.* (2015) observed spotted seals in Prudhoe Bay, including several in the immediate vicinity of West Dock, while monitoring July-August seismic activity. Therefore, we expect that spotted seals could be present in the project area during the summer months. However, spotted seals are not expected in the area during AGDC's contingency period.

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.,* Au and Hastings, 2008, Richardson *et al.,* 1995, Wartzok and Ketten, 1999). 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 in table 6.

TABLE 6—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.

For more detail concerning these groups and associated frequency ranges, please see NMFS (2024) for a review of available information.

Potential Effects of the Specified Activity 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.

Description of Sound Sources

The marine soundscape is comprised of both ambient and anthropogenic sounds. Ambient sound is defined as the all-encompassing sound in a given place and is usually a composite of sound from many sources both near and far. The sound level of an area is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g.,* waves, wind, precipitation, earthquakes, ice, atmospheric sound), biological (*e.g.,* sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (*e.g.,* vessels, dredging, aircraft, construction). The sum of the various natural and anthropogenic sound sources at any given location and time—which comprise ''ambient'' or ''background'' sound—depends not only on the source levels (as determined by current weather conditions and levels of biological and shipping 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.

In-water construction activities associated with the project would include vibratory pile driving and removal and impact pile driving. The sounds produced by these activities fall into one of two general sound types: Impulsive and non-impulsive. Impulsive sounds (*e.g.,* explosions, gunshots, sonic booms, impact pile driving) are typically transient, brief (less than one second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (American National Standards Institute (ANSI), 1986, National Institute for Occupational Safety and Health (NIOSH), 1998, NMFS, 2024, ANSI, 2005). Non-impulsive sounds (*e.g.,* aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems) can be broadband, narrowband or tonal, brief or prolonged (continuous or intermittent), and typically do not have the high peak sound pressure with raid rise/decay time that impulsive sounds do (ANSI, 1995, NIOSH, 1998, NMFS, 2024). 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, Southall *et al.,* 2007).

Two types of pile hammers would be used on this project: Impact and vibratory. Impact hammers operate by repeatedly dropping a heavy piston onto a pile to drive the pile into the substrate. Sound generated by impact hammers is characterized by rapid rise times and high peak levels, a potentially injurious combination (Hastings and Popper, 2005). Vibratory hammers install piles by vibrating them and allowing the weight of the hammer to push them into the sediment. Vibratory hammers produce significantly less sound than impact hammers. Peak sound pressure levels (SPLs) may be 180 dB or greater, but are generally 10 to 20 dB lower than SPLs generated during impact pile driving of the same-sized pile (Oestman *et al.,* 2009). Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (Nedwell and Edwards, 2002, Carlson *et al.,* 2005).

The likely or possible impacts of AGDC's proposed activity on marine mammals could involve both non-acoustic and acoustic stressors. Potential non-acoustic stressors could include the physical presence of the equipment and personnel; however, any impacts to marine mammals are expected to primarily be acoustic in nature. Acoustic stressors include effects of heavy equipment operation during pile installation and removal.

Acoustic Impacts

The introduction of anthropogenic noise into the aquatic environment from pile driving and removal is the primary means by which marine mammals may be harassed from AGDC's specified activity. Animals exposed to natural or anthropogenic sound may experience physical and psychological effects, ranging in magnitude from none to severe (Southall *et al.,* 2007, 2019). Exposure to pile driving and removal noise has the potential to result in auditory threshold shifts (TS) and behavioral reactions (*e.g.,* avoidance, temporary cessation of foraging and vocalizing, changes in dive behavior). Exposure to anthropogenic noise can also lead to non-observable physiological responses such as an increase in stress hormones. Additional noise in a marine mammal's habitat can mask acoustic cues used by marine mammals to carry out daily functions such as communication and predator and prey detection. The effects of pile driving and removal noise on marine mammals are dependent on several factors, including, but not limited to, sound type (*e.g.,* impulsive vs. non-impulsive), the species, age and sex class (*e.g.,* adult male vs. mom with calf), duration of exposure, the distance between the pile and the animal, received levels, behavior at time of exposure, and previous history with exposure (Wartzok *et al.,* 2004, Southall *et al.,* 2007). Here we discuss physical auditory effects (TS) followed by behavioral effects and potential impacts on habitat.

NMFS defines a noise-induced TS as a change, usually an 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). The amount of TS is customarily expressed in dB. TS can be permanent or temporary. As described by NMFS (2024), there are numerous factors to consider when examining the consequence of TS, including, but not limited to, the signal temporal pattern (*e.g.,* impulsive or non-impulsive), likelihood an individual would be exposed for a long enough duration or to a high enough level to induce a TS, the magnitude of the TS, time to recovery (seconds to minutes or hours to days), the frequency range of the exposure (*i.e.,* spectral content), the hearing and vocalization frequency range of the exposed species relative to the signal's frequency spectrum (*i.e.,* how an animal uses sound within the frequency band of the signal (*e.g,* Kastelein *et al.,* 2014)), and the overlap between the animal and the source (*e.g.,* spatial, temporal, and spectral).

Auditory Injury (AUD INJ) and Permanent Threshold Shift (PTS)

NMFS defines AUD INJ 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). PTS does not generally affect more than a limited frequency range, and an animal that has incurred PTS has incurred some level of hearing loss at the relevant frequencies; typically, animals with PTS are not functionally deaf (Au and Hastings, 2008, Finneran, 2016). Available data from humans and other terrestrial mammals indicate that a 40 dB TS approximates PTS onset (see Ahroon *et al.,* 1996, Kryter *et a*l., 1966, Miller, 1974, Ward *et al.,* 1958, Ward, 1960, Ward *et al.,* 1959, Henderson *et al.,* 2008). PTS levels for marine mammals are estimates, because there are limited empirical data measuring PTS in marine mammals (*e.g.,* Kastak *et al.,* 2008), 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)

NMFS defines TTS as 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 (see 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 (Finneran *et al.,* 2000, 2002; Schlundt *et al.,* 2000,). 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), and 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 auditory masking, below). 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, elephant seals (*Mirounga angustirostris*), bearded seals (*Erignathus barbatus*) and California sea lions (*Zalophus californianus*) (Kastak *et al.,* 1999, 2007; Kastelein *et al.,* 2019b, 2019c, 2021, 2022a, 2022b; Reichmuth *et al.,* 2019; Sills *et al.,* 2020). TTS was not observed in spotted (*Phoca largha*) and ringed (*Pusa hispida*) 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.,* 2020a, 2020b, Kastelein *et al.,* 2019a, 2019b). 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 SEL (Finneran *et al.,* 2010, Kastelein *et al.,* 2015, Kastelein *et al.,* 2014, Mooney *et al.,* 2009). 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. However, such relationships are assumed to be similar to those in humans and other terrestrial mammals. PTS typically occurs at exposure levels at least several dB 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.

This project would install piles using vibratory and impact pile driving. There would likely be pauses in activities producing the sound during each day. Given these pauses and that many marine mammals are likely moving through the ensonified area and not remaining for extended periods of time, the potential for TS declines.

Behavioral Harassment

Exposure to noise from pile driving and removal also has the potential to behaviorally disturb marine mammals to a level that rises to the definition of harassment under the MMPA. Generally speaking, NMFS considers a behavioral disturbance that rises to the level of harassment under the MMPA a non-minor response—in other words, not every response qualifies as behavioral disturbance, and for responses that do, those of a higher level, or accrued across a longer duration, have the potential to affect foraging, reproduction, or survival. Behavioral disturbance may include a variety of effects, including subtle changes in behavior (*e.g.,* minor or brief avoidance of an area or changes in vocalizations), more conspicuous changes in similar behavioral activities, and more sustained and/or potentially severe reactions, such as displacement from or abandonment of high-quality habitat. Behavioral responses may include changing durations of surfacing and dives; changing direction and/or speed; reducing/increasing vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); eliciting a visible startle response or aggressive behavior (such as tail/fin slapping or jaw clapping); avoidance of areas where sound sources are located. Pinnipeds may increase their haul out time, possibly to avoid in-water disturbance (Thorson and Reyff, 2006).

Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g.,* species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day), as well as the interplay between factors (*e.g.,* Richardson *et al.,* 1995; Wartzok *et al.,* 2004; Southall *et al.,* 2007, 2019; Weilgart, 2007; Archer *et al.,* 2010, Erbe *et al.,* 2019). Individuals (of different age, gender, reproductive status, *etc.*) among most populations will have variable hearing capabilities, and differing behavioral sensitivities to sounds that will be affected by prior conditioning, experience, and current activities of those individuals. Southall et al. (2007) and Southall et al. (2021) have developed and subsequently refined methods developed to categorize and assess the severity of acute behavioral responses, considering impacts to individuals that may consequently impact populations. Often, specific acoustic features of the sound and contextual variables (*i.e.,* proximity, duration, or recurrence of the sound or the current behavior that the marine mammal is engaged in or its prior experience), as well as entirely separate factors, such as the physical presence of a nearby vessel, may be more relevant to the animal's response than the received level alone. In general, pinnipeds seem more tolerant of, or at least habituate more quickly to, potentially disturbing underwater sound than do cetaceans and generally seem to be less responsive to exposure to industrial sound than most cetaceans. Please see appendices B and C of Southall *et al.* (2007) and Gomez *et al.* (2016) for reviews of studies involving marine mammal behavioral responses to sound.

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al.,* 2004). Animals are most likely to habituate to sounds that are predictable and unvarying. It is important to note that habituation is appropriately considered as a ''progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial,'' rather than as, more generally, moderation in response to human disturbance (Bejder *et al.,* 2009). The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure.

As noted above, behavioral state may affect the type of response. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al.,* 1995; Wartzok *et al.,* 2004; National Research Council (NRC), 2005). Controlled experiments with captive marine mammals have showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al.,* 1997; Finneran *et al.,* 2003). Observed responses of wild marine mammals to loud pulsed sound sources (*e.g.,* seismic airguns) have been varied but often consist of avoidance behavior or other behavioral changes (Richardson *et al.,* 1995; Morton and Symonds, 2002; Nowacek *et al.,* 2007).

Available studies show wide variation in response to underwater sound; therefore, it is difficult to predict specifically how any given sound in a particular instance might affect marine mammals perceiving the signal (*e.g.,* Erbe *et al.,* 2019). If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (Lusseau and Bejder, 2007, Weilgart, 2007, National Research Council, 2005). However, there are broad categories of potential response, which we describe in greater detail here, that include alteration of dive behavior, alteration of foraging behavior, effects to breathing, interference with or alteration of vocalization, avoidance, and flight.

Changes in dive behavior can vary widely and may consist of increased or decreased dive times and surface intervals as well as changes in the rates of ascent and descent during a dive (*e.g.,* Frankel and Clark, 2000; Costa *et al.,* 2003; Ng and Leung, 2003; Nowacek *et al.,* 2004; Goldbogen *et al.,* 2013a, 2013b, Blair *et al.,* 2016). Variations in dive behavior may reflect interruptions in biologically significant activities (*e.g.,* foraging) or they may be of little biological significance. The impact of an alteration to dive behavior resulting from an acoustic exposure depends on what the animal is doing at the time of the exposure and the type and magnitude of the response.

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (*e.g.,* bubble nets or sediment plumes), or changes in dive behavior. However, acoustic and movement bio-logging tools have been used in some cases, to infer responses of feeding to anthropogenic noise. For example, Blair *et al.* (2016) reported significant effects on humpback whale foraging behavior in Stellwagen Bank in response to ship noise including slower descent rates, and fewer side-rolling events per dive with increasing ship nose. In addition, Wisniewska *et al.* (2018) reported that tagged harbor porpoises demonstrated fewer prey capture attempts when encountering occasional high-noise levels resulting from vessel noise as well as more vigorous fluking, interrupted foraging, and cessation of echolocation signals observed in response to some high-noise vessel passes.

In response to playbacks of vibratory pile driving sounds, captive bottlenose dolphins showed changes in target detection and number of clicks used for a trained echolocation task (Branstetter *et al.* 2018). Similarly, harbor porpoises trained to collect fish during playback of impact pile driving sounds also showed potential changes in behavior and task success, though individual differences were prevalent (Kastelein *et al.* 2019d). As for other types of behavioral response, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (*e.g.,* Croll *et al.,* 2001; Nowacek *et al.,* 2004; Madsen *et al.,* 2006; Yazvenko *et al.,* 2007). A determination of whether foraging disruptions incur fitness consequences would require information on or estimates of the energetic requirements of the affected individuals and the relationships among prey availability, foraging effort and success, and the life history stage(s) of the animal.

Variations in respiration naturally vary with different behaviors and alterations to breathing rate as a function of acoustic exposure can be expected to co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may be representative of annoyance or an acute stress response. Various studies have shown that respiration rates may either be unaffected or could increase, depending on the species and signal characteristics, again highlighting the importance in understanding species differences in the tolerance of underwater noise when determining the potential for impacts resulting from anthropogenic sound exposure (*e.g.,* Kastelein *et al.,* 2001, 2005, 2006; Gailey *et al.,* 2007). For example, harbor porpoise' respiration rate increased in response to pile driving sounds at and above a received broadband SPL of 136 dB (zero-peak SPL: 151 dB re 1 μPa; SEL of a single strike: 127 dB re 1 $\mu Pa^2 - s$) (Kastelein *et al.,* 2013).

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 seismic surveys (Malme *et al.,* 1984). In response to construction noise from offshore wind farms, harbor porpoises and harbor seals have demonstrated avoidance on the scale of hours to weeks (Brandt et al., 2018; Russell et al., 2016). 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.,* Blackwell *et al.,* 2004; Bejder *et al.,* 2006; Teilmann *et al.,* 2006).

A flight response is a dramatic change in normal movement to a directed and rapid movement away from the perceived location of a sound source. The flight response differs from other avoidance responses in the intensity of the response (*e.g.,* directed movement, rate of travel). Relatively little information on flight responses of marine mammals to anthropogenic signals exist, although observations of flight responses to the presence of predators have occurred (Connor and Heithaus, 1996; Bowers *et al.,* 2018). The result of a flight response could range from brief, temporary exertion and displacement from the area where the signal provokes flight to, in extreme cases, marine mammal strandings (England *et al.,* 2001). However, it should be noted that response to a perceived predator does not necessarily invoke flight (Ford and Reeves, 2008), and whether individuals are solitary or in groups may influence the response.

