DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 217

[Docket No. 180627584–9388–01]

RIN 0648–BI00

Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Construction and Operation of the Liberty Drilling and Production Island, Beaufort Sea, Alaska

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

ACTION: Proposed rule; request for comments.

SUMMARY: NMFS has received a request from Hilcorp Alaska (Hilcorp) for authorization to take marine mammals incidental to construction and operation of the Liberty Drilling and Production Island (LDPI), over the course of five years. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is proposing regulations to govern that take, and requests comments on the proposed regulations. NMFS will consider public comments prior to making any final decision on the issuance of the requested MMPA authorization and agency responses will be summarized in the final notice of our decision.

DATES: Comments and information must be received no later than June 28, 2019.

ADDRESSES: You may submit comments on this document, identified by NOAA–NMFS–2018–0053, by any of the following methods:

- *Electronic submission:* Submit all electronic public comments via the Federal e-Rulemaking Portal. Go to *www.regulations.gov/#!docketDetail;D=NOAA-NMFS-2019-0053* click the ''Comment Now!'' icon, complete the required fields, and enter or attach your comments.
- *Mail:* Submit written comments to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East West Highway, Silver Spring, MD 20910.

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

FOR FURTHER INFORMATION CONTACT: Jaclyn Daly, Office of Protected Resources, NMFS, (301) 427–8401.

SUPPLEMENTARY INFORMATION:

Availability

A copy of Hilcorp's application and any supporting documents, as well as a list of the references cited in this document, may be obtained online at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act.* In case of problems accessing these documents, please call the contact listed above (see **FOR FURTHER INFORMATION CONTACT**).

Purpose and Need for Regulatory Action

NMFS received an application from Hilcorp requesting five-year regulations and authorization to incidentally take multiple species of marine mammals in Foggy Island Bay, Beaufort Sea, by Level A harassment (non-serious injury) and Level B harassment (behavioral disturbance), incidental to construction and operation of the LDPI and associated infrastructure. Please see ''Background'' below for definitions of harassment. In addition, a limited unintentional take involving the mortality or serious injury of no more than two ringed seals (*Phoca hispida*) would be authorized to occur during annual ice road construction and maintenance. This proposed rule establishes a framework under the authority of the MMPA (16 U.S.C. 1361 *et seq.*) to allow for the authorization of take of marine mammals incidental to Hilcorp's activities related to construction and operation of the LDPI.

Legal Authority for the Proposed Action

Section 101(a)(5)(A) of the MMPA (16 U.S.C. 1371(a)(5)(A)) directs the Secretary of Commerce 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 for up to five years if, after notice and public comment, the agency makes certain findings and issues regulations that set forth permissible methods of taking pursuant to that activity and other means of effecting the ''least practicable adverse impact'' on the affected species or stocks and their habitat (see the discussion below in the ''Proposed Mitigation'' section), as well as monitoring and reporting requirements. Section 101(a)(5)(A) of the MMPA and the implementing regulations at 50 CFR part 216, subpart I provide the legal basis for issuing this proposed rule containing five-year regulations, and for any subsequent Letters of Authorization (LOAs). As directed by this legal authority, this proposed rule contains mitigation, monitoring, and reporting requirements.

Summary of Major Provisions Within the Proposed Rule

Following is a summary of the major provisions of this proposed rule Hilcorp would be required to implement. These measures include:

- Use of soft start during impact pile driving to allow marine mammals the opportunity to leave the area prior to beginning impact pile driving at full power;
- Implementation of shutdowns of construction activities under certain circumstances to minimize harassment, including injury;
- Prohibition on impact pile driving during the fall Cross Island bowhead whale hunt and seasonal drilling restrictions to minimize impacts to marine mammals and subsistence users;
- Implementation of best management practices to avoid and minimize ice seal and habitat disturbance during ice road construction, maintenance, and use;
- Use of marine mammal and acoustic monitoring to detect marine mammals and verify predicted sound fields;
- Coordination with subsistence users and adherence to a Plan of Cooperation (POC); and
- Limitation on vessel speeds and transit areas, where appropriate.

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 issued or, if the taking is limited to harassment, a notice of a proposed incidental take authorization is provided to the public for review. Under the MMPA, ''take'' is defined as meaning to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. ''Harassment'' is statutorily defined as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment) or 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 but which does not have the potential to injure a marine mammal or marine mammal stock in the wild (Level B harassment).

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 such species or stocks for taking for certain subsistence uses (referred to in shorthand as ''mitigation''); and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth.

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 evaluate our proposed action (*i.e.,* the promulgation of regulations and subsequent issuance of incidental take authorization) and alternatives with respect to potential impacts on the human environment.

On August 23, 2018, the Bureau of Ocean Energy Management (BOEM) released a Final Environmental Impact Statement (EIS) analyzing the possible environmental impacts of Hilcorp's proposed Liberty development and production plan (DPP). BOEM's Draft EIS was made available for public comment from August 18, 2017 through December 8, 2017. The final EIS may be found at *https://www.boem.gov/hilcorp-liberty/.* NMFS is a cooperating agency on the EIS. Accordingly, NMFS plans to adopt the EIS, provided our independent evaluation of the document finds that it includes adequate information analyzing the effects on the human environment of issuing the rule. We will review all comments submitted in response to this notice prior to concluding our NEPA process or making a final decision on the regulations request.

Summary of Request

On August 2, 2017, Hilcorp petitioned NMFS for rulemaking under Section 101(a)(5)(A) of the MMPA to authorize the take of six species of marine mammals incidental to construction and operation of the proposed LDPI in Foggy Island Bay, Alaska. On April 26, 2018, Hilcorp submitted a revised petition which NMFS deemed adequate and complete. On May 9, 2018, we published a notice of receipt of Hilcorp's petition in the **Federal Register**, requesting comments and information related to the request for thirty days (83 FR 21276). We received comments from the Center for Biological Diversity and 15,843 citizens opposing issuance of the requested regulations and LOA. We also received comments from the Alaska Eskimo Whaling Commission (AEWC) who recommended we include subsistence related mitigation and coordination requirements in the final rule. The comments and information received were considered in development of this proposed rule and are available online at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act.* More recently, Hilcorp provided subsequent additional information, including details on a previously undescribed component of the project (installation of foundation piles in the interior of the LDPI), and revised marine mammal density and estimate take numbers on February 4, 2019. Hilcorp also updated their proposed Marine Mammal Mitigation and Monitoring Plan (4MP) on January 29, 2019.

To extract oil and gas in the Liberty Oil Field, Hilcorp is proposing to construct a 9.3 acre artificial island (the LDPI) in 19 feet (ft) (5.8 meters (m)) of water in Foggy Island Bay, approximately 5 miles (mi) (8 kilometers (km)) north of the Kadleroshilik River and install supporting infrastructure (*e.g.,* ice roads, pipeline). Ice roads would be constructed annually and begin December 2020. Island construction, which requires impact and vibratory pile driving, is proposed to commence and be completed in 2021. Pile driving would primarily occur during ice-covered season (only ice seals are present during this time period); however, up to two weeks of pile driving may occur during the open-water season. Pipeline installation is anticipated to occur in 2022. Drilling and production is proposed to occur from 2022 through 2025.

Hilcorp requests, and NMFS is proposing to authorize, the take, by Level A harassment and Level B harassment, of bowhead whales (*Balaena mysticetus*), gray whales (*Eschrichtius robustus),* beluga whales (*Delphinapterus leucas*), ringed seals (*Phoca hispida*), bearded seals (*Erignathus barbatus*), and spotted seals (*Phoca largha*) incidental to LDPI construction and operation activities (*e.g.,* pile driving, ice road and island construction). Hilcorp also requested, and NMFS is proposing to authorize, mortality and serious injury of two ringed seals incidental to annual ice road construction over a 5-year period. The proposed regulations and LOA would be valid for five years from December 1, 2020, through November 30, 2025.

Description of the Specified Activity

Overview

Hilcorp is proposing to construct and operate the LDPI, a self-contained offshore drilling and production facility located on an artificial gravel island. Infrastructure and facilities necessary to drill wells and process and export approximately 60,000 to 70,000 barrels of oil per day to shore would be installed on the island. To transport oil, a pipeline from the island would be installed, tying into the existing Bandami pipeline located on shore between the Sagavanirktok and Kadleroshilik Rivers on Alaska's North Slope. To access the island and move vehicles and equipment, ice roads would be constructed annually. All island construction and pipeline installation would occur during winter months as much as possible; however, pile driving and slope protection could occur during the open water season. Drilling and production, once begun, would occur year round. After island and pipeline construction, Hilcorp would commence and continue drilling and production for approximately 20 to 25 years at which time the island would be decommissioned. The proposed regulations and LOA would cover the incidental take of marine mammals during LDPI construction and operation for the first five years of work. Thereafter, data collected during these five years (*e.g.,* acoustic monitoring during drilling, ice road marine mammal monitoring) would determine if future incidental take authorizations are warranted for continuing operations.

Dates and Duration

The proposed regulations would be valid for a period of five years from December 1, 2020, through November 30, 2025. Ice road construction and pipeline installation would be limited to winter months. Island construction would be conducted primarily during winter months; however, given construction schedules are subject to delays for multiple reasons. Hilcorp anticipates, at most, up to two weeks of open-water pile driving may be required in the first year to complete any pile driving not finished during the winter. Other work such as island slope armoring may also occur during open-water conditions. All island construction would commence and is expected to be completed in the first year of the proposed regulations (December 2020 through November 2021). Pipeline installation would occur in year 2 of the proposed regulations (December 2021 through November 2022), while drilling and production would begin in year 3 and continue through the life of the proposed regulations. Ice road construction and maintenance activities would occur each winter.

Specified Geographical Region

The Liberty field is located in Federal waters of Foggy Island Bay, Beaufort Sea about 8.9 km (5.5 mi) offshore in 6.1 m (20 ft) of water and approximately 8 to 13 km (5 to 8 mi) east of the existing Endicott Satellite Drilling Island (SDI) and approximately 32 km (20 mi) east of Prudhoe Bay. Hilcorp would construct the Liberty project on three leases, OCS–Y–1650, OCS–Y–1886, and OCS–Y–1585. The proposed LDPI would be constructed in 19 ft (5.8 m) of water about 5 mi (8 km) offshore in Foggy Island Bay. The LDPI and all associated infrastructure (*e.g.,* ice roads) are located inside the McClure barrier island group which separates Foggy Island Bay from the Beaufort Sea (Figure 1).

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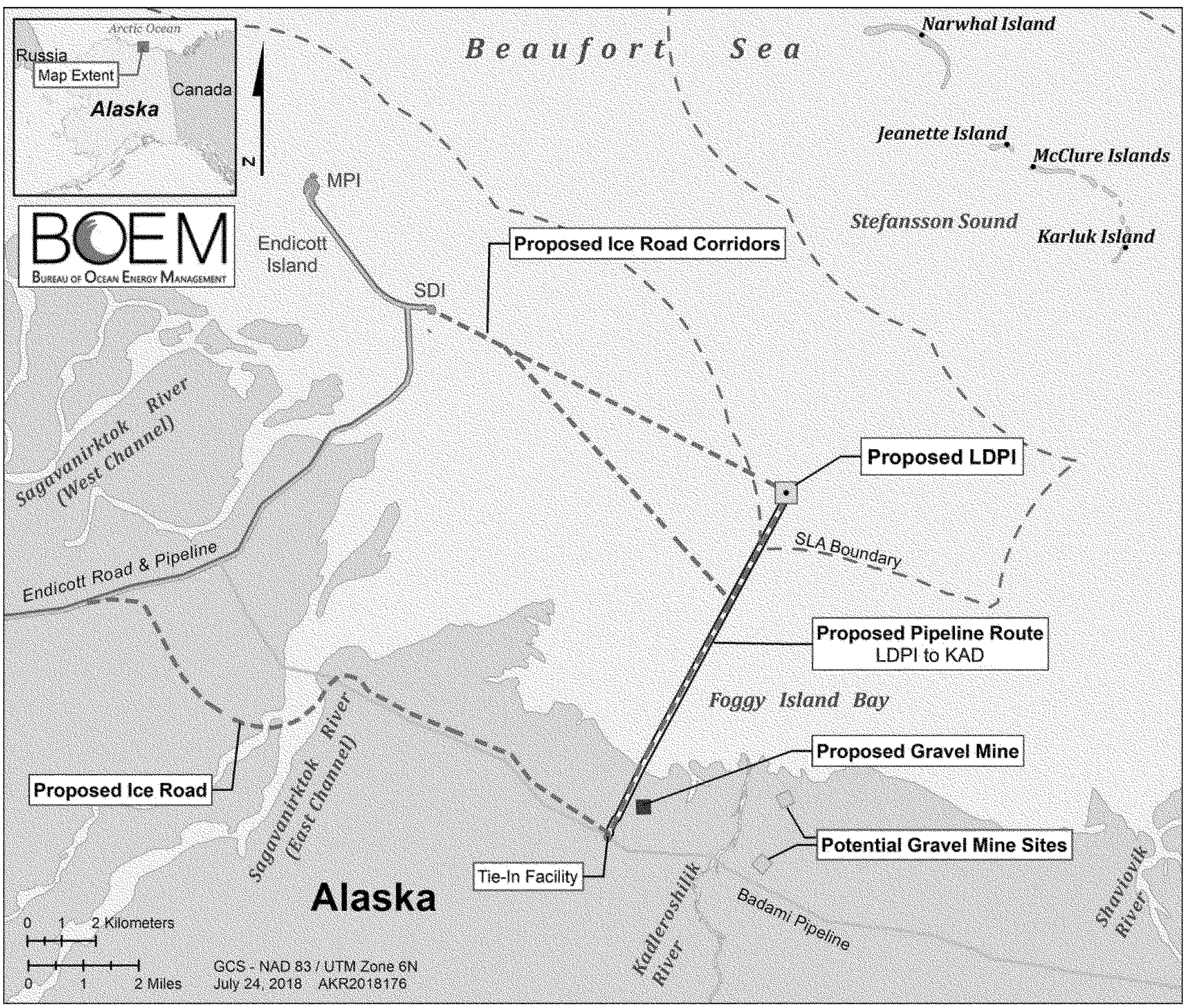