Behavioral disturbance can also impact marine mammals in more subtle ways. Increased vigilance may result in costs related to diversion of focus and attention (*i.e.,* when a response consists of increased vigilance, it may come at the cost of decreased attention to other critical behaviors such as foraging or resting). These effects have generally not been demonstrated for marine mammals, but studies involving fishes and terrestrial animals have shown that increased vigilance may substantially reduce feeding rates (*e.g.,* Beauchamp and Livoreil, 1997; Fritz *et al.,* 2002; Purser and Radford, 2011). In addition, chronic disturbance can cause population declines through reduction of fitness (*e.g.,* decline in body condition) and subsequent reduction in reproductive success, survival, or both (*e.g.,* Harrington and Veitch, 1992; Daan *et al.,* 1996; Bradshaw *et al.,* 1998). However, Ridgway *et al.* (2006) reported that increased vigilance in bottlenose dolphins exposed to sound over a 5-day period did not cause any sleep deprivation or stress effects.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (24-hour cycle). Disruption of such functions resulting from reactions to stressors such as sound exposure are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al.,* 2007). Consequently, a behavioral response lasting less than 1 day and not recurring on subsequent days is not considered particularly severe unless it could directly affect reproduction or survival (Southall *et al.,* 2007). Note that there is a difference between multi-day substantive (*i.e.,* meaningful) behavioral reactions and multi-day anthropogenic activities. For example, just because an activity lasts for multiple days does not necessarily mean that individual animals are either exposed to activity-related stressors for multiple days or, further, exposed in a manner resulting in sustained multi-day substantive behavioral responses.

Stress Response

An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (*e.g.,* Moberg, 2000, Selye, 1950). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

Neuroendocrine stress responses often involve the hypothalamus-pituitary-adrenal system. Virtually all neuroendocrine functions that are affected by stress—including immune competence, reproduction, metabolism, and behavior—are regulated by pituitary hormones. Stress-induced changes in the secretion of pituitary hormones have been implicated in failed reproduction, altered metabolism, reduced immune competence, and behavioral disturbance (*e.g.,* Moberg, 1987, Blecha, 2000). Increases in the circulation of glucocorticoids are also equated with stress (Romano *et al.,* 2004).

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and ''distress'' is the cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments for both laboratory and free-ranging animals (*e.g.,* Holberton *et al.,* 1996, Hood *et al.,* 1998, Jessop *et al.,* 2003, Krausman *et al.,* 2004, Lankford *et al.,* 2005). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Romano *et al.,* 2002b, Fair and Becker, 2000) and, more rarely, studied in wild populations (*e.g.,* Romano *et al.,* 2002a). For example, Rolland *et al.* (2012) found that noise reduction from reduced vessel traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. In addition, Lemos *et al.* (2022) observed a correlation between higher levels of fecal glucocorticoid metabolite concentrations (indicative of a stress response) and vessel traffic in gray whales. These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as ''distress.'' In addition, any animal experiencing TTS would likely also experience stress responses (National Research Council, 2005), however distress is an unlikely result of these projects based on observations of marine mammals during previous, similar projects in the area.

Masking

Sound can disrupt behavior through masking, or interfering with, an animal's ability to detect, recognize, or discriminate between acoustic signals of interest (*e.g.,* those used for intraspecific communication and social interactions, prey detection, predator avoidance, navigation) (Richardson *et al.,* 1995). Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher intensity, and may occur whether the sound is natural (*e.g.,* snapping shrimp, wind, waves, precipitation) or anthropogenic (*e.g.,* pile driving, shipping, sonar, seismic exploration) in origin. The ability of a noise source to mask biologically important sounds depends on the characteristics of both the noise source and the signal of interest (*e.g.,* signal-to-noise ratio, temporal variability, direction), in relation to each other and to an animal's hearing abilities (*e.g.,* sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age or TTS hearing loss), and existing ambient noise and propagation conditions. Masking of natural sounds can result when human activities produce high levels of background sound at frequencies important to marine mammals. Conversely, if the background level of underwater sound is high (*e.g.* on a day with strong wind and high waves), an anthropogenic sound source would not be detectable as far away as would be possible under quieter conditions and would itself be masked.

Airborne Acoustic Effects

There are no known pinniped haulouts near the project location. Therefore, it is unlikely that pinnipeds would be taken by exposure to in-air noise during the open water season. While there is a chance that a pinniped could swim by the construction site with its head out of the water during on-land construction such as pile driving, and be taken by Level B harassment, the likelihood of that occurring is so low as to be discountable. Additionally, there is a small chance that an individual animal could haul out in an area that is not a normal haulout site, but the chance of that occurring is also discountable. Further, if AGDC must work during their contingency period, they will begin pile driving prior to March 1 (see Proposed Mitigation Measures), so we would not expect ringed seals to build their lairs close enough to the project site to be taken by in-air sound during the contingency period, other than potentially by building their lair in an alternate location due to construction noise.

While the presence of non-acoustic stressors could affect pinnipeds, a pinniped in the water that is close enough to be disturbed by a non-acoustic (*i.e.,* visual) stressor is likely to have already been counted as taken due to in-water noise from activities occurring in the water. As noted above, while there is a chance that a pinniped could swim by the construction site with its head out of the water, or haul out in an area that is not a normal haulout site, and be taken by Level B harassment due to non-acoustic stressors, it is so unlikely as to be considered discountable. Therefore, while a pinniped could be taken due to disturbance from in-air or non-acoustic stressors during construction, we would expect very few of these takes, if any. Further, any such takes would be within the margin of error in the take estimate and their potential effects fully considered in the analysis.

In-air stressors and non-acoustic stressors, such as the physical presence of land-based equipment and personnel, are not expected to affect cetaceans, given that cetaceans are present only in the water at some distance from shore and the activity and remain under water the majority of the time, and therefore are not expected to be exposed to these stressors. While AGDC may use barges to stage land-based equipment during some activities, these barges would be stationary, and at the project site where the water is extremely shallow (less than 14.2 ft. (4.3 m) at West Dock); therefore, we do not expect bowhead whales to occur close enough to the barge or equipment to be disturbed by its presence. Given the rare occurrence of beluga whales within the barrier islands, as evidenced by Block 1a ASAMM survey data, we expect the potential for beluga whales to be disturbed by barges to be so low as to be discountable. (Block 1a encompasses the area between the shoreline and the barrier islands, including Prudhoe Bay. ASAMM reports include just one beluga whale was observed in survey Block 1a in 2018.) We also do not expect gray whales to occur close enough to the barge or equipment to be disturbed by its presence, as gray whales rarely occur within the barrier islands, as also evidenced by Block 1A ASAMM surveys.

Given the factors above, we do not believe that authorization of incidental take resulting from airborne sound is warranted, and airborne sound is not discussed further.

Marine Mammal Habitat Effects

AGDC's construction activities could have localized, temporary impacts on marine mammal habitat by increasing in-water sound pressure levels, disturbing benthic habitat, and increased turbidity. Construction activities are of short duration and would likely have temporary impacts on marine mammal habitat through increases in underwater sound. Increased noise levels may affect acoustic habitat (see masking discussion above) and adversely affect marine mammal prey in the vicinity of the project area (see discussion below). During vibratory pile driving, elevated levels of underwater noise would ensonify the area where both fish and mammals may occur and could affect foraging success. Additionally, marine mammals may avoid the area during construction; any displacement due to noise is expected to be temporary and is not expected to result in long-term effects to the individuals or populations.

Additionally, winter construction activities, including through-ice surveying and through-ice grading could potentially disturb ice habitat, as ice will be cut and removed to facilitate grading the seafloor. Work is expected to begin immediately after the ice becomes grounded, which typically occurs in the work area on or before February 1. These activities could affect available ringed seal habitat, however, ringed seal density is low in areas with water depths less than 10 ft (3 meters) (Moulton *et al.,* 2005), and the grounded ice conditions suitable for construction activities are not preferred habitat for ringed seals. Additionally, winter construction activities would begin prior to March 1, further reducing the potential for disturbance to ringed seal birth lairs.

In-Water Construction Effects on Potential Foraging Habitat

Potential prey (*i.e.,* fish) may avoid the immediate area due to the temporary loss of this foraging habitat during pile driving activities. The duration of fish avoidance of this area after pile driving stops is unknown, but we anticipate a rapid return to normal recruitment, distribution and behavior. Any behavioral avoidance by fish of the disturbed area would still leave large areas of fish and marine mammal foraging habitat in the nearby vicinity.

Additionally, a small amount of seafloor habitat will be disturbed as a result of pile driving, gravel deposition, screeding, and other seabed preparation. Benthic infauna abundance and diversity are very low in this area, likely due to the shallow water depth (<16 ft (5 m)), run-off from adjacent rivers, and ice related stress (Carey *et al.,* 1984). Freezing and thawing sea ice and river runoff during the summer melting season significantly affect the coastal water mass characteristics and decrease the salinity. River outflow and coastal erosion also transport significant amounts of suspended sediments. Sea ice pressure ridges scour and gouge the seafloor and move sediments, creating natural, seasonal disruptions of the seafloor. These factors result in a less than favorable habitat for benthic organisms in the activity area. Bottom disturbance is a natural and frequent occurrence in this nearshore region resulting in benthic communities with patchy distributions (Carey *et al.,* 1984). Given the low nearshore densities of benthic prey items, we do not expect screeding, pile driving, or related construction activities to have significant impacts on marine mammal foraging habitat. Additionally, installation of the new DH4 and barge bridge abutments will cover the associated seafloor; however, the total seafloor area affected from installing the structures is a very small area compared to the vast foraging area available to marine mammals in the Beaufort Sea, particularly given the limited prey expected to be in the West Dock area.

In addition to ensonification and seafloor disturbance, a temporary and localized increase in turbidity near the seafloor would occur immediately surrounding the area where piles are installed and removed, and where screeding and seabed preparation will take place. The screeding process redistributes seabed materials to create a flat even seafloor surface without the need for excavation or disposal of materials. Screeding would occur each summer immediately prior to the arrival of the first cargo barge, and would likely increase turbidity in the immediate area around West Dock. Turbidity and sedimentation rates are naturally high in this region due to ice scouring and gouging of the seafloor and significant amounts of suspended sediments from river outflow and coastal erosion.

Therefore, the additional turbidity resulting from screeding activities is not anticipated to have a significant impact. The sediments on the sea floor will also be disturbed during pile driving; however, like during screeding, sediment suspension will be brief and localized and is unlikely to measurably affect marine mammals or their prey in the area. In general, turbidity associated with pile installation is localized to about a 25-ft (7.6 m) radius around the pile (Everitt *et al.,* 1980). Cetaceans are not expected to be close enough to the project pile driving areas to experience effects of turbidity, and any pinnipeds are able to easily avoid localized areas of turbidity. Therefore, the impact from increased turbidity levels is expected to be discountable to marine mammals. Furthermore, pile driving and removal at the project site would not obstruct movements or migration of marine mammals. Impacts to potential foraging habitat are expected to be temporary and minimal based on the short duration of activities.

In-Water Construction Effects on Potential Prey

Numerous fish and invertebrate species occur in Prudhoe Bay and the Beaufort Sea and could be affected by the construction activities that would produce continuous (*i.e.,* vibratory pile driving) and impulsive (*i.e.,* impact pile driving) sounds. Fish react to sounds that are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving on fish, although several are based on studies in support of large, multiyear bridge construction projects (*e.g.,* Popper and Hastings, 2009, Scholik and Yan, 2001, Scholik and Yan, 2002). Sound pulses at received levels of 160 dB may cause subtle changes in fish behavior. SPLs of 180 dB may cause noticeable changes in behavior (Pearson *et al.,* 1992, Skalski *et al.,* 1992). SPLs of sufficient strength have been known to cause injury to fish and fish mortality.

The most likely impact to fish from pile driving activities at the project site would be temporary behavioral avoidance of the area. The duration of fish avoidance of this area after pile driving stops is unknown, but as noted above, a rapid return to normal recruitment, distribution and behavior is anticipated.

In addition to fish, prey sources such as marine invertebrates could potentially be impacted by noise stressors as a result of the proposed activities. However, most marine invertebrates' ability to sense sounds is limited. Invertebrates appear to be able to detect sounds (Pumphrey, 1950; Frings and Frings, 1967) and are most sensitive to low-frequency sounds (Packard *et al.,* 1990; Budelmann and Williamson, 1994; Lovell *et al.,* 2005; Mooney *et al.,* 2010). Data on response of invertebrates such as squid, another marine mammal prey species, to anthropogenic sound is more limited (de Soto, 2016; Sole *et al.,* 2017). Data suggest that cephalopods are capable of sensing the particle motion of sounds and detect low frequencies up to 1–1.5 kHz, depending on the species, and so are likely to detect airgun noise (Kaifu *et al.,* 2008; Hu *et al.,* 2009; Mooney *et al.,* 2010; Samson *et al.,* 2014). Sole *et al.* (2017) reported physiological injuries to cuttlefish in cages placed at-sea when exposed during a controlled exposure experiment to low-frequency sources (315 Hz, 139 to 142 dB *re 1*m Pa^2 and 400 Hz, 139 to 141 dB *re 1*m Pa^2). Fewtrell and McCauley (2012) reported squids maintained in cages displayed startle responses and behavioral changes when exposed to seismic airgun sonar (136–162 *re 1*m Pa^2·s). Jones *et al.* (2020) found that when squid (*Doryteuthis pealeii*) were exposed to impulse pile driving noise, body pattern changes, inking, jetting, and startle responses were observed and nearly all squid exhibited at least one response. However, these responses occurred primarily during the first eight impulses and diminished quickly, indicating potential rapid, short-term habituation.

Cephalopods have a specialized sensory organ inside the head called a statocyst that may help an animal determine its position in space (orientation) and maintain balance (Budelmann, 1992). Packard *et al.* (1990) showed that cephalopods were sensitive to particle motion, not sound pressure, and Mooney *et al.* (2010) demonstrated that squid statocysts act as an accelerometer through which particle motion of the sound field can be detected (Budelmann, 1992). Auditory injuries (lesions occurring on the statocyst sensory hair cells) have been reported upon controlled exposure to low-frequency sounds, suggesting that cephalopods are particularly sensitive to low-frequency sound (Andre *et al.,* 2011; Sole *et al.,* 2013). Behavioral responses, such as inking and jetting, have also been reported upon exposure to low-frequency sound (McCauley *et al.,* 2000; Samson *et al.,* 2014). Squids, like most fish species, are likely more sensitive to low frequency sounds and may not perceive mid- and high-frequency sonars.

With regard to potential impacts on zooplankton, McCauley *et al.* (2017) found that exposure to airgun noise resulted in significant depletion for more than half the taxa present and that there were two to three times more dead zooplankton after airgun exposure compared with controls for all taxa, within 1 km (0.6 mi) of the airguns. However, the results of this study are inconsistent with a large body of research that generally finds limited spatial and temporal impacts to zooplankton as a result of exposure to airgun noise (*e.g.,* Dalen and Knutsen, 1987; Payne, 2004; Stanley *et al.,* 2011). Most prior research on this topic, which has focused on relatively small spatial scales, has showed minimal effects (*e.g.,* Kostyuchenko, 1973; Booman *et al.,* 1996; Sætre and Ona, 1996; Pearson *et al.,* 1994; Bolle *et al.,* 2012).

Notably, a more recent study produced results inconsistent with those of McCauley *et al.* (2017). Researchers conducted a field and laboratory study to assess if exposure to airgun noise affects mortality, predator escape response, or gene expression of the copepod *Calanus finmarchicus* (Fields *et al.,* 2019). There were no sublethal effects on the escape performance or the sensory threshold needed to initiate an escape response at any of the distances from the airgun that were tested. Whereas McCauley *et al.* (2017) reported an SEL of 156 dB at a range of 509–658 m (1,670–2,159 ft), with zooplankton mortality observed at that range, Fields *et al.* (2019) reported an SEL of 186 dB at a range of 25 m (82 ft), with no reported mortality at that distance.

As noted above, due to the limited presence of benthic invertebrates in the West Dock area, we do not expect screeding and seafloor preparation activities to result in a significant loss of benthic prey availability, particularly in comparison to the vast foraging area available to marine mammals in the Beaufort Sea.

In summary, given the short daily duration of sound associated with individual pile driving events and the relatively small areas being affected, pile driving activities associated with the proposed action are not likely to have a permanent, adverse effect on any fish or invertebrate habitat, or populations of fish or invertebrate species. Thus, we conclude that impacts of the specified activity are not likely to have more than short-term adverse effects on any prey habitat or populations of prey species. Further, any impacts to marine mammal habitat are not expected to result in significant or long-term consequences for individual marine mammals, or to contribute to adverse impacts on their populations.

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 NMFS' consideration of "small numbers," the negligible impact determinations, and impacts on subsistence uses.

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).

Proposed takes would primarily be by Level B harassment, as vibratory and impact pile driving has the potential to result in disruption of behavioral patterns for individual marine mammals. There is some potential for AUD INJ (Level A harassment) to result from impact pile driving, primarily for phocids, due to the size of the Level A harassment zones and the difficulty in being detected by observers. Auditory injury is unlikely to occur to cetaceans. The proposed mitigation and monitoring measures are expected to minimize the severity of the taking to the extent practicable.

As described previously, no serious injury or mortality is anticipated or proposed to be authorized for this activity. Below we describe how the proposed take numbers are estimated.

For acoustic impacts, generally speaking, we estimate take by considering: (1) acoustic criteria above which NMFS believes the best available science indicates marine mammals will likely be behaviorally harassed or incur some degree of AUD INJ; (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 Criteria

NMFS recommends the use of acoustic criteria 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 AUD INJ of some degree (equated to Level A harassment). We note that the criteria for AUD INJ, as well as the names of two hearing groups, have been recently updated (NMFS 2024) as reflected below in the Level A Harassment section.

Level B Harassment—Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source or exposure context (*e.g.,* frequency, predictability, duty cycle, duration of the exposure, signal-to-noise ratio, distance to the source), the environment (*e.g.,* bathymetry, other noises in the area, predators in the area), and the receiving animals (hearing, motivation, experience, demography, life stage, depth) and can be difficult to predict (*e.g.,* Southall *et al.,* 2007, 2021, Ellison *et al.,* 2012). Based on what the available science indicates and the practical need to use a threshold based on a metric that is both predictable and measurable for most activities, NMFS typically uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS generally predicts that marine mammals are likely to be behaviorally harassed in a manner considered to be Level B harassment when exposed to underwater anthropogenic noise above root-mean-squared pressure received levels (RMS SPL) of 120 dB (referenced to 1 micropascal (re 1 μPa)) for continuous (*e.g.,* vibratory pile driving, drilling) and above RMS SPL 160 dB re 1 μPa for non-explosive impulsive (*e.g.,* seismic airguns) or intermittent (*e.g.,* scientific sonar) sources. Generally speaking, Level B harassment take estimates based on these behavioral harassment thresholds are expected to include any likely takes by 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.

AGDC's proposed construction activity includes the use of continuous (vibratory pile driving) and impulsive (impact pile driving) sources, and therefore the RMS SPL thresholds of 120 and/or 160 dB re 1 μPa are applicable.

Level A harassment—NMFS' Updated Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0) (Updated Technical Guidance, 2024) identifies dual criteria to assess 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). AGDC's proposed construction includes the use of impulsive (impact pile driving) and non-impulsive (vibratory pile driving) sources.

The 2024 Updated Technical Guidance criteria include both updated thresholds and updated weighting functions for each hearing group. The thresholds are provided in table 7. 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 7—THRESHOLDS IDENTIFYING THE ONSET OF AUDITORY INJURY

Hearing group	AUD INJ onset acoustic thresholds * (received level)	
	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	*Cell 1:* $L_{pk,flat}$: 222 dB; $L_{E,LF,24h}$: 183 dB	*Cell 2:* $L_{E,LF,24h}$: 197 dB.
High-Frequency (HF) Cetaceans	*Cell 3:* $L_{pk,flat}$: 230 dB; $L_{E,HF,24h}$: 193 dB	*Cell 4:* $L_{E,HF,24h}$: 201 dB.
Very High-Frequency (VHF) Cetaceans	*Cell 5:* $L_{pk,flat}$: 202 dB; $L_{E,VHF,24h}$: 159 dB	*Cell 6:* $L_{E,VHF,24h}$: 181 dB.
Phocid Pinnipeds (PW) (Underwater)	*Cell 7:* $L_{pk,flat}$: 223 dB; $L_{E,PW,24h}$: 183 dB	*Cell 8:* $L_{E,PW,24h}$: 195 dB.
Otariid Pinnipeds (OW) (Underwater)	*Cell 9:* $L_{pk,flat}$: 230 dB; $L_{E,OW,24h}$: 185 dB	*Cell 10:* $L_{E,OW,24h}$: 199 dB.

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

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 1 µPa^{2}s. In this table, criteria are abbreviated to be more reflective of International Organization for Standardization (ISO) standards (ISO 2017; ISO 2020). The subscript "flat" is being included to indicate peak sound pressure are flat weighted or unweighted within the generalized hearing range of marine mammals underwater (*i.e.,* 7 Hz to 165 kHz). The subscript associated with cumulative sound exposure level criteria 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 criteria 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 criteria will be exceeded.

Ensonified Area

In this section 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.

The sound field in the project area is the existing background noise plus additional construction noise from the proposed project. Marine mammals are expected to be affected via sound generated by the primary components of the project (*i.e.,* pile driving and removal). The maximum (underwater) area ensonified above the thresholds for behavioral harassment referenced above is 67.7 km^2 (26.1 mi^2), and the calculated distance to the farthest behavioral isopleth is approximately 4.6 km (2.9 mi).

The project includes vibratory pile installation and removal and impact pile installation. Source levels for these activities are based on reviews of measurements of the same or similar types and dimensions of piles available in the literature. Source levels for each pile size and activity are presented in table 8. Source levels for vibratory installation and removal of piles of the same diameter are assumed to be the same.

TABLE 8—SOUND SOURCE LEVELS FOR PILE DRIVING

Pile size and type	Hammer type	Source level (at 10 m)			Literature source
		Peak (dB re 1 µPa)	RMS (dB re 1 µPa)	SEL (dB re 1 µPa2 sec)	
11.5-inch (29.2 cm) H-Pile.	Impact	200	183	170	Caltrans (2015) (12-inch (30 cm) H-Pile).
14-inch (122 cm) H-Pile.	Impact	200	183	170	Caltrans (2015) (12-inch (30 cm) H-Pile).
	Vibratory	165	150	150	Caltrans (2015) (12- to 16-inch (30 to 40 cm) H-Pile).
48-Inch (122 cm) Pipe Pile.	Impact	213	192	179	Caltrans (2020) (40–48-inch (102 to 122 cm) Steel Pipe Pile).
Sheet Piles (19.69 and 25-inch (50.01 and 64 cm).	Vibratory	175	160	160	Caltrans (2015) (AZ Steel Sheet).

—Transmission loss (TL) is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition topography. The general formula for underwater TL is:

$$TL = B * Log10 (R_1/R_2),$$

where

TL = transmission loss in dB;
B = transmission loss coefficient;
R_1 = the distance of the modeled SPL from the driven pile; and
R_2 = the distance from the driven pile of the initial measurement.

Absent site-specific acoustical monitoring with differing measured transmission loss, a practical spreading value of 15 is used as the transmission loss coefficient in the above formula. Project and site-specific transmission loss data for the Prudhoe Bay portion of AGDC's AK LNG project are not available; therefore, the default coefficient of 15 is used to determine the distances to the Level A and Level B harassment thresholds. However, as discussed in the Proposed Monitoring and Reporting section, AGDC would conduct SSV for pile driving. Following the analysis of SSV results, AGDC may propose adjusted shutdown zones and revised Level A and Level B harassment zones (for the purpose of monitoring and reporting) for NMFS review and approval. All Level B harassment isopleths are reported in table 10. The maximum (underwater) area ensonified above the thresholds for behavioral harassment is 67.7 km^2 (42 mi^2).

The ensonified area associated with Level A harassment is more technically challenging to predict due to the need to account for a duration component. Therefore, NMFS developed an optional User Spreadsheet tool to accompany the 2024 Updated Technical Guidance that can be used to relatively simply predict an isopleth distance for use in conjunction with marine mammal density or occurrence to help predict potential takes. We note that because of some of the assumptions included in the methods underlying this optional tool, we anticipate that the resulting isopleth estimates are typically going to be overestimates of some degree, which may result in an overestimate of potential take by Level A harassment. However, this optional tool offers the best way to estimate isopleth distances when more sophisticated modeling methods are not available or practical. For stationary sources, such as pile driving, the optional User Spreadsheet tool predicts the distance at which, if a marine mammal remained at that distance for the duration of the activity, it would be expected to incur AUD INJ. Inputs used in the optional User Spreadsheet tool are provided in table 9, and the resulting estimated isopleths, are reported in table 10.

TABLE 9—USER SPREADSHEET INPUT PARAMETERS USED FOR CALCULATING LEVEL A HARASSMENT ISOPLETHS

[Source levels provided in table 8]

Pile size	Piles per day [a]	Strikes per pile	Duration to drive pile (min)	Weighting factor adjustment
Impact				
11.5-inch (29.2 cm) H-Pile	[b] 26.09	1,000	N/A	2
14-inch (36 cm) H-Pile	4	1,000	N/A	2
48-inch (122 cm) Pipe Pile	1.25	1,000	N/A	2
Vibratory				
14-inch (36 cm) H-Pile	8	N/A	15	2.5
19.69-inch (50.01 cm) Sheet Pile	[b] 15.24	N/A	18.9	2.5
25-inch (64 cm) Sheet Pile	12	N/A	24	2.5

[a] These estimates include contingencies for weather, equipment, workflow, and other factors that affect the number of piles per day, and are assumed to be a maximum anticipated per day. Given that AGDC plans to pile drive up to 24 hours per day, it is appropriate to assume that the number of piles installed within the 24-hour period may not be a whole number.

[b] These averages assume that AGDC will drive 11.5-inch (29.2-cm) H-piles and sheet piles at a rate of 25 ft (7.6 m) per day.

TABLE 10—CALCULATED DISTANCES TO LEVEL A AND LEVEL B HARASSMENT ISOPLETHS

Pile type	Hammer type	Level A harassment zone (m)			Level B harassment zone (m)
		LF cetaceans	HF cetaceans	Phocids	
11.5-Inch (29.2 cm) H-Pile	Impact	1,190	152	1,057	342
14-Inch (36 cm) H-Pile	Impact	341	44	303	341
	Vibratory	3	1	4	1,000
48-Inch (122 cm) Pipe Pile	Impact	625	80	555	1,359
19.69-Inch (50.01 cm) Sheet Pile	Vibratory	23	9	29	4,642
25-Inch (64 cm) Sheet Pile	Vibratory	23	9	29	4,642

Level A harassment zones are typically smaller than Level B harassment zones. However, in rare cases such as the impact pile driving of the 11.5-inch (29.2 cm) H-piles herein, the calculated Level A harassment isopleth is greater than the calculated Level B harassment isopleth for LF cetaceans and phocids. Calculation of Level A harassment isopleths include a duration component, which in the case of impact pile driving, is estimated through the total number of daily strikes and the associated pulse duration. For a stationary sound source such as impact pile driving, we assume here that an animal is exposed to all of the strikes expected within a 24-hour period. Calculation of a Level B harassment zone does not include a duration component. Depending on the duration included in the calculation, the calculated Level A harassment isopleths can be larger than the calculated Level B harassment isopleth for the same activity.