Figure 1. Location of the LDPI and Associated Infrastructure.

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Detailed Description of Activities

The Liberty Prospect is located 8.85 km offshore in about 6 m of water, inside the Beaufort Sea's barrier islands. Hilcorp, as the Liberty operator, is proposing to develop the Liberty Oil Field reservoir, located on the Outer Continental Shelf (OCS), in Foggy Island Bay, Beaufort Sea, Alaska. The Liberty reservoir is the largest delineated but undeveloped light oil reservoir on the North Slope. It is projected to deliver a peak production rate of between 60,000 and 70,000 barrels of oil per day within two years of initial production. Total recovery over an estimated field life of 15 to 20 years is predicted to be in the range of 80 to 150 million stock tank barrels of oil. The Liberty Oil Field leases were previously owned by BP Exploration Alaska, Inc. (BPXA). In April 2014, BPXA announced the sale of several North Slope assets to Hilcorp including the area where the proposed LDPI would be constructed and other existing oil production islands (Northstar, Endicott, Milne Point). The Liberty Project has many similarities to previous oil and gas islands constructed on the North Slope, including Endicott, Northstar and Oooguruk.

The proposed LDPI project includes development of a mine-site to supply gravel for the construction of the LDPI, construction of the island and annual ice roads, installation of an undersea pipeline that reaches shore from the LDPI and then connects to the existing above-ground Badami pipeline, drilling, production and operation (for simplicity, hence forward we refer to both production and operation as ''production''). The mine site is located inland of marine mammal habitat over which NMFS has jurisdiction; therefore, its development will not be discussed further in this proposed rule as no impacts to marine mammals under NMFS jurisdiction would be affected by this project component. Here, we discuss those activities that have the potential to take marine mammals: Ice road construction and maintenance, island construction (pile driving and slope armoring), pipeline installation, drilling and production. We also describe auxiliary activities, including vessel and aircraft transportation. A schedule of all phases on the project and summary of equipment and activities involved are included in Table 1.

TABLE 1—LDPI PROJECT COMPONENTS, SCHEDULE, AND ASSOCIATED EQUIPMENT

Project component	Regulation year	Season	Equipment and activity
Ice road construction, use, and maintenance.	1–5	Ice-covered	Grader, ice auger, trucks (flood road, haul gravel, general transit, maintenance).
Island construction	* 1	Ice-covered, open water	Impact and vibratory pile and pipe driving, backhoe (digging), excavator (slope shaping, armor installation, ditchwitch (sawing ice).
Pipeline installation	2	Ice-covered	Ditchwitch (sawing ice), backhoe (digging), trucks.
Drilling and production	3–5	Ice-covered, open water	Drill rig, land-based equipment on island (*e.g.,* generators).
Marine vessel and aircraft support.	1–5	Open-water, ice-covered (helicopter only).	Barge, tugs, crew boats, helicopter.
Emergency and oil response training.	1–5	Ice-covered, open water	Vessels, hovercrafts, all-terrain vehicles, snow machines, etc.

* Hilcorp has indicated a goal to complete all LDPI construction in the first year the regulations would be valid; however, they may need to install foundation piles in year 2.

Ice Road and Ice Pad Construction and Maintenance

Hilcorp will construct ice roads and perform maintenance, as necessary. Ice roads are a route across sea ice created by clearing and grading snow then pumping seawater from holes drilled through the floating ice. Some roads may use grounded ice. Hilcorp would clear away snow using a tractor, bulldozer, or similar piece of equipment then pump seawater from holes drilled through floating ice, and then flood the ice road. The ice roads will generally be constructed by pumper units equipped with an ice auger to drill holes in the sea ice and then pump water from under the ice to flood the surface of the ice. The ice augers and pumping units will continue to move along the ice road alignment to flood the entire alignment, returning to a previous area as soon as the flooded water has frozen. The ice road will be maintained and kept clean of gravel and other solids. Freshwater can be sprayed onto the road surface to form a cap over the main road structure for the top layer or to repair any cracks.

Ice roads will be used for onshore and offshore access, installing the pipeline, hauling gravel used to construct the island, moving equipment on/off island, personnel and supply transit, etc. Ice roads are best constructed when weather is -20 degrees Fahrenheit (F) to -30 degrees F, but temperatures below 0 degree F are considered adequate for ice road construction. Ice road construction can typically be initiated in mid- to late-December and roads maintained until mid-May. At the end of the season, ice roads will be barricaded by snow berm and/or slotted at the entrance to prevent access and allowed to melt naturally. Figure 1 shows the locations of the proposed ice roads.

- Ice road # 1 will extend approximately 11.3 km (7 mi) over shorefast sea ice from the Endicott SDI to the LDPI (the SDI to LDPI ice road). It will be approximately 37 m wide (120 ft) with driving lane of approximately 12 m (40 ft). It would cover approximately 160 acres of sea ice.
- Ice road # 2 (approximately 11.3 km (7 mi)) will connect the LDPI to the proposed Kadleroshilik River gravel mine site and then will continue to the juncture with the Badami ice road (which is ice road # 4). It will be approximately 15 m (50 ft) wide.
- Ice road # 3 (approximately 9.6 km [6 mi], termed the ''Midpoint Access Road'') will intersect the SDI to LDPI ice road and the ice road between the LDPI and the mine site. It will be approximately 12 m (40 ft) wide.
- Ice road # 4 (approximately 19.3 km (12 mi)), located completely onshore, will parallel the Badami pipeline and connect the mine site with the Endicott road.

All four ice roads would be constructed for the first three years to support pipeline installation and transportation from existing North Slope roads to the proposed gravel mine site, and from the mine site to the proposed LDPI location in the Beaufort Sea. After year 3, only ice road #1 would be constructed to allow additional materials and equipment to be mobilized to support LDPI, pipeline, and facility construction activities as all island construction and pipeline installation should be complete by year 3. Winter sea ice road/trail construction will begin as early as possible (typically December 1 through mid-February). It is anticipated that all ice road construction activities will be initiated prior to March 1, before the time when female ringed seals establish birth lairs.

In addition to the ice roads, three ice pads are proposed to support construction activities (year 2 and 3). These would be used to support LDPI, pipeline, (including pipe stringing and two stockpile/disposal areas) and facilities construction. A fourth staging area ice pad (approximately 350 feet by 700 feet) would be built on the sea ice on the west side of the LDPI during production well drilling operations.

Other on-ice activities occurring prior to March 1 could also include spill training exercises, pipeline surveys, snow clearing, and work conducted by other snow vehicles such as a Pisten Bully, snow machine, or rollagon. Prior to March 1, these activities could occur outside of the delineated ice road/trail and shoulder areas.

LDPI Construction

The LDPI will include a self-contained offshore drilling and production facility located on an artificial gravel island with a subsea pipeline to shore. The LDPI will be located approximately 8 kilometers (km) or 5 miles (mi) offshore in Foggy Island Bay and 11.7 km (7.3 mi) southeast of the existing SDI on the Endicott causeway (see Figure 1). The LDPI will be constructed of reinforced gravel in 5.8 meters (m) (19 feet (ft)) of water and have a working surface of approximately 3.8 hectares (ha) (9.3 acres (ac)). A steel sheet pile wall would surround the island to stabilize the placed gravel and the island would include slope protection bench, dock and ice road access and a seawater intake area (Figure 2).

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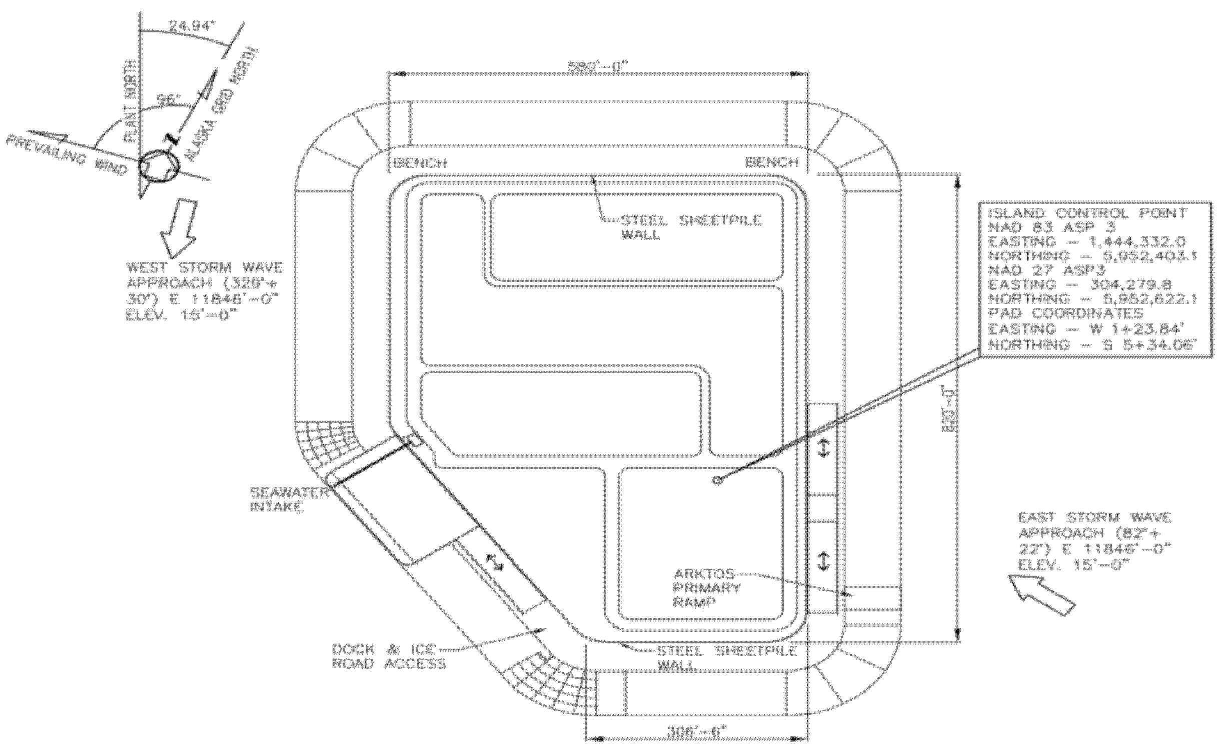

Figure 2. Proposed Liberty Development and Production Island.