Marine Mammal Occurrence

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

From 2011–2019, each fall and summer, NMFS and BOEM conducted aerial surveys in the Arctic, the ASAMM surveys (Clarke *et al.,* 2012, 2013, 2014, 2015a, 2017a, 2017b, 2018, 2019, and 2020). The goal of these surveys was to document the distribution and relative abundance of bowhead, gray, right, fin, and beluga whales and other marine mammals in area of potential oil and natural gas exploration, development, and production activities in the Alaskan Beaufort and northeastern Chukchi Seas. In 2020 and 2021, NMFS conducted aerial surveys during the fall in the western Beaufort Sea focusing on Point Barrow to Prudhoe Bay (Brower *et al.,* 2022a, Brower *et al.,* 2022b). These surveys were conducted within blocks that overlay the Beaufort and Chukchi Seas oil and gas lease sale areas offshore of Alaska (Figure 16 in AGDC's application), and provide sighting data for bowhead, gray, and beluga whales. NMFS used data from these surveys from 2011–2021 to estimate seasonal densities of cetaceans in the project area. During the summer, NMFS observed for marine mammals on effort for 15,127 km from 2011–2019 and 15,968 km during the fall from 2011 to 2021. We note that the proposed Prudhoe Bay portion of the AK LNG project is in ASAMM survey block 1; the inshore boundary of this block terminates at the McClure Island group. It was not until 2016 that on-effort surveys began inside the McClure Island group (including Prudhoe Bay) since bowhead whales, the focus of the surveys, are not likely to enter this area, given its shallow depth. However, no bowheads and only one beluga whale have been observed in block 1a (including Prudhoe Bay). Therefore, the density estimates provided here are likely an overestimate because they rely on offshore surveys where marine mammals are more likely to be present.

Cetaceans

AGDC calculated summer and fall density estimates for bowhead whale, gray whale, and beluga whale by dividing the average number of whales observed per km of transect effort in ASAMM Block 1 by two times the effective strip width (ESW) to encompass both sides of the transect line (whales per km/(2xESW) (table 11 and table 12). The ESW for bowhead whale, gray whale, and beluga whale from the Aero Commander aircraft are 1.15 km (0.71 mi), 1.2 km (0.75 mi), and 0.613 km (0.38 mi), respectively (Ferguson and Clarke, 2013). Fall sighting data is available from 2011–2021. Surveys were not conducted in the summer of 2020 and 2021, and therefore sighting data for the summer is only available from 2011–2019. Additionally, although beluga whale sighting data was available from 2011–2013, it was only summarized by depth zone, rather than by survey block. Therefore, and given that more recent data is available, data from 2011–2013 was excluded for beluga whales.

Table 11 and table 12, below, include calculated summer and fall densities for each species. All resulting densities are expected to be overestimates for the AK LNG analysis because the data are based on sighting effort outside of the barrier islands and these species rarely occur within the barrier islands. To estimate take of each cetacean species, AGDC used the higher density in an effort to avoid underestimating take. Therefore, NMFS estimated take of gray whale and beluga whale using the summer densities, 0.00003 and 0.009 whales/km² respectively, and estimated take using the fall density of 0.017 whales/km² for bowhead whale.

As noted in the Description of Marine Mammals in the Area of Specified Activities section, we do not expect cetaceans to be present during AGDC's winter/spring contingency pile driving period.

TABLE 11—SUMMER SIGHTING AND DENSITY DATA

Year	Transect (km)	Number sightings		
		Bowhead whale	Gray whale	Beluga whale
2011	346	1	0	[a] N/A
2012	1493	5	0	[a] N/A
2013	1582	21	0	[a] N/A
2014	1393	17	0	13
2015	1262	15	0	37
2016	1914	97	1	0
2017	3003	8	0	4
2018	2491	2	0	6
2019	1643	6	0	63
Total	15127	172	1	123
Encounter Rate (whales/km)		0.01137	0.00007	[b] 0.01051
Density (whales/km²) [c]		0.0049	0.00003	0.009

[a] Beluga sighting data from 2011 to 2013 was only summarized by depth zone, rather than by survey block. Therefore, data from 2011–2013 was excluded for beluga whales.

[b] Encounter rate for beluga whales was calculated using total transect from 2014–2019, which was 11,706 km.

[c] Density was calculated with the formula of Encounter rate/(2xESW). ESW for each species are as follows: Bowhead whale: 1.15, Gray whale: 1.201, Beluga whale: 0.614 (Ferguson and Clarke, 2013).

TABLE 12—FALL SIGHTING AND DENSITY DATA

Year	Transect (km)	Number sightings		
		Bowhead whale	Gray whale	Beluga whale
2011	1130	24	0	[a] N/A
2012	1696	17	0	[a] N/A
2013	1121	21	0	[a] N/A
2014	1538	79	1	9
2015	1663	17	0	3
2016	2360	23	0	1
2017	1803	255	0	0
2018	1535	69	0	0
2019	2055	45	0	1
2020	379	54	0	0
2021	668	15	0	3

TABLE 12—FALL SIGHTING AND DENSITY DATA—Continued

Year	Transect (km)	Number sightings		
		Bowhead whale	Gray whale	Beluga whale
Total	15968	619	1	17
Encounter Rate (whales/km)		0.03877	0.00006	[b] 0.00141
Density (whales/km^2) [c]		0.017	0.00002	0.00115

[a] Beluga sighting data from 2011 to 2013 was only summarized by depth zone, rather than by survey block. Therefore, data from 2011–2013 was excluded for beluga whales.
[b] Encounter rate for beluga whales was calculated using total transect from 2014–2021, which was 12,021 km.
[c] Density was calculated with the formula of Encounter rate/(2xESW). ESW for each species are as follows: Bowhead whale—1.15, Gray whale—1.201, Beluga whale—0.614 (Ferguson and Clarke, 2013).

Ringed Seal

Ringed seals are the most abundant species in the project area. They haul out on the ice to molt between late May and early June, and spring aerial surveys provide the most comprehensive density estimates available. Spring surveys are expected to provide the best ringed seal density information, as the greatest percentage of seals have abandoned their lairs and are hauled out on the ice (Kelly *et al.,* 2010). Spring aerial surveys conducted in the central Beaufort Sea from 1996–1999 (Frost *et al.,* 2004) and around the West Dock area as part of industry monitoring programs for the construction of the Northstar production facility from 1997–2002 (Richardson and Williams, 2003, Richardson and Williams, 2002) were considered the best data available to determine spring density in the area of the project. The yearly densities from these spring aerial surveys were averaged to determine spring ringed seal density. The average observed spring ringed seal density from this monitoring effort was 0.634 seals/km^2 (table 13). While more recent ASAMM surveys have been conducted in the project area, these surveys did not identify observed pinnipeds to species, and therefore these data are not included.

TABLE 13—RINGED SEAL DENSITIES ESTIMATED USING SPRING AERIAL SURVEYS CONDUCTED FROM 1996 TO 2002

Survey year	Density (seals/km^2)	Reference
1996	0.81	Frost *et al.* (2004).
1997	0.73	Frost *et al.* (2004).
1997	0.43	Richardson and Williams (2002).
1998	0.64	Frost *et al.* (2004).
1998	0.39	Richardson and Williams (2002).
1999	0.87	Frost *et al.* (2004).
1999	0.63	Richardson and Williams (2002).
2000	0.47	Richardson and Williams (2002).
2001	0.54	Richardson and Williams (2002).
2002	0.83	Richardson and Williams (2003).
Average	0.634	

In order to generate a summer density, as AGDC expects that the majority of their work will occur during the summer, we first begin with the spring density. Summer densities in the project area are expected to significantly decrease as ringed seals range considerable distances during the open water season. Summer density was estimated to be 50 percent of the spring density (0.634 seals/km^2), resulting in a summer density of 0.317 seals/km^2. Given that AGDC will only pile drive during the winter if they are unable to complete the work during the summer and fall open water season, NMFS estimated ringed seal takes using the summer density of 0.317 seals/km^2 rather than winter.

Spotted Seal

The spotted seal occurs in the Beaufort Sea in small numbers during the summer open water period. At the onset of freeze-up in the fall, spotted seals return to the Chukchi Sea and then Bering Sea to spend the winter and spring. As such, AGDC does not expect spotted seals to occur in the project area during AGDC's winter/spring contingency period, and NMFS concurs.

Only a few of the studies referenced in calculating the ringed seal densities also include data for spotted seals. Given the limited spotted seal data, NMFS expects that relying on this data may result in an underestimate, and that it is more appropriate to calculate the spotted seal density as a percentage of ringed seal density. Therefore, summer spotted seal density was estimated as a percentage of ringed seal sightings observed during monitoring during seismic exploration in this area from 2006–2008 (Funk *et al.,* 2010). Spotted seals comprised 34.8 percent of ringed seal sightings during these monitoring efforts. Therefore, summer spotted seal density was calculated as 34.8 percent of the ringed seal density of 0.317 seals/km^2, which results in an estimated spotted seal summer density of 0.11 seals/km^2. This density will be used to estimate take of spotted seal.

Bearded Seal

The majority of bearded seals spend the winter and spring in the Chukchi and Bering Seas; however, some remain in the Beaufort Sea year-round. A reliable population estimate for the bearded seal stock is not available, and occurrence in the Beaufort Sea is less known than in the Bering Sea. Spring aerial surveys conducted as part of industry monitoring for the Northstar production facility provide limited sighting numbers from 1999–2002 (Richardson and Williams, 2002, 2003).

Bearded seals occur in the Beaufort Sea more frequently during the open water season, rather than other parts of the year. They prefer water farther offshore. Only a few of the studies referenced in calculating the ringed seal densities also include data for bearded seals. Given the limited bearded seal data, NMFS expects that relying on this data may result in an underestimate, and that it is more appropriate to calculate the bearded seal density as a proportion of the ringed seal density. Therefore, summer bearded seal density was estimated as a percentage of ringed seal sightings observed during seismic exploration in this area from 2006–2008 (Funk *et al.,* 2010). Bearded seals comprised 21.3 percent of ringed seal sightings during these monitoring efforts. Therefore, summer bearded seal density was calculated as 21.3 percent of the summer ringed seal density of 0.317 seals/km^2, which results in an estimated bearded seal density of 0.068 seals/km^2. NMFS used this density to estimate take of bearded seal.

As noted in the Description of Marine Mammals in the Area of Specified Activities section, bearded seals could potentially occur in the project area during AGDC's winter/spring contingency period. However, we would expect very few, if any bearded seals to be present during this time. In consideration of this species presence information and AGDC's plan to conduct most construction during the open-water season, NMFS estimated take of bearded seal using the summer 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.

To estimate take by Level A and Level B harassment, AGDC multiplied the area (km^2) estimated to be ensonified above the Level A or Level B harassment (table 14 and table 15) thresholds for each species, respectively, for pile driving (and removal) of each pile size and hammer type by the duration (days) of that activity in that season by the seasonal density for each species (number of animals/km^2). NMFS generally concurs with, and has adopted this method, with the exception of the estimated duration of the activity (described below). NMFS also used updated densities as described in the *Marine Mammal Occurrence* section.

TABLE 14—LEVEL B HARASSMENT ZONES

Pile type	Area (km^2)
Impact	
11.5-Inch (29.2 cm) H-Pile	0.37
14-Inch (36 cm) H-Pile	0.37
48-Inch (122 cm) Pipe Pile	5.8
Vibratory	
14-Inch (36 cm) H-Pile	3.14
Sheet Piles (19.69- and 25-Inch (50.01 and 64 cm))	67.7

TABLE 15—LEVEL A HARASSMENT ZONES

Pile type	Area (km^2)		
	LF cetacean	HF cetacean	Phocids
Impact			
11.5-Inch (29.2 cm) H-Pile	4.45	0.073	3.51
14-Inch (36 cm) H-Pile	0.37	0.006	0.29
48-Inch (122 cm) Pipe Pile	1.23	0.020	0.97
Vibratory			
14-Inch (36 cm) H-Pile	0.00	0.00	0.00
19.69-Inch (50.01 cm) Sheet Pile	0.00	0.00	0.00
25-Inch (64 cm) Sheet Pile	0.00	0.00	0.00

NMFS calculated take using summer densities for all species except for bowhead whale (tables 16, 17, 18, and 19). For bowhead whales, NMFS conservatively calculated take using the fall density.

TABLE 16—MARINE MAMMAL DENSITIES USED TO ESTIMATE TAKE

Species	Density (animals/km^2)	Season
Bowhead whale	0.017	Fall (September–October).
Gray whale	0.00003	Summer (July–August).
Beluga whale	0.009	Summer (July–August).
Ringed seal	0.317	Summer (July–August).
Spotted seal	0.11	Summer (July–August).
Bearded seal	0.068	Summer (July–August).

TABLE 17—ESTIMATED TAKE BY LEVEL B HARASSMENT BY SPECIES, PILE SIZE AND TYPE, AND INSTALLATION/REMOVAL METHOD

Activity	Estimated duration (days)	Bowhead whale	Gray whale	Beluga whale	Ringed seal	Spotted seal	Bearded seal
DH4							
Anchor Pile (11.5-inch (29.2 cm) H-Pile) (impact)	9	0.06	0.00	0.03	1.04	0.36	0.22
25-inch (64 cm) Sheet Pile (Vibratory)	36	41.43	0.07	21.93	772.54	268.07	165.72
Mooring Dolphins (48-inch (122 cm) Pipe Pile) (Impact)	10	0.99	0.00	0.52	18.39	6.38	3.95
Spud Piles (14-inch (36 cm) H-Pile) (vibratory)	12	0.64	0.00	0.34	11.95	4.15	2.56
South Bridge Abutment							
Dock Face (19.69-inch (50.01 cm) Sheet Pile) (Vibratory)	23	26.47	0.05	14.01	493.57	171.27	105.88
Tailwall (19.69-inch (50.01 cm) Sheet Pile) (Vibratory)	23	26.47	0.05	14.01	493.57	171.27	105.88
Anchor Pile (14-inch (36 cm) H-Pile) (Impact)	1	0.01	0.00	0.00	0.12	0.04	0.02
North Bridge Abutment							
Dock Face (19.69-inch (50.01 cm) Sheet Pile) (Vibratory)	24	27.62	0.05	14.62	515.03	178.72	110.48
Tailwall (19.69-inch (50.01 cm) Sheet Pile) (Vibratory)	17	19.56	0.03	10.36	364.81	126.59	78.26
Anchor Pile (14-inch (36 cm) H-Pile (Impact)	1	0.01	0.00	0.00	0.12	0.04	0.02
Barge Bridge							
Mooring Dolphins (48-inch (122 cm) Pipe Pile) (Impact)	4	0.39	0.00	0.21	7.36	2.55	1.58
Spud Pile (14-inch (36 cm) H-Pile) (vibratory)	4	0.21	0.00	0.11	3.98	1.38	0.85
Total	164	143.86	0.25	76.16	2,682.48	930.83	575.42
75 percent of Total	123	107.89	0.19	57.12	2,011.86	698.12	431.57
Proposed take by Level B Harassment		108	*2	57	2,012	698	432

* Although 75 percent of the calculated total is 0.2, in order to account for group size (Clarke *et al.,* 2017b), NMFS is proposing to authorize two takes by Level B harassment of gray whale.

AGDC expects that construction will likely be completed during the open-water construction season. AGDC calculated that the construction would require approximately 164 days of in-water work; however, this estimate does not take into account that different pile types would be installed on the same day, therefore reducing the total number of pile driving days. Therefore, NMFS expects that the take calculation using the method described above overestimates take. Taking into consideration the number of calendar days, construction occurring 6 days per week, and no work occurring on days during the whaling season, there are 123 days in the months of July through October on which the work is expected to occur (75 percent of the 164 days estimated by AGDC). As such, for each species, NMFS is proposing to authorize 75 percent of the take estimate calculated using the estimated 164 work days (except for Level A harassment take of bowhead whales and beluga whales, and Level B harassment of gray whales as noted below).

NMFS recognizes that AGDC may work outside of this period in their February to April contingency period; however, we expect that if AGDC works during the contingency period, it would be because of construction delays (and therefore, days on which they did not work) during their planned open water work season. Additionally, we recognize that ringed seals may be present in ice lairs during the contingency period. However, AGDC must initiate pile driving prior to March 1, as described in the Proposed Mitigation section. Initiating pile driving before March 1 is expected to discourage seals from establishing birthing lairs near pile driving. As such, we expect that this measure will eliminate the potential for physical injury to ringed seals during this period. Therefore, NMFS expects that the take estimates described herein are reasonable even if AGDC must pile drive during their contingency period.

TABLE 18—ESTIMATED TAKE BY LEVEL A HARASSMENT BY SPECIES, PILE SIZE AND TYPE, AND INSTALLATION/REMOVAL METHOD

Activity	Estimated duration (days)	Bowhead whale	Gray whale	Beluga whale	Ringed seal	Spotted seal	Bearded seal
DH4							
Anchor Pile (11.5-inch (29.2 cm) H-Pile) (impact)	9	0.68	0.00	0.01	10.01	3.47	2.15
25-inch (64 cm) Sheet Pile (Vibratory)	36	0.00	0.00	0.00	0.03	0.01	0.01

TABLE 18—ESTIMATED TAKE BY LEVEL A HARASSMENT BY SPECIES, PILE SIZE AND TYPE, AND INSTALLATION/REMOVAL METHOD—Continued

Activity	Estimated duration (days)	Bowhead whale	Gray whale	Beluga whale	Ringed seal	Spotted seal	Bearded seal
Mooring Dolphins (48-inch (122 cm) Pipe Pile) (Impact)	10	0.21	0.00	0.00	3.07	1.06	0.66
Spud Piles (14-inch (36 cm) H-Pile) (vibratory)	12	0.00	0.00	0.00	0.00	0.00	0.00
South Bridge Abutment							
Dock Face (19.69-inch (50.01 cm) Sheet Pile) (Vibratory)	23	0.00	0.00	0.00	0.02	0.01	0.00
Tailwall (19.69-inch (50.01 cm) Sheet Pile) (Vibratory)	23	0.00	0.00	0.00	0.02	0.01	0.00
Anchor Pile (14-inch (36 cm) H-Pile) (Impact)	1	0.01	0.00	0.00	0.09	0.03	0.02
North Bridge Abutment							
Dock Face (19.69-inch (50.01 cm) Sheet Pile) (Vibratory)	24	0.00	0.00	0.00	0.02	0.01	0.00
Tailwall (19.69-inch (50.01 cm) Sheet Pile) (Vibratory)	17	0.00	0.00	0.00	0.01	0.00	0.00
Anchor Pile (14-inch (36 cm) H-Pile (Impact)	1	0.01	0.00	0.00	0.09	0.03	0.02
Barge Bridge							
Mooring Dolphins (48-inch (122 cm) Pipe Pile) (Impact)	4	0.08	0.00	0.00	1.23	0.43	0.26
Spud Pile (14-inch (36 cm) H-Pile) (vibratory)	4	0.00	0.00	0.00	0.00	0.00	0.00
Total	164	0.99	0.00	0.01	14.59	5.06	3.13
75 percent of Total	123	0.74	0.00	0.01	10.95	3.8	2.35
Proposed Take by Level A Harassment		*0	0	0	11	4	2

*NMFS does not expect bowhead whales to occur within the Level A harassment zone, and therefore NMFS does not propose to authorize take by Level A harassment of bowhead whales.

NMFS does not expect bowhead whales to occur within the Level A harassment zones due to the shallow waters (approximately 19ft in depth at the isopleth), lack of historic sightings, and required mitigation. Waters less than 15 ft deep are considered too shallow to support these whales, and in three decades of aerial surveys by BOEM (ASAMM), no bowhead whale has been recorded in waters less than 16.4 ft (5 m) deep (Clarke and Ferguson 2010). Further, no bowhead whales have been observed during ASAMM surveys in Block 1a (which encompasses the Level A harassment zone) when surveys were conducted in Block 1a (Clarke *et al.,* 2017b, 2018, 2019, 2020). Shutdown requirements within designated shutdown zones for LF cetaceans (which includes bowhead whales) are expected to prevent take by Level A harassment given the large size and visibility of bowhead whales. Additionally, Level A harassment zones are calculated with an associated duration component based on the amount of pile driving expected to occur within one day. Therefore, a marine mammal is not taken by Level A harassment instantaneously when it enters the Level A harassment zone, and given the shallow depths, even if a bowhead did enter the Level A harassment zone, we would not expect it to remain within the zone for a long enough period to incur AUD INJ. Therefore, we do not expect Level A harassment of bowhead whales to occur, and are not proposing to authorize Level A harassment take of bowheads.

The likelihood of gray whales occurring in the Level A harassment zone is extremely low, as evidenced by the very low densities included in the *Marine Mammal Occurrence* section and the lack of modeled takes in table 18. Further, shutdown requirements within designated shutdown zones for LF cetaceans (which include gray whales) are expected to prevent take by Level A harassment given the large size and visibility of gray whales, and the duration component associated with the Level A harassment zones. Even if a gray whale did enter the Level A harassment zone, NMFS would not expect it to remain within the zone for a long enough period to incur AUD INJ, given the mitigation and visibility. Therefore, NMFS does not expect Level A harassment of gray whales to occur, and is not proposing to authorize Level A harassment take of the gray whale.

The largest Level A harassment zone for high-frequency cetaceans (including the beluga whale) extends 152 m from the source during impact driving of the 11.5-inch (29.2 cm) H pile (table 10). Considering the small size of the Level A harassment zones, and the low likelihood that a beluga whale will occur in this area, as evidenced by the estimated values in table 18, Level A harassment is unlikely to occur. Additionally, AGDC is planning to implement a 150 m shutdown zone during this activity. NMFS expects shutdown zones (table 20) will eliminate the potential for Level A harassment take of the beluga whale. Therefore, NMFS is not proposing to authorize takes of beluga whale by Level A harassment.

TABLE 19—TAKE BY LEVEL A AND LEVEL B HARASSMENT, BY SPECIES AND STOCK, PROPOSED FOR AUTHORIZATION

Species	Stock	Level A harassment	Level B harassment	Total instances of take	Stock abundance	Percent of stock
Bowhead Whale	Western Arctic	0	108	108	15,227	0.7
Gray Whale	Eastern North Pacific	0	2	2	26,960	0.01
Beluga Whale *	Beaufort Sea	0	57	57	39,258	0.145
	Eastern Chukchi	0	57	57	13,305	0.43
Ringed Seal	Arctic	11	2,012	2,023	UND	N/A
Spotted Seal	Bering	4	698	702	461,625	0.15
Bearded Seal	Beringia	2	432	434	UND	N/A

* Beluga whales in the project area are likely to be from the Beaufort Sea stock. However, NMFS has conservatively attributed all takes to each stock for their analysis.

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 North Slope Borough (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. Bowhead whale harvest (percent of total marine mammal harvest), harvest weight, and percent of households using bowhead whale are presented in table 25 of AGDC's application.

Due to ongoing oil and gas activities in the North Slope, the Department of the Interior funded a subsistence mapping study conducted in 2004 (Stephen R. Braund & Associates, 2010) and the Alaska LNG Project funded a study, conducted by the Alaska Department of Fish & Game in 2014 (Brown *et al.,* 2016), to characterize and describe the harvests and uses of wild foods by subsistence communities on the North Slope. These are the most recent and applicable studies that NMFS is aware of and will be used to describe the harvests of Utqiaġvik, Kaktovik, and Nuiqsut 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 occurs 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 in any community (Stephen R. Braund & Associates, 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). We do not expect the planned activities at the AK LNG project site to affect beluga whale subsistence harvests, as none are expected.

Gray whale harvests were not reported by any of the communities surveyed by Stephen R. Braund & Associates (2010) or Brown *et al.* (2016) in any of the survey years, and therefore are not included as an important subsistence species and are not further discussed.

Utqiaġvik

Utqiaġvik (formerly known as Barrow) is the northernmost community on the North Slope and the United States, and is approximately 320 km (200 mi) northwest of Prudhoe 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 area impacted by activities considered in this authorization. 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 construction would mostly include limited, temporary behavioral disturbances of seals, however, some slight AUD INJ within the lower frequencies associated with pile driving is possible. Additionally a small number of takes of bowhead whales, by Level B harassment only, are predicted to occur in the vicinity of AGDC'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 construction activities, and the planned mitigation measures. Additionally, no serious injury or mortality of marine mammals is expected or proposed for authorization, and the activities are not expected to have any impacts on reproductive or survival rates of any marine mammal species.

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 occur seaward of the project area and westward in the fall.

Bowhead whale hunters report traveling between Camden Bay to the west and Nuvagapak Lagoon to the east. This range does not include the project area impacted by the activities analyzed for this IHA. The small number of takes of bowhead whales, by Level B harassment only, predicted to occur in the vicinity of AGDC's activity are not expected to have any impacts on the fitness of any bowhead whales. Further, we do not expect construction 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 the predicted Level B harassment isopleths. 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 Kaktovik hunting area during the eastbound migration, and during the westbound migration, a bowhead exposed to construction 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. Please refer to AGDC's application for additional information.

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 Native Alaskans 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 (Stephen R. Braund & Associates 2010). In 2006, 7 people (18 percent of survey respondents) indicated that they had recently hunted for ringed seals in Kaktovik (Stephen R. Braund & Associates, 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 (Stephen R. Braund & Associates, 2010). Ringed seal hunting typically peaks between March and August but continues into September, as well (Stephen R. Braund & Associates. 2010). Although residents reported hunting ringed seals up to approximately 30 mi (48 km) from shore, the highest numbers of overlapping use areas generally occur within a few miles from shore (Stephen R. Braund & Associates, 2010). The total use area for ringed seal from 1995–2006 encompassed approximately 2,139 mi^2 (5540 km^2). Harvest of ringed seals by Kaktovik hunters does not typically occur to the west of Camden Bay. Additionally, impacts to ringed seals are expected to include temporary behavioral disturbances and some slight PTS within the lower frequencies associated with pile driving. Serious injury or mortality of ringed seals is not anticipated from the planned 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, AK LNG project activities are not expected to impact Kaktovik ringed seal harvests.

Kaktovik hunters harvested 126 pounds of spotted seals in 1992 (ADF&G Community Subsistence Information System (CSIS); retrieved and analyzed August 15, 2018). Spotted seals were not reported harvested in 2006 survey interviews conducted in Nuiqsut (Stephen R. Braund & Associates, 2010).

Hunting of bearded seals is more common than that of ringed seals by Kaktovik residents, with 68 percent of respondents reporting the hunting of bearded seals over the previous 10 years (Stephen R. Braund & Associates, 2010). Kaktovik bearded seal hunting occurs along the coast as far west as Prudhoe Bay and as far east as the United States/Canada border (Stephen R. Braund & Associates, 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; Stephen R. Braund & Associates 2010). Between 1994–2003, 29 bearded seals were taken in Kaktovik. Bearded seal hunting activities, like ringed seal, begin in March, peaking in July and August, and then conclude in September (Stephen R. Braund & Associate, 2010).

The community of Kaktovik is approximately 100 (direct) mi (161 km) from the planned project at Prudhoe Bay; subsistence activities for these communities primarily occur outside of the project construction area and the associated Level A and Level B harassment zones. The planned construction and use of improvements to West Dock would occur in Prudhoe Bay, adjacent to existing oil and gas infrastructures, and in an area that is not typically used for subsistence other than extremely limited bearded seal hunting by residents of Kaktovik.

Because of the distance from Kaktovik, and Kaktovik's very limited use of waters offshore of Prudhoe Bay, and because the planned activities would occur in an already-developed area, 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 planned 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 construction activities, and the planned mitigation measures. Impacts to marine mammals would mostly include limited, temporary behavioral disturbances of seals, with limited AUD INJ associated with pile driving. Serious injury or mortality of marine mammals is not anticipated from the planned activities, and the activities are not expected to have any impacts on reproductive or survival rates of any marine mammal species. Therefore, we do not discuss Kaktovik's subsistence activities further.

Nuiqsut

The proposed construction 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, spanning 16,322 mi^2 (km^2) across the central Arctic Slope (see Figure 19 of AGDC's application, 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). The community of Nuiqsut uses subsistence-harvest areas adjacent to the proposed construction area; however, West Dock is not a common hunting area, nor is it visited regularly by Nuiqsut subsistence hunters primarily because of its industrial history.

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 included 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. Seal subsistence use areas of Nuiqsut from 1995 through 2006 are depicted in Figure 21 of AGDC's application.