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Hilcorp would begin constructing the LDPI during the winter immediately following construction of the ice road from the mine site to the island location. Sections of sea ice at the island's location would be cut using a ditchwitch and removed. A backhoe and support trucks using the ice road would move ice away. Once the ice is removed, gravel will be poured through the water column to the sea floor, building the island structure from the bottom up. A conical pile of gravel (hauled in from trucks from the mine site using the ice road) will form on the sea floor until it reaches the surface of the ice. Gravel hauling over the ice road to the LDPI construction site is estimated to continue for 50 to 70 days, and conclude mid-April or earlier depending on road conditions. The construction would continue with a sequence of removing additional ice and pouring gravel until the surface size is achieved. Following gravel placement, slope armoring and protection installation would occur. Using island-based equipment (*e.g.,* backhoe, bucket-dredge) and divers, Hilcorp would create a slope protection profile consisting of a 60-ft (18.3 m) wide bench covered with a linked concrete mat that extends from a sheet pile wall surrounding the island to slightly above mean low low water (MLLW) (Figure 3). The linked concrete mat requires a high strength, yet highly permeable woven polyester fabric under layer to contain the gravel island fill. The filter fabric panels will be overlapped and tied together side-by-side (requiring diving operations) to prevent the panels from separating and exposing the underlying gravel fill. Because fabric is overlapped and tied together, no slope protection debris would enter the water column should it be damaged. Above the fabric under layer, a robust geo-grid will be placed as an abrasion guard to prevent damage to the fabric by the linked mat armor. The concrete mat system would continue another at a 3:1 slope another 86.5 ft into the water, terminating at a depth of −19 ft (−5.8 m). In total, from the sheet pile wall, the bench and concrete mat would extend 146.5 ft. Island slope protection is required to assure the integrity of the gravel island by protecting it from the erosive forces of waves, ice ride-up, and currents. A detailed inspection of the island slope protection system will be conducted annually during the open-water season to document changes in the condition of the island slope protection system that have occurred since the previous year's inspection. Any damaged material would be removed. Above-water activities will consist of a visual inspection of the dock and sheet pile enclosure, and documenting the condition of the island bench and ramps. The below-water slopes will be inspected by divers or if water clarity allows, remotely by underwater cameras contracted separately by Hilcorp. The results of the below water inspection will be recorded for repair if needed. No vessels will be required. Multi-beam bathymetry and side-scan sonar imagery of the below-water slopes and adjacent sea bottom will be acquired using a bathymetry vessel. The sidescan sonar would operate at a frequency between 200–400 kilohertz (kHz). The single-beam echosounder would operate at a frequency of about 210 kHz.

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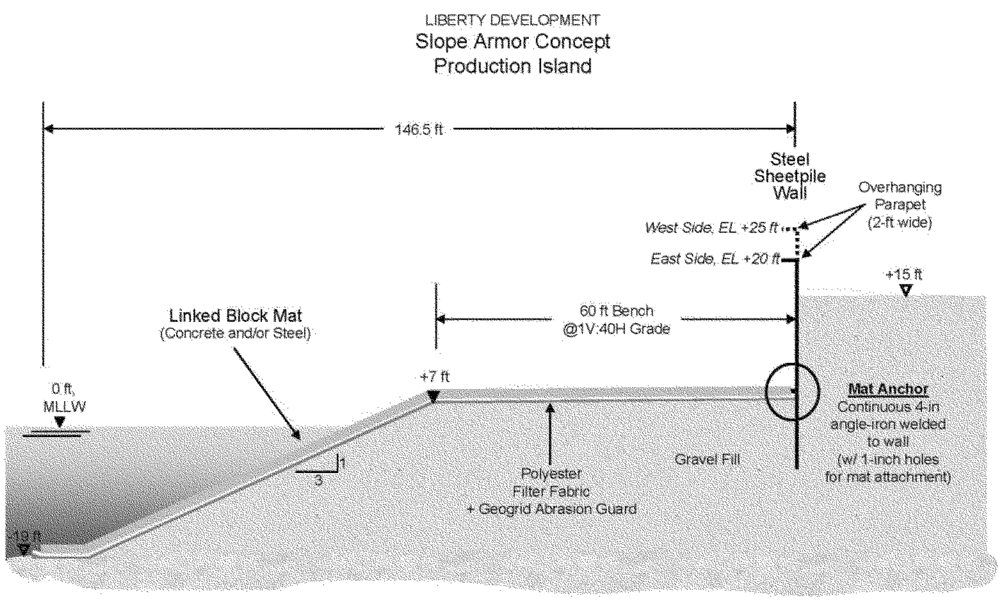

Figure 3. LDPI Slope Protection.

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Once the slope protection is in place, Hilcorp would install the sheet pile wall around the perimeter of the island using vibratory and, if necessary, impact hammers. Hilcorp anticipates driving up to 20 piles per day to a depth of 25 ft. A vibratory hammer would be used first followed by an impact hammer to ''proof'' the pile. Hilcorp anticipates each pile needing 100 hammer strikes over approximately 2 minutes of impact driving to obtain final desired depth for each sheet pile. Per day, this equates to a maximum of 40 minutes and 2,000 strikes of impact hammering per day. For vibratory driving, pile penetration speed can vary depending on ground conditions, but a minimum sheet pile penetration speed is 20 inches (0.5 m) per minute to avoid damage to pile or hammer (NASSPA 2005). For this project, the anticipated duration is based on a preferred penetration speed greater than 40 inches (1 m) per minute, resulting in 7.5 minutes to drive each pile. Given the high storm surge and larger waves that are expected to arrive at the LDPI site from the west and northwest, the wall will be higher on the west side than on the east side. At the top of the sheet-pile wall, overhanging steel ''parapet'' will be installed to prevent wave passage over the wall.

Within the interior of the island, 16 steel conductor pipes would be driven to a depth of 160 ft (49 m) to provide the initial stable structural foundation for each oil well. They would be set in a well row in the middle of the island. Depending on the substrate the conductor pipes would be driven by impact or vibratory methods or both. During construction of the nearby Northstar Island (located in deeper water), it took 5 to 8.5 hours to drive one conductor pipe (Blackwell *et al.,* 2004). For the Liberty LDPI, Hilcorp anticipates it would take two hours of active pile driving per day to install a conductor pipe given the 5 to 8.5 hour timeframe at Northstar includes pauses in pile driving and occurred in deeper water requiring deeper pile depths. In addition, approximately 700 to 1,000 foundation piles may also be installed within the interior of the island should engineering determine they are necessary for island support.

Pipeline Installation

Hilcorp would install a pipe-in-pipe subsea pipeline consisting of a 12-in diameter inner pipe and a 16-in diameter outer pipe to transport oil from the LDPI to the existing Bandami pipeline. Pipeline construction is planned for the winter after the island is constructed. A schematic of the pipeline can be found in Figure 2–3 of BOEM's Final EIS available at *https://www.boem.gov/Hilcorp-Liberty/*. The pipeline will extend from the LDPI, across Foggy Island Bay, and terminate onshore at the existing Badami Pipeline tie-in location. For the marine segment, construction will progress from shallower water to deeper water with multiple construction spreads.

To install the pipeline, a trench will be excavated using ice-road based long reach excavators with pontoon tracks. The pipeline bundle will be lowered into the trench using side booms to control its vertical and horizontal position, and the trench will be backfilled by excavators using excavated trench spoils and select backfill. Hilcorp intends to place all material back in the trench slot. All work will be done from ice roads using conventional excavation and dirt-moving construction equipment. The target trench depth is 9 to 11 ft (2.7 to 3.4 m) with a proposed maximum depth of cover of approximately 7 ft (2.1 m). The pipeline will be approximately 5.6 mi (9 km) long. Hydro-testing (pressure testing using sea water) of the entire pipeline will be completed prior to commissioning.

Drilling and Production

The final drill rig has yet to be chosen by Hilcorp but has been narrowed to two options and will accommodate drilling of 16 wells. The first option is the use of an existing platform-style drilling unit that Hilcorp owns and operates in the Cook Inlet. Designated as Rig 428, the rig has been used recently and is well suited in terms of depth and horsepower rating to drill the wells at Liberty. A second option that is being investigated is a new build drilling unit that would be built to not only drill Liberty development wells, but would be more portable and more adaptable to other applications on the North Slope. Regardless of drill rig type, the well row arrangement on the island is designed to accommodate up to 16 wells. We note that while Hilcorp is proposing a 16 well design, only 10 wells would be drilled. The 6 additional well slots would be available as backups or for potential in-fill drilling if needed during the project life.

Process facilities on the island will separate crude oil from produced water and gas. Gas and water will be injected into the reservoir to provide pressure support and increase recovery from the field. A single-phase subsea pipe-in-pipe pipeline will transport sales-quality crude from the LDPI to shore, where an aboveground pipeline will transport crude to the existing Badami pipeline. From there, crude will be transported to the Endicott Sales Oil Pipeline, which ties into Pump Station 1 of the TransAlaska Pipeline System (TAPS) for eventual delivery to a refinery.

Description of Marine Mammals in the Area of the Specified Activity

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. 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 (*www.nmfs.noaa.gov/pr/species/mammals/*). Additional information may be found in BOEM's Final EIS for the project which is available online at *https://www.boem.gov/Hilcorp-Liberty/.*

Table 2 lists all species with expected potential for occurrence in Foggy Island Bay and surrounding Beaufort Sea and summarizes information related to the population or stock, including regulatory status under the MMPA and ESA and potential biological removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2016). 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). PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species 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. 2017 SAR for Alaska (Muto *et al.,* 2018). All values presented in Table 2 are the most recent available at the time of publication and are available in the 2017 SARs (Muto *et al.,* 2018).

TABLE 2—MARINE MAMMALS WITH EXPECTED POTENTIAL OCCURRENCE IN BEAUFORT SEA, ALASKA

Common name	Scientific name	Stock	ESA/MMPA status; strategic (Y/N) [1]	Stock abundance) (CV, N_{min}, most recent abundance survey) [2]	PBR	Annual M/SI [3]
Order Cetartiodactyla—Cetacea—Superfamily Mysticeti (baleen whales)						
Family Eschrichtiidae						
Gray whale	*Eschrichtius robustus*	Eastern North Pacific	-;N	20,990 (0.05, 20,125, 2011).	624	132
Family Balaenidae						
Bowhead whale	*Balaena mysticetus*	Western Arctic	E/D; Y	16,820 (0.052, 16,100, 2011).	161	46
Humpback whale	*Megaptera novaeangliae*	Central North Pacific Stock	E/D; Y	10,103 (0.3, 7,891, 2006)	83	26
Minke whale		Alaska	-;N	unk	undet	0
Fin whale		Northeast Pacific	E/D; Y	3,168 (0.26, 2,554, 2013) [6].	5.1	0.6
Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Beluga whale	*Delphinapterus leucas*	Beaufort Sea	-; N	39,258 (0.229, N/A, 1992).	Und	139
		Eastern Chukchi	-; N	20,752 (0.70, 12,194, 2012).	244	67
Killer whale	*Orcinus orcas*	Eastern North Pacific Gulf of Alaska, Aleutian Islands, and Bering Sea Transient.	-;N	587 (n/a, 587, 2012)	5.9	0
Order Carnivora—Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						
Steller sea lion	*Eumatopias jubatus*	Eastern U.S	-; N	41,638 (-, 41,638, 2015)	2,498	108
		Western U.S	E/D;Y	53,303 (-, 53,303, 2016)	320	241
Family Phocidae (earless seals)						
Ringed Seal	*Pusa hispida*	Alaska	T, D; Y	170,000 (-, 170,000, 2012) [4].	Und	1,054
Bearded seal	*Erignathus barbatus*	Alaska	T, D; Y	299,174 (-, 273,676) [5]	Und	391
Spotted seal	*Phoca largha*	Alaska		423,625 (-, 423,237, 2013).	12,697	329
Ribbon seal	*Histriophoca fasciata*	Alaska		184,000 (-, 163,086, 2013).	9,785	3.9

[1] 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.

[2] NMFS marine mammal stock assessment reports online at: *www.nmfs.noaa.gov/pr/sars/.* CV is coefficient of variation; Nmin is the minimum estimate of stock abundance.

[3] These values, found in NMFS' SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.,* subsistence use, commercial fisheries, ship 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.

[4] The population provided here was derived using a using a very limited sub-sample of the data collected from the U.S. portion of the Bering Sea in 2012 (Conn *et al.,* 2014). Thus, the actual number of ringed seals in the U.S. sector of the Bering Sea is likely much higher, perhaps by a factor of two or more (Muto *et al.,* 2018). Reliable estimates of abundance are not available for the Chukchi and Beaufort seas (Muto *et al.,* 2018).