Ringed seals are an important subsistence resource for Native Alaskans living in communities along the Beaufort Sea coast. Nuiqsut residents commonly harvest ringed seal in the Beaufort Sea during the summer months (Stephen R. Braund & Associates, 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; Stephen R. Braund & Associates, 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 (Stephen R. Braund & Associates, 2010). In 2006, 12 people (36 percent of survey respondents) indicated that they had recently hunted for ringed seals in Nuiqsut (Stephen R. Braund & Associates, 2010).

Nuiqsut bearded seal use 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 12 mi (19 km) northwest of West Dock. 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 (Stephen R Braund & Associates, 2010). Harvest locations in 1973–2011 and GPS tracks of 2001–2011 whaling efforts are shown in Figure 19 of AGDC'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 (Stephen R. Braund & Associates, 2010). Pile driving would not occur during Nuiqsut whaling.

Nuiqsut subsistence hunting crews operating from Cross Island have harvested three to four bowhead whales per year (Bacon *et al.,* 2009; Galginaitis 2014). In 2014, the Alaska Eskimo Whaling Commission (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 (Stephen R. Braund & Associates, 2010). In 2016, Nuiqsut whaling crews harvested four bowhead whales (Suydam *et al.,* 2017).

Nuiqsut is 70 mi (112 km) away from the proposed project, and is likely to be the community that has the greatest potential to experience any impacts to subsistence practices. The primary potential for AK LNG project impacts to Nuiqsut's subsistence use of marine mammals is associated with barge activity, which could interfere with summer seal and fall bowhead whale hunting (Alaska LNG 2016). Barge activity is beyond the scope of this IHA, but noise associated with barging could deflect bowhead whales as they migrate through Nuiqsut's fall whaling grounds or cause temporary disturbances of seals, making successful harvests more difficult. Barge traffic would occur from July through September. Although barging activities would not cease during Nuiqsut's fall bowhead whale hunting activities, the AGDC plans to keep vessels landward of Cross Island during the August 25–September 15 period, avoiding the high use areas offshore of the island during the entire whaling season in most years and greatly reducing the impact to the whale hunt (Alaska LNG 2016, 2017).

Pile driving associated with construction at West Dock could also affect subsistence hunting of bowhead whales, as the Level B harassment zones extend up to 4.6 km from the pile driving site for some pile and hammer type combinations. As such, AGDC will not pile drive during the Nuiqsut whaling season (see Proposed Mitigation). AGDC has consulted with AEWC and NSB on mitigation measures to limit impacts (Alaska LNG 2016), and has continued to provide formal and informal project updates to these groups, as recently as July 2023.

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 construction activities, and the proposed mitigation measures. Impacts to marine mammals would mostly include limited, temporary behavioral disturbances of seals, however, some PTS is possible. 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 West Dock construction and primary seal hunting areas, and proposed mitigation during the Nuiqsut bowhead whale hunt.

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 Marine Mammals and Their Habitat

In addition to the measures described later in this section, AGDC will employ the following mitigation measures:

- Conduct briefings between construction supervisors and crews and the marine mammal monitoring team prior to the start of all pile driving activity and when new personnel join the work, to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures;
- For in-water construction, heavy machinery activities other than pile driving, if a marine mammal comes within 10 m (33 ft), operations shall cease and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions;
- For those marine mammals for which take by Level B harassment has not been requested, in-water pile installation/removal will shut down immediately when it is safe to do so if such species are observed within or entering the Level B harassment zones; and
- If take reaches the authorized limit for an authorized species, pile installation will be stopped as these species approach the Level B harassment zone to avoid additional take.

Aircraft

Aircraft will transit at an altitude of 457 m (1,500 ft) or higher, to the extent practicable, while maintaining Federal Aviation Administration flight rules (*e.g.,* avoidance of cloud ceiling, *etc.*), excluding takeoffs and landing. If flights must occur at altitudes less than 457 m (1,500 ft) due to environmental conditions, aircraft must make course adjustments, as needed, to maintain at least a 457 m (1,500 ft) separation from all observed marine mammals. Helicopters (if used) must not hover or circle above marine mammals. A minimum transit altitude is expected to reduce the potential for disturbance to marine mammals from transiting aircraft.

The following mitigation measures would apply to AGDC's in-water construction activities. In addition, AGDC would be required to implement all mitigation measures described in the reinitiated biological opinion.

Establishment of Shutdown Zones

AGDC will establish shutdown zones for all pile driving and removal activities. The purpose of a shutdown zone is generally to define an area within which shutdown of the activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area). Shutdown zones will vary based on the activity type and marine mammal hearing group (see table 20). A minimum shutdown zone of 10 m will be required for all in-water construction activities to avoid physical interaction with marine mammals. The largest shutdown zones are generally for low frequency cetaceans as shown in table 20. In this instance, the largest shutdown zone for low frequency cetaceans is 1,200 m. AGDC expects that they will be able to effectively observe phocids at distance up to 500 m, large cetaceans at 2–4 km, and belugas at 2–3 km.

TABLE 20—SHUTDOWN ZONES DURING PILE INSTALLATION AND REMOVAL

Pile size	Hammer type	LF cetaceans	HF cetaceans	Phocids
11.5-inch (29.2 cm) H-Pile	Impact	1,200	150	500
14-inch (36 cm) H-Pile	Impact	350	50	300
	Vibratory	10	10	10
48-inch (122 cm) Pipe Pile	Impact	650	100	500
Sheet Piles	Vibratory	20	10	30
Screeding		215		

The placement of protected species observers (PSOs) during all pile driving and removal activities (described in detail in the Proposed Monitoring and Reporting section) will ensure that the entire shutdown zone is visible during pile installation. If visibility degrades to where the PSO determines that they cannot effectively monitor the entire shutdown zone during pile driving, the applicant may continue to drive the pile section that was being driven to its target depth when visibility degraded to unobservable conditions, but will not drive additional sections of pile until conditions improve. Pile driving may continue during low light conditions to allow for the evaluation of night vision devices (NVDs) and infrared (IR) sensing devices, as described in the Proposed Monitoring and Reporting section, below.

If marine mammals are observed within the shutdown zone, pile driving will be delayed until the animal has moved out of the shutdown zone, either verified by an observer or after 15 minutes (small cetaceans and pinnipeds) or 30 minutes (large cetaceans) has elapsed without redetection of the animal. If a marine mammal approaches or enters the shutdown zone during pile driving, the activity will be halted. If a species for which authorization has not been granted, or a species which has been granted but the authorized takes are met, is observed approaching or within the Level B harassment zone during pile driving or tension anchoring, the activity will be halted. Pile driving may resume after the animal has moved out of and is moving away from the shutdown zone or after at least 15 or 30 minutes (described above) has passed since the last observation of the animal.

Pre- and Post-Activity Monitoring

Monitoring must take place from 30 minutes prior to initiation of pile driving activities (*i.e.,* pre-clearance monitoring) through 30 minutes post-completion of pile driving. Prior to the start of daily in-water construction activity, or whenever a break in pile driving of 30 minutes or longer occurs, PSOs must observe the shutdown and monitoring zones for a period of 30 minutes. If a marine mammal is observed within the shutdown zone, a soft-start (described below) cannot proceed until the animal has left the zone or has not been observed for 15 minutes (pinnipeds) or 30 minutes (cetaceans). When a marine mammal for which Level B harassment take is authorized is present in the Level B harassment zone, activities may begin and Level B harassment take will be recorded. Pile driving or removal activities can begin if the entire Level B harassment zone is not visible at the start of construction, as long as the shutdown zone may be effectively monitored, as described above.

Monitoring for Level A and Level B Harassment

AGDC will monitor for marine mammals in the Level B harassment zones and Level A harassment zones, to the extent practicable, and throughout the area as far as visual monitoring can occur. Monitoring enables observers to be aware of, and communicate the presence of marine mammals in the project area outside the shutdown zone and thus prepare for a potential shutdown of activity should the animal enter the shutdown zone. Placement of PSOs on elevated structures on West Dock will allow PSOs to observe phocids within the Level A and Level B harassment zones, to an estimated distance of 500 m. Due to the large Level A and Level B harassment zones (table 10), PSOs will not be able to effectively observe the entire zones during all activities for all species. All marine mammals observed within the visible portion of the harassment zones will be recorded. AGDC will also conduct acoustic monitoring as described in the Proposed Monitoring and Reporting section, below.

Nighttime Monitoring

PSOs will use NVDs and IR for nighttime and low visibility monitoring. AGDC will select devices for monitoring, and will test the devices to determine the efficacy of the monitoring equipment and technique. For a detailed explanation of AGDC's plan to test the NVDs and IR equipment, please see AGDC's Marine Mammal Monitoring and Mitigation Plan, available online at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable.* (Please note that AGDC will not assess object detection at distance intervals using buoys as stated in the Marine Mammal Monitoring and Mitigation Plan. Rather, they will test object detection on land using existing landmarks at known distances from PSOs, such as road signs.)

Soft Start

Soft-start procedures provide additional protection to marine mammals by providing warning and/or giving marine mammals a chance to leave the area prior to the hammer operating at full capacity. For impact pile driving, contractors will be required to provide an initial set of three strikes from the hammer at reduced energy, followed by a 30-second waiting period, then two subsequent three-strike sets before initiating continuous driving. Soft start will be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer.

Pile Driving During Contingency Period

In the event that AGDC must continue pile driving or removal during their contingency period (February–April), AGDC must begin pile driving before March 1, the approximate onset of ice seal lairing season. Initiating pile driving before March 1 is expected to discourage seals from establishing birthing lairs near pile driving. Discouraging seals from establishing birthing lairs near pile driving will likely reduce potential instances of take by Level B harassment by reducing the likelihood of an individual seal occurring within the Level B harassment zone on multiple occasions, which would be far more likely if seals established lairs within the zone. Additionally, a subsistence advisor would survey areas within a buffer zone of DH4 where water depth is greater than 10 ft (3 m) to identify potential ringed seal structures before activity begins. Construction crews must avoid identified ice seal structures by a minimum of 500 ft (150 m). NMFS expects these measures to prevent physical interaction between seals and construction equipment.

AGDC does not plan to use a bubble curtain or other sound attenuation devices, and NMFS concurs that sound attenuation devices are not appropriate for this project. Conditions in the project area mean that the common practice of using bubble curtains for attenuation is not appropriate, as the water is shallow and therefore sound source level reductions are likely to be minimal (Caltrans, 2020), effective deployment of a bubble curtain system is logistically challenging in shallow water, and there is potential for sea ice. Sound attenuation devices have not been used for pile driving in this area during past projects.

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 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.

AGDC provided a draft Plan of Cooperation to NMFS on March 27, 2019 and submitted revised versions on February 7, 2020, November 16, 2020, December 21, 2020, January 4, 2021, and, most recently, June 20, 2024. The POC outlines AGDC's extensive coordination with subsistence communities that may be affected by the AK LNG 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. AGDC will continue coordination with subsistence communities throughout the project duration, and will develop a Communications Plan in coordination with subsistence groups, as described below and in the POC. The POC is a living document and has been updated throughout the project review and permitting process. The proposed IHA includes a requirement stating that AGDC 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.*

AGDC continues to document its communications with the North Slope subsistence communities, as well as the substance of its communications with subsistence stakeholder groups, and has developed mitigation measures that include measures suggested by community members as well as industry standard measures. AGDC 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 Arctic Safety Waterways Committee meetings. Local communities and subsistence groups identified by AGDC are listed in the POC. AGDC will develop a Communication Plan and will implement this plan before initiating construction operations to coordinate activities with local subsistence users, as well as Village Whaling Captains' Associations, to minimize 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. A project informational mailer with a request for community feedback (traditional mail, email, phone) will be sent to community members prior to construction. Following the construction season, AGDC intends to have a post-season co-management meeting with the commissioners and committee heads to discuss results of mitigation measures and outcomes of the preceding season. The goal of the post-season meeting is to build upon the knowledge base, discuss successful or unsuccessful outcomes of mitigation measures, and possibly refine plans or mitigation measures if necessary.

The AEWC works annually with industry partners to develop a Conflict Avoidance Agreement (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. AGDC is required to enter the CAA for the construction year by an order from the FERC.

AGDC will not conduct pile driving during the Nuiqsut whaling season in an effort to eliminate effects on the availability of bowhead whales for subsistence hunting that could occur as a result of project noise. Nuiqsut whaling is approximately August 25–September 15, though the exact dates may change.

Barging activities could potentially impact Nuiqsut's fall bowhead whale hunt and possibly other marine mammal harvest activities in the Beaufort Sea. As mentioned previously, barging activities are beyond the scope of this proposed IHA, and no take is expected to occur as a result of barging activities. However, NMFS proposes to require AGDC to limit barges to waters landward of Cross Island during the Nuiqsut whaling season (approximately August 25–September 15, though the exact dates may change) in an effort to avoid any potential impacts on subsistence uses. AGDC 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 described above in the Effects of Specified Activities on Subsistence Uses of Marine Mammals section, AGDC's construction activities at West Dock 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, AGDC will continue to meet with subsistence groups, including the Ice Seal Committee, as described in the POC.

Based on our evaluation of the applicant's proposed measures, 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, 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.

Visual Monitoring

Marine mammal monitoring must be conducted in accordance with the Marine Mammal Monitoring Plan, available online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable.* Marine mammal monitoring during pile driving and removal must be conducted by NMFS-approved PSOs in a manner consistent with the following:

• PSOs must be independent of the activity contractor (for example, employed by a subcontractor) and have no other assigned tasks during monitoring periods.

• At least one PSO must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization;

• Other PSOs may substitute other relevant experience, education (degree in biological science or related field), or training for prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization. PSOs may also substitute Alaska native traditional knowledge for experience (NMFS recognizes that PSOs with traditional knowledge may also have prior experience, and therefore be eligible to serve as the lead PSO).

• Where a team of three or more PSOs is required, a lead observer or monitoring coordinator must be designated. The lead observer must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization; and

• PSOs must be approved by NMFS prior to beginning any activity subject to this IHA.

PSOs must have the following additional qualifications:

• Ability to conduct field observations and collect data according to assigned protocols;

• Experience or training in the field identification of marine mammals, including the identification of behaviors;

• Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;

• Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammal observed; dates and times when in-water construction activities were conducted; dates, times, and reason for implementation of mitigation (or why mitigation was not implemented when required); and marine mammal behavior; and

• Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary.