[5] 5. In spring of 2012 and 2013, surveys were conducted in the Bering Sea and Sea of Okhotsk; these data do not include seals in the Chukchi and Beaufort Seas at the time of the survey.

[6] N_{BEST}, N_{MIN}, and PBR have been calculated for this stock; however, important caveats exist. See Stock Assessment Report text for details.

Note—*Italicized species are not expected to be taken or proposed for authorization.*

All species that could potentially occur in the Beaufort Sea are included in Table 2. However, the temporal and/or spatial occurrence of minke, fin, humpback whales, killer whales, narwhals, harbor porpoises, and ribbon seals are such that take is not expected to occur, and they are not discussed further beyond the explanation provided here. These species, regularly occur in the Chukchi Sea but not as commonly in the Beaufort Sea. Narwhals, Steller sea lions, and hooded seals are considered extralimital to the proposed action area These species could occur in the Beaufort Sea, but are either uncommon or extralimital east of Barrow (located in the Foggy Island Bay area and surveys within the Bay have revealed zero sightings).

In addition, the polar bear may be found in Foggy Island Bay. However, this species is managed by the U.S. Fish and Wildlife Service and is not considered further in this document.

On October 11, 2016, NOAA released the Final Environmental Impact Statement (FEIS) for the Effects of Oil and Gas Activities in the Arctic Ocean (81 FR 72780, October 21, 2016) regarding geological and geophysical (*i.e.,* seismic) activities, ancillary activities, and exploratory drilling. The Final EIS may be found at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/environmental-impact-statement-eis-effects-oil-and-gas-activities.* Although no seismic activities are proposed by Hilcorp, the EIS contains detailed information on marine mammal species proposed to be potentially taken by Hilcorp's specified activities. More recently, BOEM released a final EIS on the Liberty Project. We incorporate by reference the information on the species proposed to be potentially taken by Hilcorp's specified activities from these documents and provide a summary and any relevant updates on species status here.

Bowhead Whale

The only bowhead whale stock found within U.S. waters is the Western Arctic stock, also known as the Bering-Chukchi-Beaufort stock (Rugh *et al.,* 2003) or Bering Sea stock (Burns *et al.,* 1993). The majority of the Western Arctic stock migrates annually from wintering areas (December to March) in the northern Bering Sea, through the Chukchi Sea in the spring (April through May), to the eastern Beaufort Sea where they spend much of the summer (June through early to mid-October) before returning again to the Bering Sea in the fall (September through December) to overwinter (Braham *et al.,* 1980, Moore and Reeves 1993, Quakenbush *et al.,* 2010a, Citta *et al.,* 2015). Some bowhead whales are found in the western Beaufort, Chukchi, and Bering seas in summer, and these are thought to be a part of the expanding Western Arctic stock (Rugh *et al.,* 2003; Clarke *et al.,* 2013, 2014, 2015; Citta *et al.,* 2015). The most recent population parameters (*e.g.,* abundance, PBR) of western Arctic bowhead whales are provided in Table 2.

Bowhead whale distribution in the Beaufort Sea during summer-fall has been studied by aerial surveys through the Bowhead Whale Aerial Survey Project (BWASP). This project was funded or contracted by the Minerals Management Service (MMS)/Bureau of Ocean Energy Management (BOEM) and Bureau of Land Management (BLM) annually from 1979 to 2010. The focus of the BWASP aerial surveys was the autumn migration of bowhead whales through the Alaskan Beaufort Sea, although data were collected on all marine mammals sighted. The NMFS National Marine Mammal Laboratory (NMML) began coordinating BWASP in 2007, with funding from MMS. In 2011, an Interagency Agreement between the BOEM and NMML combined BWASP with COMIDA under the auspices of a single survey called Aerial Surveys of Arctic Marine Mammals (ASAMM) (Clarke *et al.,* 2012); both studies are funded by BOEM. In September to mid-October bowheads begin their western migration out of the Canadian Beaufort Sea to the Chukchi Sea (Figure 3.2–10). Most westward travel across the Beaufort Sea by tagged whales was over the shelf, within 100 km (62 mi) of shore, although a few whales traveled farther offshore (Quakenbush *et al.,* 2012).

During winter and spring, bowhead whales are closely associated with sea ice (Moore and Reeves 1993, Quakenbush *et al.,* 2010a, Citta *et al.,* 2015). The bowhead whale spring migration follows fractures in the sea ice around the coast of Alaska, generally in the shear zone between the shorefast ice and the mobile pack ice. During summer, most of the population is in relatively ice-free waters in the southeastern Beaufort Sea (Citta *et al.,* 2015), an area often exposed to industrial activity related to petroleum exploration (*e.g.,* Richardson *et al.,* 1987, Davies, 1997). Summer aerial surveys conducted in the western Beaufort Sea during July and August of 2012–2014 have had relatively high sighting rates of bowhead whales, including cows with calves and feeding animals (Clarke *et al.,* 2013, 2014, 2015). During the autumn migration through the Beaufort Sea, bowhead whales generally select shelf waters (Citta *et al.,* 2015). In winter in the Bering Sea, bowhead whales often use areas with ~100 percent sea-ice cover, even when polynyas are available (Quakenbush *et al.,* 2010a, Citta *et al.,* 2015).

From 2006 through 2014, median distance of bowhead whales from shore was 23.6 km (14.7 mi) in the East Region and 24.2 km (15.0 mi) in the West Region during previous low-ice years, with annual median distances ranging from as close as 6.3 km (3.9 mi) in 2009 to 37.6 km (23.4 mi) in 2013 (Clarke *et al.,* 2015b). Median depth of sightings during previous low-ice years was 39 m (128 ft) in the East Region and 21 m (69 ft) in the West Region; in 2014, median depth of on-transect sightings was 20 m (66 ft) and 19 m (62 ft), respectively (Clarke *et al.,* 2015b). In September and October 2014, bowhead whales in the East Region of the study area were sighted in shallower water and closer to shore than in previous years of light sea ice cover; in the West Region, bowhead sightings in fall 2014 were in shallower water than in previous light ice years, but the distance from shore did not differ (Clarke *et al.,* 2015b). Behaviors included milling, swimming, and feeding, to a lesser degree. Highest numbers of sightings were in the central Beaufort Sea and east of Point Barrow. Overall, the most shoreward edge of the bowhead migratory corridor for bowhead extends approximately 40 km (25 mi) north from the barrier islands, which are located approximately 7 km (4 mi) north of Liberty Project. The closest approach of a tagged whale occurred in August 2016 when it came within 16 km of the proposed LDPI (Quakenbush, 2018).

Historically, there have been few spring, summer, or autumn observations of bowheads in larger bays such as Camden, Prudhoe, and Harrison Bays, although some groups or individuals have occasionally been observed feeding around the periphery of or, less commonly, inside the bays as migration demands and feeding opportunities permit. Observations indicate that juvenile, sub-adult, and cow-calf pairs of bowheads are the individuals most frequently observed in bays and nearshore areas of the Beaufort, while more competitive whales are found in the Canadian Beaufort and Barrow Canyon, as well as deeper offshore waters (Clarke *et al.,* 2011b, 2011c, 2011d, 2012, 2013, 2014, 2015b; Koski and Miller, 2009; Quakenbush *et al.,* 2010).

Clarke *et al.* (2015) evaluated biologically important areas (BIAs) for bowheads in the U.S. Arctic region and identified nine BIAs. The spring (April-May) migratory corridor BIA for bowheads is far offshore of the LDPI but within the transit portion of the action area, while the fall (September-October) migratory corridor BIA (western Beaufort on and north of the shelf) for bowheads is further inshore and closer to the LDPI. Clarke *et al.* (2015) also identified four BIAs for bowheads that are important for reproduction and encompassed areas where the majority of bowhead whales identified as calves were observed each season; none of these reproductive BIAs overlap with the LDPI, but may be encompassed in indirect areas such as vessel transit route. Finally, three bowhead feeding BIAs were identified. Again, there is no spatial overlap of the activity area with these BIAs.

From July 8, 2008, through August 25, 2008, BPXA conducted a 3D seismic survey in the Liberty Prospect, Beaufort Sea. During the August survey a mixed-species group of whales was observed in one sighting near the barrier islands that included bowhead and gray whales (Aerts *et al.,* 2008). This is the only known survey sighting of bowhead whales within Foggy Island Bay despite industry surveys occurring during the open water season in 2010, 2014, and 2015 and NMFS aerial surveys flown inside Foggy Island Bay in 2016 and 2017.

Alaska Natives have been taking bowhead whales for subsistence purposes for at least 2,000 years (Marquette and Bockstoce, 1980, Stoker and Krupnik, 1993). Subsistence takes have been regulated by a quota system under the authority of the IWC since 1977. Alaska Native subsistence hunters, primarily from 11 Alaska communities, take approximately 0.1–0.5 percent of the population per annum (Philo *et al.,* 1993, Suydam *et al.,* 2011). The average annual subsistence take (by Natives of Alaska, Russia, and Canada) during the 5-year period from 2011 through 2015 is 43 landed bowhead whales (Muto *et al.,* 2018).

Gray Whale

The eastern North Pacific population of gray whales migrates along the coasts of eastern Siberia, North America, and Mexico (Allen and Angliss 2010; Weller *et al.,* 2002) and population size has been steadily increasing, potentially reaching carrying capacity (Allen and Angliss, 2010, 2012). Abundance estimates will likely rise and fall in the future as the population finds a balance with the carrying-capacity of the environment (Rugh *et al.,* 2005). The steadily increasing population abundance warranted delisting of the eastern North Pacific gray whale stock in 1994, as it was no longer considered endangered or threatened under the ESA (Rugh *et al.,* 1999). A five-year status review determined that the stock was neither in danger of extinction nor likely to become endangered in the foreseeable future, thus, retaining the non-threatened classification (Rugh *et al.,* 1999). Table 2 provided population parameters for this stock.

The gray whale migration may be the longest of any mammalian species. They migrate over 8,000 to 10,000 km (5,000 to 6,200 mi) between breeding lagoons in Mexico and Arctic feeding areas each spring and fall (Rugh *et al.,* 1999). The southward migration out of the Chukchi Sea generally begins during October and November, passing through Unimak Pass in November and December, then continues along a coastal route to Baja California (Rice *et al.,* 1984). The northward migration usually begins in mid-February and continues through May (Rice *et al.* 1984).

Gray whales are the most coastal of all the large whales and inhabit primarily inshore or shallow, offshore continental shelf waters (Jones and Swartz, 2009); however, they are more common in the Chukchi than in the Beaufort Sea. Throughout the summers of 2010 and 2011, gray whales regularly occurred in small groups north of Point Barrow and west of Barrow (George *et al.,* 2011; Shelden *et al.,* 2012). In 2011, there were no sightings of gray whales east of Point Barrow during ASAMM aerial surveys (Clarke *et al.,* 2012); however, they were observed east of Point Barrow, primarily in the vicinity of Barrow Canyon, from August to October 2012 (Clarke *et al.,* 2013). Gray whales were again observed east of Point Barrow in 2013, with all sightings in August except for one sighting in late October (Clarke *et al.,* 2014). In 2014, sightings in the Beaufort Sea included a few whales east of Point Barrow and one north of Cross Island near Prudhoe Bay (Clarke *et al.,* 2015b). Gray whales prefer shoal areas (<60 m (197 ft) deep) with low (<7 percent) ice cover (Moore and DeMaster, 1997). These areas provide habitat rich in gray whale prey (amphipods, decapods, and other invertebrates).

From July 8, 2008 through August 25, 2008, BPXA conducted a 3D seismic survey in the Liberty Prospect, Beaufort Sea. During the August survey a mixed-species group of whales was observed in one sighting near the barrier islands that included bowhead and gray whales (Aerts *et al.,* 2008). This is the only known survey sighting of gray whales within Foggy Island Bay despite industry surveys occurring during the open water season in 2010, 2014, and 2015 and NMFS aerial surveys flown inside Foggy Island Bay in 2016 and 2017.

Beluga Whale

Five beluga whale stocks are present in Alaska including the Cook Inlet, Bristol Bay, eastern Bering Sea, eastern Chukchi Sea, and Beaufort Sea stocks (O'Corry-Crowe *et al.,* 1997, Allen and Angliss, 2015). The eastern Chukchi and Beaufort Sea stocks are thought to overlap in the Beaufort Sea. Both stocks are closely associated with open leads and polynyas in ice-covered regions throughout Arctic and sub-Arctic waters of the Northern Hemisphere. Distribution varies seasonally. 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. 2012c). In the spring, belugas migrate to coastal estuaries, bays, and rivers. Annual migrations may cover thousands of kilometers (Allen and Angliss, 2010, 2012a).

Satellite telemetry data from 23 whales tagged in Kaseguluk Lagoon in 1998 through 2002 provided information on movements and migrations of eastern Chukchi Sea belugas. Animals initially traveled north and east into the northern Chukchi and western Beaufort seas after capture (Suydam *et al.,* 2001, 2005). Movement patterns between July and September vary by age and/or sex classes. Adult males frequent deeper waters of the Beaufort Sea and Arctic Ocean (79–80° N), where they remain throughout the summer. Immature males moved farther north than immature females but not as far north as adult males. All of the belugas frequented water deeper than 200 m (656 ft) along and beyond the continental shelf break. Use of the inshore waters within the Beaufort Sea Outer Continental Shelf lease sale area was rare (Suydam *et al.,* 2005).

Most information on distribution and movements of belugas of the Beaufort Sea stock was similarly derived using satellite tags. A total of 30 belugas were tagged in the Mackenzie River Delta, Northwest Territories, Canada, during summer and autumn in 1993, 1995, and 1997 (Richard *et al.,* 2001). Approximately half of the tagged whales traveled far offshore of the Alaskan coastal shelf, while the remainder traveled on the shelf or near the continental slope (Richard *et al.,* 2001). Migration through Alaskan waters lasted an average of 15 days. In 1997, all of the tagged belugas reached the western Chukchi Sea (westward of 170° W) between September 15 and October 9. Overall, the main fall migration corridor for beluga whales is believed to be approximately 62 mi (100 km) north of the Project Area (Richard *et al.,* 1997, 2001). Both the spring (April-May) and fall (September-October) migratory corridor BIAs for belugas are far north of the proposed action area because sightings of belugas from aerial surveys in the western Beaufort Sea are primarily on the continental slope, with relatively few sightings on the shelf (Clarke *et al.,* 2015). No reproductive and feeding BIAs exist for belugas in the action area (Clarke *et al.,* 2015).

O'Corry *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 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 stock mix in spring. Citta *et al.* (2016) also observed that tagged eastern Beaufort Sea whales migrated north in 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 should not be present in the action area at any time in general, but especially during summer-late fall, when the beluga exposures would be anticipated for this project. Therefore, we assume all belugas impacted by the proposed project are from the Beaufort Sea stock.

Beluga whales were regularly sighted during the September-October BWASP and the more recent ASAMM aerial surveys of the Alaska Beaufort Sea coast. Burns and Seaman (1985) suggest that beluga whales are strongly associated with the ice fringe and that the route of the autumn migration may be mainly determined by location of the drift ice margin. Relatively few beluga whales have been observed in the nearshore areas (on the continental shelf outside of the barrier islands) of Prudhoe Bay. However, groups of belugas have been detected nearshore in September (Clarke *et al.,* 2011a) and opportunistic sightings have been recorded from Northstar Island and Endicott. These sightings are part of the fall migration which generally occurs farther offshore although a few sightings of a few individuals do occur closer to the shore, and occasionally inside the barrier islands of Foggy Island Bay. During the 2008 seismic survey in Foggy Island Bay, three sightings of eight individuals were observed at a location about 3 mi (4.8 km) east of the Endicott Satellite Drilling Island (Aerts *et al.,* 2008). In 2014, during a BPXA 2D HR shallow geohazard survey in July and August, PSOs recorded eight groups of approximately 19 individual beluga whales, five of which were juveniles (Smultea *et al.,* 2014). During the open water season July 9 through July 19, 2015, five sightings of belugas occurred (Cate *et al.,* 2015). Also in 2015, acoustic monitoring was conducted in Foggy Island Bay between July 6 and September 22, 2015, to characterize ambient sound conditions and to determine the acoustic occurrence of marine mammals near Hilcorp's Liberty Prospect in Foggy Island Bay (Frouin-Jouy *et al.,* 2015). Two recorders collected underwater sound data before, during, and after Hilcorp's 2015 geohazard survey (July 6–Sept. 22). Detected marine mammal vocalizations included those from beluga whales and pinnipeds. Belugas were detected on five days by passive-recorders inside the bay during the three-month survey period (Frouin-Jouy *et al.,* 2015). During the 2016 and 2017 ASAMM surveys flown inside Foggy Island Bay, no belugas were observed. Beluga whales are the cetacean most likely to be encountered during the open-water season in Foggy Island Bay, albeit few in abundance.

Ringed Seal

One of five Arctic ringed seal stocks, the Alaska stock, occurs in U.S. waters. The Arctic subspecies of ringed seals was listed as threatened under the ESA on December 28, 2012, primarily due to expected impacts on the population from declines in sea and snow cover stemming from climate change within the foreseeable future (77 FR 76706). However, on March 11, 2016, the U.S. District Court for the District of Alaska issued a decision in a lawsuit challenging the listing of ringed seals under the ESA (*Alaska Oil and Gas Association et al.* v. *National Marine Fisheries Service,* Case No. 4:14–cv–00029–RRB). The decision vacated NMFS' listing of Arctic ringed seals as a threatened species. However, on February 12, 2018, in *Alaska Oil & Gas Association* v. *Ross*, Case No. 16–35380, the U.S. Court of Appeals for the Ninth Circuit reversed the district court's 2016 decision. As such, Arctic ringed seals remain listed as threatened under the ESA.

During winter and spring in the United States, ringed seals are found throughout the Beaufort and Chukchi Seas; they occur in the Bering Sea as far south as Bristol Bay in years of extensive ice coverage. Most ringed seals that winter in the Bering and Chukchi Seas are thought to migrate northward in spring with the receding ice edge and spend summer in the pack ice of the northern Chukchi and Beaufort Seas.

Ringed seals are resident in the Beaufort Sea year-round, and based on results of previous surveys in Foggy Island Bay (Aerts *et al.,* 2008, Funk *et al.,* 2008, Savarese *et al.,* 2010, Smultea *et al.,* 2014), and monitoring from Northstar Island (Aerts and Richardson, 2009, 2010), they are expected to be the most commonly occurring pinniped in the action area year-round.

Ringed seals are present in the nearshore and sea ice year-round, maintaining breathing holes and excavating subnivean lairs in the landfast ice during the ice-covered season. Ringed seals overwinter in the landfast ice in and around the LDPI action area. There is some evidence indicating that ringed seal densities are low in water depths of less than 3 m, where landfast ice extending from the shoreline generally freezes to the sea bottom in very shallow waters during the course of the winter (Moulton *et al.,* 2002a, Moulton *et al.,* 2002b, Richardson and Williams, 2003). Ringed seals that breed on shorefast ice may either forage within 100 km (62.1 mi) of their breeding habitat or undertake extensive foraging trips to more productive areas at distances of between 100–1,000 kilometers (Kelly *et al.,* 2010b). Adult Arctic ringed seals show site fidelity, returning to the same subnivean site after the foraging period ends. Movements are limited during the ice-bound months, including the breeding season, which limits their foraging activities and may minimize gene flow within the species (Kelly *et al.* 2010b). During April to early June (the reproductive period), radio-tagged ringed seals inhabiting shorefast ice near Prudhoe Bay had home range sizes generally less than 1,336 ac (500 ha) in area (Kelly *et al.,* 2005). Sub-adults, however, were not constrained by the need to defend territories or maintain birthing lairs and followed the advancing ice southward to winter along the Bering Sea ice edge where there may be enhanced feeding opportunities and less exposure to predation (Crawford *et al.,* 2012). Sub-adult ringed seals tagged in the Canadian Beaufort Sea similarly undertook lengthy migrations across the continental shelf of the Alaskan Beaufort Sea into the Chukchi Sea, passing Point Barrow prior to freeze-up in the central Chukchi Sea (Harwood *et al.,* 2012). Factors most influencing seal densities during May through June in the central Beaufort Sea between Oliktok Point and Kaktovik were water depth, distance to the fast ice edge, and ice deformation. Highest densities of seals were at depths of 5 to 35 m (16 to 144 ft) and on relatively flat ice near the fast ice edge (Frost *et al.,* 2004).

Sexual maturity in ringed seals varies with population status. It can be as early as 3 years for both sexes and as late as 7 years for males and 9 years for females. Ringed seals breed annually, with timing varying regionally. Mating takes place while mature females are still nursing their pups on the ice and is thought to occur under the ice near birth lairs. In all subspecies except the Okhotsk, females give birth to a single pup hidden from view within a snow-covered birth lair. Ringed seals are unique in their use of these birth lairs. Pups learn how to dive shortly after birth. Pups nurse for 5 to 9 weeks and, when weaned, are four times their birth weights. Ringed seal pups are more aquatic than other ice seal pups and spend roughly half their time in the water during the nursing period (Lydersen and Hammill, 1993). Pups are normally weaned before the break-up of spring ice.

Ringed seals are an important resource for Alaska Native subsistence hunters. Approximately 64 Alaska Native communities in western and northern Alaska, from Bristol Bay to the Beaufort Sea, regularly harvest ice seals (Ice Seal Committee, 2016). Based on the harvest data from 12 Alaska Native communities, a minimum estimate of the average annual harvest of ringed seals in 2009–2013 is 1,050 seals (Muto *et al.,* 2016).

Other sources of mortality include commercial fisheries and predation by marine and terrestrial predators including polar bears, arctic foxes, walrus, and killer whales. During 2010–2014, incidental mortality and serious injury of ringed seals was reported in 4 of the 22 federally-regulated commercial fisheries in Alaska monitored for incidental mortality and serious injury by fisheries observers: the Bering Sea/Aleutian Islands flatfish trawl, Bering Sea/Aleutian Islands pollock trawl, Bering Sea/Aleutian Islands Pacific cod trawl, and Bering Sea/Aleutian Islands Pacific cod longline fisheries (Muto *et al.,* 2016). From May 1, 2011 to December 31, 2016, 657 seals, which included 233 dead stranded seals, 179 subsistence hunted seals, and 245 live seals, stranded or were sampled during permitted health assessments studies. Species involved were primarily ice seals including ringed, bearded, ribbon, and spotted seals in northern and western Alaska. The investigation identified that clinical signs were likely due to an abnormality of the molt, but a definitive cause for the abnormal molt was not determined.

Bearded Seal

Two subspecies of bearded seal have been described: *E. b. barbatus* from the Laptev Sea, Barents Sea, North Atlantic Ocean, and Hudson Bay (Rice 1998); and *E. b. nauticus* from the remaining portions of the Arctic Ocean and the Bering and Okhotsk seas (Ognev, 1935, Scheffer, 1958, Manning, 1974, Heptner *et al.,* 1976). On December 28, 2012, NMFS listed two distinct population segments (DPSs) of the *E. b. nauticus* subspecies of bearded seals—the Beringia DPS and Okhotsk DPS—as threatened under the ESA (77 FR 76740). Similar to ringed seals, the primary concern for these DPSs is the ongoing and projected loss of sea-ice cover stemming from climate change, which is expected to pose a significant threat to the persistence of these seals in the foreseeable future (based on projections through the end of the 21st century; Cameron *et al.,* 2010). Similar to ringed seals, the ESA listing of the Beringia and Okhotsk DPSs of bearded seal was challenged in the U.S. District Court for the District of Alaska, and on July 25, 2014, the court vacated NMFS' listing of those DPSs of bearded seals as threatened under the ESA (*Alaska Oil and Gas Association et al.* v. *Pritzker,* Case No. 4:13–cv–00018–RRB). However, the U.S. Court of Appeals for the Ninth Circuit reversed the district court's 2016 decision on October 24, 2016 (*Alaska Oil & Gas Association* v. *Pritzer*, Case No. 14–35806). As such, the Beringia and Okhotsk DPSs of bearded seal remain listed as threatened under the ESA.

For the purposes of MMPA stock assessments, the Beringia DPS is considered the Alaska stock of the bearded seal (Muto *et al.,* 2016). The Beringia DPS of the bearded seal includes all bearded seals from breeding populations in the Arctic Ocean and adjacent seas in the Pacific Ocean between 145° E longitude (Novosibirskiye) in the East Siberian Sea and 130° W longitude in the Canadian Beaufort Sea, except west of 157° W longitude in the Bering Sea and west of the Kamchatka Peninsula (where the Okhotsk DPS is found). They generally prefer moving ice that produces natural openings and areas of open-water (Heptner *et al.,* 1976, Fedoseev, 1984, Nelson *et al.,* 1984). They usually avoid areas of continuous, thick, shorefast ice and are rarely seen in the vicinity of unbroken, heavy, drifting ice or large areas of multi-year ice (Fedoseev, 1965, Burns and Harbo, 1972, Burns and Frost, 1979, Burns, 1981, Smith, 1981, Fedoseev, 1984, Nelson *et al.,* 1984).