At least two PSOs will be present during all pile driving/removal activities. PSOs will have an unobstructed view of all water within the shutdown zones. PSOs will observe as much of the Level A and Level B harassment zone as possible. PSO locations are as follows:

• Dock Head 4—During impact pile driving at DH4, two PSOs must be stationed to view toward the east, north, and west of the sweater treatment plan. During vibratory pile driving at DH4, two PSOs must monitor from each PSO location (four PSOs); and

• Barge Bridge—During work at the barge bridge, two PSOs must be stationed at the north end of the bridge.

PSOs will be stationed on elevated platforms at DH4, and on the elevated bridge during work at the barge bridge. They will possess the equipment described in the Marine Mammal Monitoring and Mitigation Plan, including NVDs during nighttime monitoring. However, during the primary construction season, nighttime on the North Slope will be brief. Given the elevated PSO sites and equipment, AGDC expects that they will be able to effectively observe phocids at distances up to 500 m, large cetaceans at 2–4 km, and belugas at 2–3 km, however, PSOs will not be able to effectively observe the entire area of the Level A harassment (seals only) or Level B harassment zones during all pile driving activities.

PSOs will begin monitoring three days prior to the onset of pile driving and removal activities and continue through three days after completion of the pile driving and removal activities. PSOs will monitor 24 hours per day, even during periods when construction is not occurring. In addition, observers shall record all incidents of marine mammal occurrence, regardless of distance from activity, and shall document any behavioral reactions in concert with distance from piles being driven or removed. Pile driving activities include the time to install or remove a single pile or series of piles, as long as the elapsed between uses of the pile driving equipment is no more than 30 minutes.

Acoustic Monitoring

Acoustic monitoring, to be conducted for purposes of measuring sound source levels and sound propagation, must be conducted in accordance with accepted methodology as described in an Acoustic Monitoring Plan, which AGDC must develop after its contractor is selected. The plan must be reviewed by NMFS, the NSB, and the AEWC, and approved by NMFS. AGDC must conduct acoustic monitoring for the number of each pile type and size indicated in the approved plan. AGDC may request that NMFS adjust the shutdown zones and revise the Level A and Level B harassment zones, as appropriate, pending NMFS' review and approval of the results of acoustic monitoring.

AGDC will also conduct passive acoustic monitoring (PAM) for marine mammals. AGDC will deploy three hydrophones during the open-water season to monitor for marine mammals, in accordance with a Marine Mammal Monitoring and Mitigation Plan and Acoustic Monitoring Plan. This PAM is intended to inform the estimate of marine mammals in the Level B harassment zone, given that PSOs are not able to observe the entire zone for all species and activities.

AGDC would deploy the hydrophones as recommended by the Peer Review Panel (PRP), located between the 1,400 m and 4,700 m zones (noting that the 1,400 m zone was updated since the Peer Review Panel report to reflect an updated acoustic analysis (formerly 2,200 m)), as described below, and would adjust the locations as appropriate if the Level B harassment zones are adjusted following sound source verification (SSV) results. AGDC will deploy the PAM recorders three days prior to the start of pile driving and will retrieve them three days after completion of pile driving during the open-water season.

Should construction be required during the contingency period when there will be ice-cover, AGDC will deploy one hydrophone at the end of the open-water season located in between the 1,400 m and 4,700 m zones, perpendicular to the pile driving site. The location must be reviewed by NMFS, the NSB, and the AEWC, and approved by NMFS prior to deployment. Additional hydrophones during the contingency period are not warranted, as we do not expect cetaceans to be present in the area during this time (Citta *et al.,* 2017, Quakenbush *et al.,* 2018), and while ringed seals likely will be present, few, if any, spotted or bearded seals are likely to be present during that time (Bengtson *et al.,* 2005, Lowry *et al.,* 1998, Simpkins *et al.,* 2003).

Reporting

A draft marine mammal monitoring report will be submitted to NMFS within 90 days after the completion of marine mammal and acoustic monitoring or 60 days prior to the issuance of any subsequent IHA for this project, whichever comes first. The report will include an overall description of work completed, a narrative regarding marine mammal sightings, and associated PSO data sheets. Specifically, the report must include:

- Dates and times (begin and end) of all marine mammal monitoring;
- Construction activities occurring during each daily observation period, including precise start and stop time of each type of construction operation mode, how many and what types of piles were driven or removed and by what method (*i.e.,* impact or vibratory);
- Total number of hours during which each construction activity type occurred;
- Total number of hours that PSOs were on duty during each construction activity, and total number of hours that PSOs were on duty during periods of no construction activity;
- Weather parameters and water conditions during each monitoring period (*e.g.,* wind speed, percent cover, visibility, sea state), and number of hours of observation that occurred during various visibility and sea state conditions;
- The number of marine mammals observed, by species and operation mode, relative to the pile location, and if pile driving or removal was occurring at time of sighting;
- The number of marine mammals observed (including periods with no construction);
- Age and sex class, if possible, of all marine mammals observed;
- PSO locations during marine mammal monitoring, including elevation above sea level;
- Distances and bearings of each marine mammal observed to the pile being driven or removed for each sighting (if pile driving or removal was occurring at time of sighting);
- Description of any marine mammal behavior patterns during observation, including direction of travel and estimated time spent within the Level A and Level B harassment zones while the source was active;
- Number of individuals of each species (differentiated by month as appropriate) detected within the Level A and Level B harassment zones;
- Histograms of perpendicular distances to PSO sightings, by species (or species group if sample sizes are small);
- Sighting rates summarized into daily or weekly periods for the before, during, and after construction periods;
- Maps showing visual detections by species and construction activity type.
- Detailed information about any implementation of any mitigation triggered (*e.g.,* shutdowns and delays), a description of specific actions that ensued, and resulting behavior of the animal, if any;
- Description of attempts to distinguish between the number of individual animals taken and the number of incidences of take, such as ability to track groups of individuals;
- An estimation of potential takes, by species, by Level A and Level B harassment based on the number of observed exposures within the Level A and Level B harassment zones and the percentages of the Level A and Level B harassment zones that were not visible;
- Submit all PSO datasheets and/or raw sighting data (in a separate file from the Final Report referenced immediately above).

If no comments are received from NMFS within 30 days, the draft report will constitute the final report. If comments are received, a final report addressing NMFS comments must be submitted within 30 days after receipt of comments.

For the SSV, AGDC's acoustic monitoring report must, at minimum, include the following:

- Hydrophone equipment and methods: Recording device, sampling rate, distance (m) from the pile where recordings were made, depth of recording device(s);
- Type and size of pile being driven, substrate type, method of driving during recordings;
- For impact pile driving: Pulse duration and mean, median, and maximum sound levels (dB re: 1μPa): Cumulative sound exposure level (SELcum), peak sound pressure level (SPLpeak), root-mean-square sound pressure level (SPLrms), and single-strike sound exposure level (SELs-s).
- For vibratory driving/removal: Mean, median, and maximum sound levels (dB re: 1μPa): SPL_{rms}, SELcum, and timeframe over which the sound is averaged.
- Number of strikes (impact) or duration (vibratory) per pile measured, one-third octave band spectrum, power spectral density plot;
- Estimated source levels referenced to 10 m, transmission loss coefficients, and estimated Level A and Level B harassment zones.

For the PAM for marine mammals, AGDC's acoustic monitoring report must, at minimum, include the following:

- Number of marine mammal detections (including species, date and time of detections, and type of pile driving underway during each detection, if applicable);
- Detection rates summarized into daily or weekly periods for the before, during, and after construction periods;
- Received sound levels from pile driving activity;
- The following hydrophone equipment and method information: Recording devices, sampling rate, sensitivity of the PAM equipment, locations of the hydrophones, duty cycle, distance (m) from the pile where recordings were made, depth of recording devices, and depth of water in area of recording devices.

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, the IHA-holder shall report the incident to the Office of Protected Resources, NMFS and to the Alaska Regional Stranding Coordinator as soon as feasible. If the death or injury was clearly caused by the specified activity, the IHA-holder must immediately cease the specified activities until NMFS is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the IHA. The IHA-holder must not resume their activities until notified by NMFS.

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.

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 PRP 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 PRP to review AGDC's Monitoring Plan for the planned project in Prudhoe Bay. NMFS provided AGDC's monitoring plan to the PRP and asked them to answer the following questions:

1. Will the applicant's stated objectives effectively further the understanding of the impacts of their

activities on marine mammals and otherwise accomplish the goals stated below? If not, how should the objectives be modified to better accomplish the goals below?

2. Can the applicant achieve the stated objectives based on the methods described in the plan?

3. Are there technical modifications to the proposed monitoring techniques and methodologies proposed by the applicant that should be considered to better accomplish the objectives?

4. Are there techniques not proposed by the applicant (*i.e.,* additional monitoring techniques or methodologies) that should be considered for inclusion in the applicant's monitoring program to better accomplish the objectives?

5. What is the best way for an applicant to present their data and results (formatting, metrics, graphics, *etc.*) in the required reports that are to be submitted to NMFS (*i.e.,* 90-day report)?

The PRP met in March 2020 and subsequently provided a final report to NMFS containing recommendations that the panel members felt were applicable to AGDC's monitoring plan. The panel concluded that the objectives are appropriate; however, they provided some recommendations to improve AGDC's ability to achieve their stated objectives. The PRP's primary recommendations and comments are summarized and addressed below. The PRP's full report is available on our website at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable.* Given that AGDC's proposed activities have not changed since the PRP reviewed the Monitoring Plan, an additional peer review was not necessary. However, where changes in best available science since the peer review (such as the publication of NMFS 2024) affect aspects of the monitoring plan and NMFS' analysis herein, we have noted those changes, and modified the monitoring requirements that resulted from PRP recommendations, as appropriate, and as described below.

The PRP recommended that AGDC station PSOs on elevated platforms to increase sighting distance. NMFS agrees and proposes to require AGDC to provide elevated monitoring locations for PSOs. The structures would vary depending on the construction location.

The PRP recommended that PSOs focus on scanning the shoreline and water, alternately with visual scans and using binoculars, to detect as many animals as possible rather than following individual animals for any length of time to collect detailed behavioral information. NMFS requires PSOs to document and report the behavior of marine mammals observed within the Level A and Level B harassment zones. While NMFS agrees that PSOs should not document behavior at the expense of detecting other marine mammals, particularly within the shutdown zone, we are asking PSOs to record an estimate of the amount of time that an animal spends in the harassment zone, which is important to help understand the likelihood of incurring AUD INJ (given the duration component of the thresholds) and the severity of behavioral disturbance.

The PRP recommended that the PSOs record visibility conditions at regular intervals (*e.g.,* every five minutes) and as conditions change throughout the day. The panel recommended using either laser range finders or a series of ''landmarks'' at varying distances from each observer. The PRP notes that if AGDC uses landmarks, AGDC could measure the distance to the landmarks on the ground before pile driving or removal begins, and reference these landmarks throughout the season to record visibility. The landmarks could be buildings, signs, or other stationary objects on land that are located at increasing distances from each observation platform. PSOs should record visibility according to the farthest landmark the laser range finder can detect or that the PSO can clearly see. NMFS proposes to require AGDC to record visibility conditions throughout construction; however, NMFS proposes to require PSOs to record visibility every 30 minutes, rather than every 5 minutes, in an effort to minimize distraction from observing marine mammals. PSOs would be equipped with range finders, and will establish reference landmarks on land.

The PRP recommended that AGDC have a designated person on site keeping an activity log that includes the precise start and stop dates and times of each type of construction operation mode. AGDC's field lead PSO would record this information during construction.

The PRP commended AGDC's proposed use and experimentation with NVD and IR technology. The panel noted that there are many devices with a broad range of capabilities that should be thoroughly understood before the experiment is conducted. As described in the *Mitigation for Marine Mammals and their Habitat,* AGDC plans to use and test NVD and IR technology, and AGDC will select the most effective devices based on surveys of experienced PSOs and literature provided by the panel.

The PRP expressed concern about the limited effective visual detection range of the PSOs in comparison with the estimated size of the Level A and Level B harassment zones, including AGDC's ability to shut down at the proposed distances, and AGDC's ability to estimate actual Level A and Level B harassment takes. The panel noted that effective sighting distances are likely 200 m for seals, and 1 km for mysticetes, based on ship-based PSO observations in the Chukchi Sea (LGL *et al.,* 2011). They noted that the effective sighting distance for beluga whales may be greater than 200 m, although visibility would likely decrease in windy conditions with white caps (DeMaster *et al.,* 2001). The panel recommended that AGDC implement real-time PAM to verify the harassment zone sizes, and to improve detection of marine mammals at distances where visual detection probability is limited or not possible. The panel recommended that AGDC begin PAM two to three weeks prior to the start of construction and continue through two to three weeks after construction activities conclude for the season. They recommended archival bottom mounted recorders as an alternative to real-time PAM, but noted that these setups are not as easy to relocate and that data can only be accessed after recovery.

In a related comment, the panel recommended that AGDC report total estimated Level A and Level B harassment takes using two methods. First, the panel recommended that AGDC assume that animal density is uniform throughout the Level B harassment zone and use distance sampling methods, such as Burt *et al.* (2014), based only on the shore-based PSO observations to estimate actual takes by Level B harassment. Second, the PRP recommended that AGDC also use real-time PAM to estimate takes by Level B harassment only in the far field, assuming that each acoustic detection that occurs during pile driving or removal is a Level B harassment take.

NMFS has acknowledged the shorter likely sighting distances (via the potential takes by Level A harassment considered in the analysis) and has included a shutdown zone for phocids during impact pile driving of 500 m, as stated herein (and included in the proposed IHA), which is expected to be visible to PSOs. While this distance is greater than the 200 m estimated by the PRP, shore-based PSOs typically have greater visibility. Additionally, AGDC's

PSOs will observe from elevated locations.

In consideration of the effective sighting distances included in the PRP report, and estimated effective sighting distances from the applicant, NMFS has acknowledged the shorter likely sighting distances (via the potential takes by Level A harassment considered in the analysis) and has included a shutdown zone for phocids of 500 m during impact pile driving of 11.5-in H–Piles 48-inch pile piles, and of (29.2 cm) (122 cm) 300 m for impact pile driving of 14-inch (36 cm) H–piles, both of which are expected to be visible to PSOs. While these distances are greater than the 200 m estimated by the PRP, shore-based PSOs typically have greater visibility. Additionally, AGDC's PSOs will observe from elevated locations.