Spring surveys conducted in 1999–2000 along the Alaska coast indicate that bearded seals are typically more abundant 20–100 nautical miles (nmi) from shore than within 20 nmi from shore, except for high concentrations nearshore to the south of Kivalina (Bengtson *et al.,* 2005; Simpkins *et al.,* 2003).

Although bearded seal vocalizations (produced by adult males) have been recorded nearly year-round in the Beaufort Sea (MacIntyre *et al.,* 2013, MacIntyre *et al.,* 2015), most bearded seals overwinter in the Bering Sea. In addition, during late winter and early spring, Foggy Island Bay is covered with shorefast ice and the nearest lead systems are at least several kilometers away, making the area unsuitable habitat for bearded seals. Therefore, bearded seals are not expected to be encountered in or near the LDPI portion of the action area during this time (from late winter through early spring).

During the open-water period, the Beaufort Sea likely supports fewer bearded seals than the Chukchi Sea because of the more extensive foraging habitat available to bearded seals in the Chukchi Sea. In addition, as a result of shallow waters, the sea floor in Foggy Island Bay south of the barrier islands is often scoured by ice, which limits the presence of bearded seal prey species. Nevertheless, aerial and vessel-based surveys associated with seismic programs, barging, and government surveys in this area between 2005 and 2010 reported several bearded seal sightings (Green and Negri, 2005, Green and Negri 2006, Green *et al.,* 2007, Funk *et al.,* 2008, Hauser *et al.,* 2008, Savarese *et al.,* 2010, Clarke *et al.,* 2011, Reiser *et al.,* 2011). In addition, eight bearded seal sightings were documented during shallow geohazard seismic and seabed mapping surveys conducted in July and August 2014 (Smultea *et al.,* 2014). Frouin-Mouy *et al.* (2016) conducted acoustic monitoring in Foggy Island Bay from early July to late September 2014, and detected pinniped vocalizations on 10 days via the nearshore recorder and on 66 days via the recorder farther offshore. Although the majority of these detections were unidentified pinnipeds, bearded seal vocalizations were positively identified on two days (Frouin-Mouy *et al.,* 2016).

Bearded seals are an important resource for Alaska Native subsistence hunters. Approximately 64 Alaska Native communities in western and northern Alaska, from Bristol Bay to the Beaufort Sea, regularly harvest ice seals (Ice Seal Committee, 2016). However, during 2009–2013, only 12 of 64 coastal communities were surveyed for bearded seals; and, of those communities, only 6 were surveyed for two or more consecutive years (Ice Seal Committee, 2016). Based on the harvest data from these 12 communities (Table 2), a minimum estimate of the average annual harvest of bearded seals in 2009–2013 is 390 seals. Harvest surveys are designed to estimate harvest within the surveyed community, but because of differences in seal availability, cultural hunting practices, and environmental conditions, extrapolating harvest numbers beyond that community is not appropriate (Muto *et al.,* 2016).

Of the 22 federally-regulated U.S. commercial fisheries in Alaska monitored for incidental mortality and serious injury by fisheries observers, 12 fisheries could potentially interact with bearded seals. During 2010–2014, incidental mortality and serious injury of bearded seals occurred in three fisheries: The Bering Sea/Aleutian Islands pollock trawl, Bering Sea/ Aleutian Islands flatfish trawl, and Bering Sea/Aleutian Islands Pacific cod trawl fisheries (Muto *et al.,* 2016). This species was also part of the aforementioned 2011–2016 UME.

Spotted Seal

Spotted seals are distributed along the continental shelf of the Bering, Chukchi, and Beaufort seas, and the Sea of Okhotsk south to the western Sea of Japan and northern Yellow Sea. Eight main areas of spotted seal breeding have been reported (Shaughnessy and Fay, 1977) and Boveng *et al.* (2009) grouped those breeding areas into three DPSs: The Bering DPS, which includes breeding areas in the Bering Sea and portions of the East Siberian, Chukchi, and Beaufort seas that may be occupied outside the breeding period; the Okhotsk DPS; and the Southern DPS, which includes spotted seals breeding in the Yellow Sea and Peter the Great Bay in the Sea of Japan. For the purposes of MMPA stock assessments, NMFS defines the Alaska stock of spotted seals to be that portion of the Bering DPS in U.S. waters.

The distribution of spotted seals is seasonally related to specific life-history events that can be broadly divided into two periods: Late-fall through spring, when whelping, nursing, breeding, and molting occur in association with the presence of sea ice on which the seals haul out, and summer through fall when seasonal sea ice has melted and most spotted seals use land for hauling out (Boveng *et al.,* 2009). Spotted seals are most numerous in the Bering and Chukchi seas (Quakenbush, 1988), although small numbers do range into the Beaufort Sea during summer (Rugh *et al.,* 1997; Lowry *et al.,* 1998).

At Northstar, few spotted seals have been observed. A total of 12 spotted seals were positively identified near the source-vessel during open-water seismic programs in the central Alaskan Beaufort Sea, generally occurring near Northstar from 1996 to 2001 (Moulton and Lawson, 2002). The number of spotted seals observed per year ranged from zero (in 1998 and 2000) to four (in 1999).

During a seismic survey in Foggy Island Bay, PSOs recorded 18 pinniped sightings, of which one was confirmed as a spotted seal (Aerts *et al.,* 2008). Spotted seals were the second most abundant seal species observed by PSOs during Hilcorp's geohazard surveys in July-August 2014 (Smultea *et al.,* 2014) and in July 2015 (Cate *et al.,* 2015). Given their seasonal distribution and low numbers in the nearshore waters of the central Alaskan Beaufort Sea, no spotted seals are expected in the action area during late winter and spring, but could be present in low numbers during the summer or fall.

Similar to other ice seal species, spotted seals are an important resource for Alaska Native subsistence hunters. Of the 12 communities (out of 64) surveyed during 2010–2014, the minimum annual spotted seal harvest estimates totaled across 12 out of 64 user communities surveyed ranged from 83 (in 2 communities) to 518 spotted seals (in 10 communities). Based on the harvest data from these 12 communities, a minimum estimate of the average annual harvest of spotted seals in 2010–2014 is 328 seals.

From 2011–2015, incidental mortality and serious injury of spotted seals occurred in 2 of the 22 federally-regulated U.S. commercial fisheries in Alaska monitored for incidental mortality and serious injury by fisheries observers: The Bering Sea/Aleutian Islands flatfish trawl and Bering Sea/ Aleutian Islands Pacific cod longline fisheries. In 2014, there was one report of a mortality incidental to research on the Alaska stock of spotted seals, resulting in a mean annual mortality and serious injury rate of 0.2 spotted seals from this stock in 2011–2015. This species was also part of the aforementioned 2011–2016 UME.

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. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.,* Richardson *et al.,* 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al.* (2007 and 2019) recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.,* low-frequency cetaceans). Subsequently, NMFS (2016) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 dB threshold from the normalized composite audiograms, with an exception for lower limits for low-frequency cetaceans where the result was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. The functional groups and the associated frequencies are indicated below (note that these frequency ranges correspond to the range for the composite group, with the entire range not necessarily reflecting the capabilities of every species within that group):

- *Low-frequency cetaceans (mysticetes):* Generalized hearing is estimated to occur between approximately 7 (hertz) Hz and 35 kHz;
- *Mid-frequency cetaceans (larger toothed whales, beaked whales, and most delphinids):* Generalized hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- *High-frequency cetaceans (porpoises, river dolphins, and members of the genera Kogia and Cephalorhynchus; including two members of the genus Lagenorhynchus, on the basis of recent echolocation data and genetic data):* Generalized hearing is estimated to occur between approximately 275 Hz and 160 kHz;
- *Pinnipeds in water; Phocidae (true seals):* Functional hearing is estimated to occur between approximately 50 Hz to 86 kHz; and
- *Pinnipeds in water; Otariidae (eared seals):* Functional hearing is estimated to occur between approximately 60 Hz and 39 kHz.

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. Six marine mammal species (three cetacean and three phocid pinniped) have the potential to co-occur with Hilcorp's LDPI project. Of the three cetacean species that may be present, two are classified as low-frequency cetaceans (*i.e.,* all mysticete species) and one is classified as a mid-frequency cetacean (beluga whale).

Potential Effects of the Specified Activity on Marine Mammals and Their Habitat

This section includes a summary and discussion of the ways that components of the specified activity may impact marine mammals and their habitat. The *Estimated Take by Incidental Harassment* 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 by Incidental Harassment* 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 how those impacts on individuals are likely to impact marine mammal species or stocks.

The potential impacts of the proposed LDPI on marine mammals involve both non-acoustic and acoustic effects. Potential non-acoustic effects could result from the physical presence of personnel, structures and equipment, construction or maintenance activities, and the occurrence of oil spills. The LDPI project also has the potential to result in mortality and serious injury of ringed seals via direct physical interaction on ice roads and harass (by Level A harassment and Level B harassment) cetaceans and seals via acoustic disturbance. We first discuss the effects of ice road and ice trail construction and maintenance on ringed seals with respect to direct human interaction followed by an in-depth discussion on sound and potential effects on marine mammals from acoustic disturbance. The potential for and potential impacts from both small and large oil spills are discussed in more detail later in this section; however, please note Hilcorp did not request, nor is NMFS proposing to authorize, take from oil spills.

Mortality, Serious Injury and Non-Acoustic Harassment—Ice Seals

This section discusses the potential impacts of ice road construction, use and maintenance on ringed seals, the only species likely to be encountered during this activity. Acoustic impacts from this and other activities (*e.g.,* pile driving) are provided later in the document. To assess the potential impacts from ice roads, one must understand sea ice dynamics, the influence of ice roads on sea ice, and ice seal ecology.

Sea ice is constantly moving and flexing due to winds, currents, and snow load. Sea ice grows (thickens) to its maximum in March, then begins to degrade once solar heating increases above the necessary threshold. Sea ice will thin and crack due to atmospheric pressure and temperature changes. In the absence of ice roads, sea ice is constantly cracking, deforming (creating pressure ridges and hummocks), and thickening or thinning. Ice road construction interrupts this dynamic by permanently thickening and stabilizing the sea ice for the season; however, it thins and weakens sea ice adjacent to ice roads due to weight of the ice road and use as speed and load of vehicles using the road creates pressure waves in the ice, cracking natural ice adjacent to the road (pers. comm., M. Williams, August 17, 2018). These cracks and thinned ice, occurring either naturally or adjacent to ice roads, are easily exploitable habitat for ringed seals.

As discussed in the Description of Marine Mammal section, ringed seals build lairs which are typically concentrated along pressure ridges, cracks, leads, or other surface deformations (Smith and Stirling 1975, Hammill and Smith, 1989, Furgal *et al.,* 1996). To build a lair, a pregnant female will first excavate a breathing hole, most easily in cracked or thin ice. The lair will then be excavated (snow must be present for lair construction). Later in the season, basking holes may be created from collapsed lairs or new basking holes will be excavated; both of which must have breathing holes and surface access (pers. comm., M. Williams, August 17, 2018).

Williams *et al.* (2006) provides the most in-depth discussion of ringed seal use around Northstar Island, the first offshore oil and gas production facility seaward of the barrier islands in the Alaskan Beaufort Sea. Northstar is located 9.5 km from the mainland on a manmade gravel island in 12 m of water. In late 2000 and early 2001, sea ice in areas near Northstar Island where summer water depth was greater than 1.5 m was searched for ringed seal structures. At Northstar, ringed seals were documented creating and using sea ice structures (basking holes, breathing holes, or birthing lairs) within 11 to 3,500 m (36 to 11,482 ft) of Northstar infrastructure which includes ice roads, pipeline, and the island itself (Williams *et al.,* 2006). Birth lairs closest to Northstar infrastructure were 882 m and 144 m (2,894 and 374 ft) from the island and ice road, respectively (Williams *et al.,* 2006). Two basking holes were found within 11 and 15 m (36 and 49 ft) from the nominal centerline of a Northstar ice road and were still in use by the end of the study (Williams *et al.,* 2006). Although located in deeper water outside of the barrier islands, we anticipate ringed seals would use ice around the LDPI and associated ice roads in a similar manner.

Since 1998, there have been three documented incidents of ringed seal interactions on North Slope ice roads, with one recorded mortality. On April 17, 1998, during a vibroseis on-ice seismic operation outside of the barrier islands east of Bullen Point in the eastern Beaufort Sea, a ringed seal pup was killed when its lair was destroyed by a Caterpillar tractor clearing an ice road. The lair was located on ice over water 9 m (29 ft) deep with an ice thickness of 1.3 m (4.3 ft). It was reported that an adult may have been present in the lair when it was destroyed. Crew found blood on the ice near an open hole approximately 1.3 km (0.8 mi) from the destroyed lair; this could have been from a wounded adult (MacLean, 1998). On April 24, 2018, a Tucker (a tracked vehicle used in snow conditions) traveling on a Northstar sea ice trail broke through a brine pocket. After moving the Tucker, a seal pup climbed out of the hole in the ice, but no adult was seen in the area. The seal pup remained in the area for the next day and a half. This seal was seen in an area with an estimated water depth of 6 to 7 m (20 to 24 ft) (Hilcorp, 2018b). The third reported incident occurred on April 28, 2018, when a contractor performing routine maintenance activities to relocate metal plates beneath the surface of the ice road from Oliktok Point to Spy Island Drill site spotted a ringed seal pup next to what may have been a lair site. No adult was observed in the area. The pup appeared to be acting normally and was seen going in and out of the opening several times (Eni, 2018).

Overall, NMFS does not anticipate the potential for mortality or serious injury of ringed seals to be high given there has been only one documented mortality over 25 years of ice road construction in the Arctic. However, the potential does exist; therefore, we are including a small amount of mortality or serious injury (n = 2) in this proposed rule over the five-year life of the regulations. To mitigate this risk, NMFS and Hilcorp have developed a number of best management practices (BMPs) aimed at reducing the potential of disturbing (*e.g.,* crushing) ice seal structures on ice roads (see Proposed Mitigation and Monitoring).

Potential Acoustic Impacts—Level A Harassment and Level B Harassment

In the following discussion, we provide general background information on sound before considering potential effects to marine mammals from sound produced by construction and operation of the LDPI.

Description of Sound Sources

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

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

Root mean square (rms) is the quadratic mean sound pressure over the duration of an impulse. Root mean square is calculated by squaring all of the sound amplitudes, averaging the squares, and then taking the square root of the average (Urick, 1983). Root mean square accounts for both positive and negative values; squaring the pressures makes all values positive so that they may be accounted for in the summation of pressure levels (Hastings and Popper, 2005). This measurement is often used in the context of discussing behavioral effects, in part because behavioral effects, which often result from auditory cues, may be better expressed through averaged units than by peak pressures.

Sound exposure level (SEL; represented as dB re 1 μPa^2-s) represents the total energy in a stated frequency band over a stated time interval or event, and considers both intensity and duration of exposure. The per-pulse SEL is calculated over the time window containing the entire pulse (*i.e.,* 100 percent of the acoustic energy). SEL is a cumulative metric; it can be accumulated over a single pulse, or calculated over periods containing multiple pulses. Cumulative SEL represents the total energy accumulated by a receiver over a defined time window or during an event. Peak sound pressure (also referred to as zero-to-peak sound pressure or 0-pk) is the maximum instantaneous sound pressure measurable in the water at a specified distance from the source, and is represented in the same units as the rms sound pressure.

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

Even in the absence of sound from the specified activity, the underwater environment is typically loud due to ambient sound, which is defined as environmental background sound levels lacking a single source or point (Richardson *et al.,* 1995). The sound level of a region is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g.,* wind and waves, earthquakes, ice, atmospheric sound), biological (*e.g.,* sounds produced by marine mammals, fish, and invertebrates), and anthropogenic (*e.g.,* vessels, dredging, construction) sound. A number of sources contribute to ambient sound, including wind and waves, which are a main source of naturally occurring ambient sound for frequencies between 200 Hz and 50 kHz (Mitson, 1995). In general, ambient sound levels tend to increase with increasing wind speed and wave height. Precipitation can become an important component of total sound at frequencies above 500 Hz, and possibly down to 100 Hz during quiet times. Marine mammals can contribute significantly to ambient sound levels, as can some fish and snapping shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz. Sources of ambient sound related to human activity include transportation (surface vessels), dredging and construction, oil and gas drilling and production, geophysical surveys, sonar, and explosions. Vessel noise typically dominates the total ambient sound for frequencies between 20 and 300 Hz. In general, the frequencies of anthropogenic sounds are below 1 kHz and, if higher frequency sound levels are created, they attenuate rapidly.

The sum of the various natural and anthropogenic sound sources that comprise ambient sound at any given location and time depends not only on the source levels (as determined by current weather conditions and levels of biological and human activity) but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor, and is frequency-dependent. As a result of the dependence on a large number of varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Sound levels at a given frequency and location can vary by 10–20 decibels (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.

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

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

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

The impulsive sound generated by impact hammers is characterized by rapid rise times and high peak levels. Vibratory hammers produce non-impulsive, continuous noise at levels significantly lower than those produced by impact hammers. Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (*e.g.,* Nedwell and Edwards, 2002; Carlson *et al.,* 2005).

Acoustic Effects

We previously provided general background information on marine mammal hearing (see ''Description of Marine Mammals in the Area of the Specified Activity''). Here, we discuss the potential effects of sound on marine mammals.

Potential Effects of Underwater Sound—Note that, in the following discussion, we refer in many cases to a review article concerning studies of noise-induced hearing loss conducted from 1996–2015 (*i.e.,* Finneran, 2015). For study-specific citations, please see that work. Anthropogenic sounds cover a broad range of frequencies and sound levels and can have a range of highly variable impacts on marine life, from none or minor to potentially severe responses, depending on received levels, duration of exposure, behavioral context, and various other factors. The potential effects of underwater sound from active acoustic sources can potentially result in one or more of the following: Temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, stress, and masking (Richardson *et al.,* 1995; Gordon *et al.,* 2004; Nowacek *et al.,* 2007; Southall *et al.,* 2007; Götz *et al.,* 2009). The degree of effect is intrinsically related to the signal characteristics, received level, distance from the source, and duration of the sound exposure. In general, sudden, high level sounds can cause hearing loss, as can longer exposures to lower level sounds. Temporary or permanent loss of hearing will occur almost exclusively for noise within an animal's hearing range. We first describe specific manifestations of acoustic effects before providing discussion specific to pile driving.

Richardson *et al.* (1995) described zones of increasing intensity of effect that might be expected to occur, in relation to distance from a source and assuming that the signal is within an animal's hearing range. First is the area within which the acoustic signal would be audible (potentially perceived) to the animal but not strong enough to elicit any overt behavioral or physiological response. The next zone corresponds with the area where the signal is audible to the animal and of sufficient intensity to elicit behavioral or physiological responsiveness. Third is a zone within which, for signals of high intensity, the received level is sufficient to potentially cause discomfort or tissue damage to auditory or other systems. Overlaying these zones to a certain extent is the area within which masking (*i.e.,* when a sound interferes with or masks the ability of an animal to detect a signal of interest that is above the absolute hearing threshold) may occur; the masking zone may be highly variable in size.

Potential effects from impulsive sound sources can range in severity from effects such as behavioral disturbance or tactile perception to physical discomfort, slight injury of the internal organs and the auditory system, or mortality (Yelverton *et al.,* 1973). Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to high level underwater sound or as a secondary effect of extreme behavioral reactions (*e.g.,* change in dive profile as a result of an avoidance reaction) caused by exposure to sound include neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage (Cox *et al.,* 2006; Southall *et al.,* 2007; Zimmer and Tyack, 2007; Tal *et al.,* 2015). The construction and operational activities associated with the LDPI do not involve the use of devices such as explosives or mid-frequency tactical sonar that are associated with these types of effects.

Auditory Threshold Shifts

NMFS defines threshold shift (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 threshold shift is customarily expressed in decibels (ANSI, 1995). Threshold shift can be permanent (PTS) or temporary (TTS). As described in NMFS (2018), 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 animal uses sound within the frequency band of the signal; *e.g.,* Kastelein *et al.,* 2014b), and their overlap (*e.g.,* spatial, temporal, and spectral).

Marine mammals exposed to high-intensity sound, or to lower-intensity sound for prolonged periods, can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Finneran, 2015). TS can be permanent (PTS), in which case the loss of hearing sensitivity is not fully recoverable, or temporary (TTS), in which case the animal's hearing threshold would recover over time (Southall *et al.,* 2007). Repeated sound exposure that leads to TTS could cause PTS. In severe cases of PTS, there can be total or partial deafness, while in most cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter, 1985).

When PTS occurs, there is physical damage to the sound receptors in the ear (*i.e.,* tissue damage), whereas TTS represents primarily tissue fatigue and is reversible (Southall *et al.,* 2007). In addition, other investigators have suggested that TTS is within the normal bounds of physiological variability and tolerance and does not represent physical injury (*e.g.,* Ward, 1997).

Therefore, NMFS does not consider TTS to constitute auditory injury.

Relationships between TTS and PTS thresholds have not been studied in marine mammals, and there is no PTS data for cetaceans, but such relationships are assumed to be similar to those in humans and other terrestrial mammals. PTS typically occurs at exposure levels at least several decibels above (a 40-dB threshold shift approximates PTS onset; *e.g.,* Kryter *et al.,* 1966; Miller, 1974) that inducing mild TTS (a 6-dB threshold shift approximates TTS onset; *e.g.,* Southall *et al.* 2007). Based on data from terrestrial mammals, a precautionary assumption is that the PTS thresholds for impulse 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). 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.

TTS is the mildest form of hearing impairment that can occur during exposure to sound (Kryter, 1985). 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. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals.

Marine mammal hearing plays a critical role in communication with conspecifics, and interpretation of environmental cues for purposes such as predator avoidance and prey capture. 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. 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 occurs during a time 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.

Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin (*Tursiops truncatus*), beluga whale (*Delphinapterus leucas*), harbor porpoise, and Yangtze finless porpoise (*Neophocoena asiaeorientalis*)) and three species of pinnipeds (northern elephant seal, harbor seal, and California sea lion) exposed to a limited number of sound sources (*i.e.,* mostly tones and octave-band noise) in laboratory settings (Finneran, 2015). TTS was not observed in trained spotted (*Phoca largha*) and ringed (*Pusa hispida*) seals exposed to impulsive noise at levels matching previous predictions of TTS onset (Reichmuth *et al.,* 2016). In general, harbor seals and harbor porpoises have a lower TTS onset than other measured pinniped or cetacean species (Finneran, 2015). Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species. There are no data available on noise-induced hearing loss for mysticetes. For summaries of data on TTS in marine mammals or for further discussion of TTS onset thresholds, please see Southall *et al.* (2007), Finneran and Jenkins (2012), Finneran (2015), and NMFS (2018).

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, 2016). A TTS of 6 dB is considered the minimum threshold shift clearly larger than any day-to-day or session-to-session variation in a subject's normal hearing ability (Schlundt *et al.,* 2000; Finneran *et al.,* 2000; Finneran *et al.,* 2002, as reviewed in Southall *et al.,* 2007 for a review). TTS can last from minutes or hours to days (*i.e.,* there is recovery), occur in specific frequency ranges (*i.e.,* an animal might only have a temporary loss of hearing sensitivity between the frequencies of 1 and 10 kHz)), and can be of varying amounts (for example, an animal's hearing sensitivity might be temporarily reduced by only 6 dB or reduced by 30 dB). Currently, TTS measurements exist for only four species of cetaceans (bottlenose dolphins, belugas, harbor porpoises, and Yangtze finless porpoise) and three species of pinnipeds (Northern elephant seal, harbor seal, and California sea lion). These TTS measurements are from a limited number of individuals within these species.

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.

Behavioral Effects—Behavioral disturbance from elevated noise exposure 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 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.,* 2003; Southall *et al.,* 2007; Weilgart, 2007). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison *et al.,* 2012), and can vary depending on characteristics associated with the sound source (*e.g.,* whether it is moving or stationary, number of sources, distance from the source). Please see Appendices B–C of Southall *et al.* (2007) for a review 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.,* 2003). 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, 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; NRC, 2003; Wartzok *et al.,* 2003). 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 (typically airguns or acoustic harassment devices) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds, 2002; see also Richardson *et al.,* 1995; Nowacek *et al.,* 2007). However, many delphinids approach low-frequency airgun source vessels with no apparent discomfort or obvious behavioral change (*e.g.,* Barkaszi *et al.,* 2012), indicating the importance of frequency output in relation to the species' hearing sensitivity.