NMFS does not propose to require AGDC to report Level A and Level B harassment takes using distance sampling methods, as NMFS does not believe that it is appropriate to apply precise distance sampling methods intended for systematic surveys to estimating take numbers in this situation. As noted by the panel, the assumption of uniform density throughout the Level A and Level B harassment zones is not likely appropriate for this project, given varying habitat attributes throughout the zones such as distance from the shore and water depth. The pile driving and removal activities are likely to further affect the distribution within the zones. However, as a simpler alternative to help understand the potential exposures within the unseen area, NMFS proposes to require AGDC to include an estimation of potential takes by Level A and Level B harassment based on the number of observed exposures within the Level A or Level B harassment zone and the percentage of the Level A or Level B harassment zone that was not visible in their final report.

NMFS does not propose to require AGDC to implement real-time PAM (as described below). However, NMFS proposes to require AGDC to conduct SSV at the start of construction, and as appropriate, NMFS may update the Level A and Level B harassment zones and shutdown zones based on the SSV results. Additionally, NMFS proposes to require AGDC to deploy three archival PAM receivers during the open water season to collect data that indicates the presence of marine mammals. As stated previously, the PRP recommended archival bottom mounted recorders as an alternative to real-time PAM, although NMFS proposes to require AGDC to deploy these in stationary locations, rather than relocating the receivers for various construction activities as recommended by the PRP. If NMFS updates the Level B harassment zones following review of the SSV results, the hydrophones may be relocated, as described in AGDC's monitoring plan. AGDC will implement the majority, if not all, of the proposed pile driving and removal during the open water season. Since AGDC would need to deploy the PAM system after ice melt, deploying it two to three weeks before and after the construction period would narrow AGDC's open water work window by at least one month. Additionally, while AGDC's construction is occurring within a limited timeframe, other companies have operations in the area also, which may interfere with the ability to gather baseline data regarding marine mammal presence without interference from other industrial activities. Marine mammals in the project area are migratory, so presence within the work area would change throughout the suggested monitoring period, even if AGDC was not conducting the activity. As such, NMFS proposes to require AGDC to deploy the three archival PAM receivers for three days prior to the start of construction, through construction, and for three days after completion of construction activities. AGDC would deploy the hydrophones in the general locations suggested by the PRP (noting that some zones have been updated since the PRP report) and as described in the *Acoustic Monitoring* section above. If the Level A and Level B harassment zones are updated based on SSV results, the hydrophones may be relocated, as appropriate.

If construction during the contingency period is necessary, AGDC would deploy one overwintering hydrophone at the end of the open-water season for monitoring during the contingency period. Additional hydrophones during the contingency period are not warranted, as we do not expect cetaceans to be present in the area during this time (Quakenbush *et al.,* 2018, Citta *et al.,* 2017) and while ringed seals likely will be present, few, if any, spotted or bearded seals are likely to be present during that time (Bengtson *et al.,* 2005, Lowry *et al.,* 1998, Simpkins *et al.,* 2003). A location for the contingency period hydrophone would be selected closer to construction, and must be reviewed by NMFS, the NSB, and the AEWC, and approved by NMFS prior to deployment.

Real-time PAM might be helpful if there were a limited ability to detect animals using other methods as required to support the implementation of mitigation action, such as shutting down operations at the time that a detection occurs. However, in this instance, visual monitoring by PSOs can adequately detect marine mammals and minimize take by Level A harassment, and the proposed authorization includes take by Level A harassment of ice seals. Further, the operation of real-time PAM is significantly more costly than collecting PAM data for later analyses, as someone would need to monitor the data in real-time, and the PAM buoys would need to be relocated for changes in Level A and Level B harassment zone sizes between various pile sizes and installation or removal methods. Given the limitations described above, and the limited additional detection value added by the addition of real-time PAM in these circumstances, implementation of real-time PAM is not warranted in light of the associated cost and effort.

The PRP also recommended that PSOs observations begin 2–3 weeks prior to construction, continue through the construction season, and continue for 2–3 weeks after the construction season ends. Given that ice conditions in the weeks leading up to the construction period will differ from that during construction (as will ice seal presence), NMFS is proposing to require PSOs to observe from shore during the three days before construction begins, and for three additional days after the construction season ends, rather than 2–3 weeks. During the construction season, NMFS proposes to require PSOs to monitor 24 hours per day, even during periods without construction.

The PRP also made recommendations regarding how AGDC should present their monitoring data and results. Please refer to part V of the report for those suggestions. AGDC would implement the reporting recommendations that do not require PAM as stated in the recommendations. NMFS proposes to require AGDC to conduct the reporting in recommendations i and j (report received sound levels, propagation loss, isopleth distances and sound source levels, as well as sighting and acoustic detection rates summarized into daily or weekly periods for the before, during, and after construction periods). However, NMFS does not propose to require AGDC to include maps showing acoustic detections by species and construction activity type (part of recommendation h), as AGDC does not intend to set the hydrophones up as a localization array, and therefore, the data would not be appropriate for reporting specific locations of marine mammal detections.

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 19, given that many of the anticipated effects of this project 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.

Pile driving and removal activities associated with the project, as outlined previously, have the potential to disturb or temporarily displace marine mammals or, in limited cases, cause auditory injury. Specifically, the specified activities may result in take, in the form of Level A and Level B harassment, from underwater sounds generated from pile driving and removal. Potential takes could occur if individuals of these species are present in zones ensonified above the thresholds for Level A or Level B harassment, identified above, when these activities are underway. While AGDC may pile drive at any time of day (24 hours per day), we do not expect noise-producing pile driving will actually occur at all times during a 24-hour period, given the general construction process, including time for setting up piles for installation.

The takes by Level A and Level B harassment would be due to potential behavioral disturbance, TTS, and AUD INJ. No mortality or serious injury is anticipated given the nature of the activity. Level A harassment is only anticipated for ringed seal, spotted seal, and bearded seal. The potential for Level A harassment is minimized through the construction method and the implementation of the required mitigation (see Proposed Mitigation).

Effects on individuals that are taken by Level B harassment, on the basis of reports in the literature as well as monitoring from other similar activities, will likely be limited to reactions such as increased swimming speeds, increased surfacing time, or decreased foraging (if such activity were occurring) (*e.g.,* Thorson and Reyff, 2006, HDR Inc., 2012, Lerma, 2014, ABR, 2016). Most likely for pile driving, individuals will move away from the sound source and be temporarily displaced from the areas of pile driving, although even this reaction has been observed primarily only in association with impact pile driving, which is just a portion of AGDC's construction. Level B harassment will be reduced to the level of least practicable adverse impact through use of mitigation measures described herein. If sound produced by project activities is sufficiently disturbing, animals are likely to avoid the area while the activity is occurring. While vibratory driving associated with the project may produce sound at distances of many km from the project site, the project site itself is located in an active industrial area, as previously described. Therefore, we expect that animals disturbed by project sound will avoid the area and use more-preferred habitats.

In addition to the expected effects resulting from proposed Level B harassment, we anticipate that ringed seals, spotted seals, and bearded seals may sustain limited Level A harassment in the form of AUD INJ. However, animals that experience AUD INJ will likely only receive minor degradation of hearing capabilities within regions of hearing that align most completely with the frequency range of the energy produced by pile driving, *i.e.* the low-frequency region below 2 kHz, not severe hearing impairment or impairment in the regions of greatest hearing sensitivity. If hearing impairment occurs, it is most likely that the affected animal will lose no more than a few dB in its hearing sensitivity, which in most cases is not likely to meaningfully affect its ability to forage and communicate with conspecifics.

Habitat disturbance and alteration resulting from project activities could have a few highly localized, short-term effects for a few marine mammals; however, the area of affected habitat would be small compared to that available to marine mammal species. The activities may cause some fish to leave the area of disturbance, thus temporarily impacting marine mammals' foraging opportunities in a limited portion of the foraging range. We do not expect pile driving activities to have significant, long-term consequences to marine invertebrate populations. Given the relatively short duration of the activities and the relatively small area of the habitat that may be affected, the impacts to marine mammal habitat, including fish and invertebrates, are not expected to cause significant or long-term negative consequences to marine mammals or to populations of fish or invertebrate species.

A small portion of the project area overlaps with habitat that was previously designated as ringed seal critical habitat, but subsequently vacated by the U.S. District Court for the District of Alaska. Although this portion of habitat located within the project area contains features necessary for ringed seal formation and maintenance of subnivean birth lairs, basking and molting, and foraging, these features also exist outside of the project area and should be available to ringed seals. AGDC's February to April pile driving contingency period overlaps with the period when ringed seals are constructing subnivean lairs, giving birth, and nursing pups. As discussed in the Proposed Mitigation section, in the unlikely event that they need to work during the contingency period, AGDC would be required to begin construction prior to March 1 when ringed seals are known to begin constructing lairs. As such, we expect that ringed seals would construct their lairs away from the pile driving operations, therefore minimizing disturbance and avoiding any potential for physical injury to seals in lairs. We expect that AGDC would complete the majority, if not all of the pile driving during the open water season, so any pile driving that did remain could likely be completed in the earlier portion of the contingency period, further reducing the potential for impacts to ringed seals while lairing or pupping.

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 proposed for authorization;
- The relatively small number of takes by Level A harassment, for seals only, are anticipated to result only in slight AUD INJ within the lower frequencies associated with pile driving;
- The intensity of anticipated takes by Level B harassment would be minimized through implementation of the mitigation measures described above. While some instances of TTS could occur, the majority of Level B harassment takes would likely be in the form of avoidance of the project area, temporary cessation of foraging and vocalizing, or changes in dive behavior;
- The area impacted by the specified activity is very small relative to the overall habitat ranges of all species;
- The project area has minimal overlap with ringed seal critical habitat;
- Impacts to critical behaviors such as lairing and pupping by ringed seals would be avoided and minimized through implementation of mitigation measures described above;
- AGDC would cease pile driving during the Nuiqsut whaling season, therefore minimizing the amount or severity of take of bowhead whale during a time when animals are expected to migrate by in relatively higher density.

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 proposed activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

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

The number of instances of take for each species or stock proposed for authorization is included in table 19. Our analysis shows that less than one-third of the best available population abundance estimate of each stock could be taken by harassment (in fact, take of individuals no more than 0.7 percent of the abundance for all affected stocks). The number of animals proposed to be taken for each stock would be considered small relative to the relevant stock's abundances.

For beluga whale, the percentages in table 19 conservatively assumes that all takes of beluga whale would be accrued to each stock; however, we expect that most, if not all, beluga whales taken by this project would be from the Beaufort Sea stock.

For the Beringia stock of bearded seals, a complete stock abundance value is not available. As noted in the 2023 Alaska SAR (Young *et al.,* 2024), an abundance estimate is currently only available for the portion of bearded seals in the Bering Sea. This abundance estimate for the Bering Sea is 301,836 bearded seals (Conn *et al.,* 2014). Given the proposed 432 takes by Level B harassment and 2 takes by Level A harassment for the stock, comparison to the Bering Sea estimate, which is only a portion of the Beringia stock (which also includes animals in the Chukchi and Beaufort Seas), shows that, at most, less than one percent of the stock would be expected to be impacted.

A complete stock abundance value is also not available for the Arctic stock of ringed seals. As noted in the 2023 Alaska SAR (Young *et al.,* 2024), the abundance estimate available, 171,418 animals, is only a partial estimate of the Bering Sea portion of the population (Conn *et al.,* 2014). As noted in the SAR, this estimate does not include animals in the shore fast ice zone, and the authors did not account for availability bias. Young *et al.* (2024) expect that the Bering Sea portion of the population is actually much higher. Given the proposed 2,012 takes by Level B harassment and 11 takes by Level A harassment takes for the stock, comparison to the Bering Sea partial estimate, which is only a portion of the Arctic stock (which also includes animals in the Chukchi and Beaufort Seas) represents only 1.2 percent of the stock.

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 mostly include limited, temporary behavioral disturbances of seals, however, some slight AUD INJ in seals within the lower frequencies associated with pile driving is possible. Additionally, a small number of takes of bowhead whales, by Level B harassment only, are predicted to occur in the vicinity of AGDC's activity. 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 Prudhoe Bay and the area ensonified above the relevant harassment thresholds. However, as described in the Effects of Specified Activities on Subsistence Uses of Marine Mammals section, subsistence use of seals and beluga whales is extremely limited in this area, as it is not within the preferred and frequented hunting areas. Bowhead whales typically remain outside of the area between the barrier islands and Prudhoe Bay, minimizing the likelihood of impacts from AGDC's project. The proposed 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, and nor are the activities otherwise expected to interfere with the hunt. Additionally, during the Nuiqsut whaling season, NMFS proposes to require AGDC to cease pile driving and project vessels must transit landward of Cross Island, therefore minimizing the potential impact to the Nuiqsut hunt. AGDC will continue to coordinate with local communities and subsistence groups to minimize impacts of the project, as described in the POC.

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 other proposed mitigation and monitoring measures, NMFS has preliminarily determined that AGDC's proposed activities will not have an unmitigable adverse impact on subsistence uses of marine mammals.

Endangered Species Act

Section 7(a)(2) of the ESA of 1973 (16 U.S.C. 1531 *et seq.*) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally whenever we propose to authorize take for endangered or threatened species, in this case with the Alaska Regional Office.

NMFS is proposing to authorize take of bowhead whale, bearded seal (Beringia DPS), and ringed seal (Arctic subspecies) which are listed under the ESA.

NMFS issued a Biological Opinion on June 3, 2020, concluding that the issuance of an IHA for the same project activities in Prudhoe Bay was not likely to jeopardize the continued existence of the threatened and endangered species under NMFS' jurisdiction.

The Permits and Conservation Division intends to initiate section 7 consultation with the Alaska Regional Office 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 AGDC for construction of the AK LNG Project in Prudhoe Bay, Alaska for one year, beginning June 1, 2027 or June 1, 2028, 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-other-energy-activities-renewable.*

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 project. 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, 1-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 1 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: April 14, 2025.

Kimberly Damon-Randall,

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

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