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. 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 (*e.g.,* Lusseau and Bejder, 2007; Weilgart, 2007; NRC, 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). 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. 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 relationship between prey availability, foraging effort and success, and the life history stage 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; Gailey *et al.,* 2016).

Marine mammals vocalize for different purposes and across multiple modes, such as whistling, echolocation click production, calling, and singing. Changes in vocalization behavior in response to anthropogenic noise can occur for any of these modes and may result from a need to compete with an increase in background noise or may reflect increased vigilance or a startle response. For example, in the presence of potentially masking signals, humpback whales and killer whales have been observed to increase the length of their songs (Miller *et al.,* 2000; Foote *et al.,* 2004), while right whales have been observed to shift the frequency content of their calls upward while reducing the rate of calling in areas of increased anthropogenic noise (Parks *et al.,* 2007). In some cases, animals may cease sound production during production of aversive signals (Bowles *et al.,* 1994).

Avoidance is the displacement of an individual from an area or migration path as a result of the presence of a sound or other stressors, and is one of the most obvious manifestations of disturbance in marine mammals (Richardson *et al.,* 1995). For example, gray whales are known to change direction—deflecting from customary migratory paths—in order to avoid noise from airgun surveys (Malme *et al.,* 1984). 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). 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 (Evans and England, 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 fish 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 five-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 one 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 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 Responses—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.,* Seyle, 1950; Moberg, 2000). 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 and 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 (Fair and Becker, 2000; Romano *et al.,* 2002b) 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 ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right 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 (NRC, 2003).

Auditory 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; Erbe *et al.,* 2016). 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.,* 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.

Under certain circumstances, marine mammals experiencing significant masking could also be impaired from maximizing their performance fitness in survival and reproduction. Therefore, when the coincident (masking) sound is man-made, it may be considered harassment when disrupting or altering critical behaviors. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

The frequency range of the potentially masking sound is important in determining any potential behavioral impacts. For example, low-frequency signals may have less effect on high-frequency echolocation sounds produced by odontocetes but are more likely to affect detection of mysticete communication calls and other potentially important natural sounds such as those produced by surf and some prey species. The masking of communication signals by anthropogenic noise may be considered as a reduction in the communication space of animals (*e.g.,* Clark *et al.,* 2009) and may result in energetic or other costs as animals change their vocalization behavior (*e.g.,* Miller *et al.,* 2000; Foote *et al.,* 2004; Parks *et al.,* 2007; Di Iorio and Clark, 2009; Holt *et al.,* 2009). Masking can be reduced in situations where the signal and noise come from different directions (Richardson *et al.,* 1995), through amplitude modulation of the signal, or through other compensatory behaviors (Houser and Moore, 2014). Masking can be tested directly in captive species (*e.g.,* Erbe, 2008), but in wild populations it must be either modeled or inferred from evidence of masking compensation. There are few studies addressing real-world masking sounds likely to be experienced by marine mammals in the wild (*e.g.,* Branstetter *et al.,* 2013).

Masking affects both senders and receivers of acoustic signals and can potentially have long-term chronic effects on marine mammals at the population level as well as at the individual level. Low-frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of SPL) in the world's ocean from pre-industrial periods, with most of the increase from distant commercial shipping (Hildebrand, 2009). All anthropogenic sound sources, but especially chronic and lower-frequency signals (*e.g.,* from vessel traffic), contribute to elevated ambient sound levels, thus intensifying masking.

Potential Effects of Hilcorp's Activity—As described previously (see ''Description of the Specified Activity''), Hilcorp proposes to build ice roads, install a pipeline, construct and operate a gravel island using impact and vibratory pile driving, and drill for oil in Foggy Island Bay. These activities would occur under ice and open water conditions (with the exception of ice roads). These activities have the potential to harass marine mammals from acoustic disturbance (all species) and via human disturbance/presence on ice (ice seals). There is also potential for ice seals, specifically ringed seals, to be killed in the event a lair is crushed during ice road construction and maintenance in undisturbed areas after March 1, annually.

NMFS analyzed the potential effects of oil and gas activities, including construction of a gravel island and associated infrastructure, in its 2016 EIS on the Effects of Oil and Gas Activities in the Arctic Ocean (NMFS, 2016; available at *https://www.fisheries.noaa.gov/resource/document/effects-oil-and-gas-activities-arctic-ocean-final-environmental-impact*). Although that document focuses on seismic exploration, there is a wealth of information in that document on marine mammal impacts from anthropogenic noise. More specific to the proposed project, BOEM provides a more detailed analysis on the potential impacts of the Liberty LDPI in its' EIS on the Liberty Development and Production Plan, Beaufort Sea, Alaska, on which NMFS was a cooperating agency (BOEM, 2018; available at *https://www.boem.gov/Hilcorp-Liberty/*). We refer to those documents, specifically Chapter 4 of each of those documents, as a comprehensive impact assessment but provide a summary and complimentary analysis here.

The effects of pile driving on marine mammals are dependent on several factors, including the size, type, and depth of the animal; the depth, intensity, and duration of the pile driving sound; the depth of the water column; the substrate of the habitat; the standoff distance between the pile and the animal; and the sound propagation properties of the environment. With both types of pile driving, it is likely that the onset of pile driving could result in temporary, short term changes in an animal's typical behavioral patterns and/or avoidance of the affected area. These behavioral changes may include (as summarized in Richardson *et al.,* 1995): Changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where sound sources are located; and/or flight responses.

For all noise-related activities, bowhead and gray whales are not anticipated to be exposed to noise above NMFS harassment threshold often. As previously described, Hilcorp aims to conduct all pile driving during the ice-covered season, as was done at Northstar; however, they are allowing for unforeseen scheduling delays. Bowheads are not present near LDPI during the winter and are not normally found in the development area during mid-summer (July through mid-August) when the whales are further east in the Canadian Beaufort. Therefore there are no impacts on foraging habitat for bowhead whales during mid-summer. Starting in late August and continuing until late October, bowheads may be exposed to sounds from the proposed activities at LDPI or may encounter vessel traffic to and from the island. It is unlikely that any whales would be displaced from sounds generated by activities at the LDPI due to their distance from the offshore migrating whales, and the effects of buffering from the barrier islands. Any displacement would be subtle and involve no more than a small proportion of the passing bowheads, likely less than that found at Northstar (Richardson, 2003, 2004; Mcdonald *et al.,* 2012). This is due to the baffling-effect of the barrier island between the construction activity and the main migratory pathway of bowhead whales. Moreover, mitigation such as avoiding pile driving during the fall bowhead whale hunt further reduces potential for harassment as whales are migrating offshore.

Ongoing activities such as drilling may also harass marine mammals; however, drilling sounds from artificial islands are relatively low. As summarized in Richardson *et al.* (1995), beluga whales (the cetacean most likely to occur in Foggy Island Bay) are often observed near drillsites within 100 to 150 m (328.1 to 492.1 ft) from artificial islands. Drilling operations at Northstar facility during the open-water season resulted in brief, minor localized effects on ringed seals with no consequences to ringed seal populations (Richardson and Williams, 2004). Adult ringed seals seem to tolerate drilling activities. Brewer *et al.* (1993) noted ringed seals were the most common marine mammal sighted and did not seem to be disturbed by drilling operations at the Kuvlum 1 project in the Beaufort Sea. Southall *et al.* (2007) reviewed literature describing responses of pinnipeds to continuous sound and reported that the limited data suggest exposures between ~90 and 140 dB re 1 μPa generally do not appear to induce strong behavioral responses in pinnipeds exposed to continuous sounds in water. Hilcorp will conduct acoustic monitoring during drilling to determine if future incidental take authorizations are warranted from LDPI operation.

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences of behavioral modification could be expected to be biologically significant if the change affects growth, survival, or reproduction. Significant behavioral modifications that could lead to effects on growth, survival, or reproduction, such as drastic changes in diving/surfacing patterns or significant habitat abandonment are extremely unlikely in this area (*i.e.,* shallow waters in modified industrial areas).

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

Whether impact or vibratory driving, sound sources would be active for relatively short durations, with relation to the durations animals use sound (either emitting or receiving) on a daily basis, and over a small spatial scale relative to marine mammal ranges. Therefore, the potential impacts from masking are limited in both time and space. Further, the frequencies output of pile driving are low relative to the range of frequencies used by most species for vital life functions such as communication or foraging. In summary, we expect some masking to occur; however, the biological impacts of any potential masking are anticipated to be negligible. Finally, any masking that might rise to Level B harassment under the MMPA would occur concurrently within the zones of behavioral harassment already estimated for vibratory and impact pile driving, and which have already been taken into account in the exposure analysis.

Oil Spills

During the life of the proposed regulations, Hilcorp would be actively drilling for crude oil in Foggy Island Bay and transporting that oil via a single-phase subsea pipe-in-pipe pipeline from the LDPI to shore, where an aboveground pipeline will transport crude to the existing Badami pipeline. From there, crude will be transported to the Endicott Sales Oil Pipeline, which ties into Pump Station 1 of the TransAlaska Pipeline System (TAPS) for eventual delivery to a refinery. Whenever oil is being extracted or transported, there is potential for a spill. Accidental oil spills have a varying potential to occur and with varying impacts on marine mammals. For example, if a spill or pipeline leak occurs during the winter, oil would be trapped by the ice. However, response may be more difficult due in part to the presence of ice. If a spill or leak occurs during the open-water season, oil may disperse more widely; however, response time may be more prompt. Spills may also be large or small. Small spills are defined as spills of less than 1,000 barrels (bbls), and a large spill is greater than 1,000 bbls. For reference, 1 bbl equates to 42 gallons.

Based on BOEM's oil spill analyses in its EIS, the only sized spills that are reasonably likely to occur in association with the proposed action are small spills (<1,000 bbls) (BOEM, 2017a). Small spills, although accidental, occur during oil and gas activities with generally routine frequency and are considered likely to occur during development, production, and/or decommissioning activities associated with the proposed action. BOEM estimates about 70 small spills, most of which would be less than 10 bbls, would occur over the life of the Liberty Project. Small crude oil spills would not likely occur before drilling operations begin. Small refined oil spills may occur during development, production, and decommissioning. The majority of small spills are likely to occur during the approximate 22-year production period, which is an average of about 3 spills per year.

The majority of small spills would be contained on the proposed LDPI or landfast ice (during winter). BOEM anticipates that small refined spills that reach the open water would be contained by booms or absorbent pads; these small spills would also evaporate and disperse within hours to a few days. A 3 bbl refined oil spill during summer is anticipated to evaporate and disperse within 24 hours, and a 200 bbl refined oil spill during summer is anticipated to evaporate and disperse within 3 days (BOEM, 2017a).

A large spill is a statistically unlikely event. The average number of large spills for the proposed action was calculated by multiplying the spill rate (Bercha International Inc., 2016; BOEM, 2017a), by the estimated barrels produced (0.11779 bbl or 117.79 Million Barrels). By adding the mean number of large spills from the proposed LDPI and wells (~0.0043) and from pipelines (~0.0024), a mean total of 0.0067 large spills were calculated for the proposed action. Based on the mean spill number, a Poisson distribution indicates there is a 99.33 percent chance that no large spill occurs over the development and production phases of the project, and a 0.67 percent chance of one or more large spills occurring over the same period. The statistical distribution of large spills and gas releases shows that it is much more likely that no large spills or releases occur than that one or more occur over the life of the project. However, a large spill has the potential to seriously harm ESA-listed species and their environment. Assuming one large spill occurs instead of zero allows BOEM to more fully estimate and describe potential environmental effects (BOEM, 2017a).

Hilcorp is currently developing its oil spill response plan in coordination with the Bureau of Safety and Environmental Enforcement (BSEE) who must approve the plan. BSEE oversees oil spill planning and preparedness for oil and gas exploration, development, and production facilities in both state and Federal offshore waters of the United States. NMFS provided BSEE with its recommended marine mammal oil spill response protocols available at *https://www.fisheries.noaa.gov/resource/document/pinniped-and-cetacean-oil-spill-response-guidelines.* NMFS has provided BSEE with recommended marine mammal protocols should a spill occur. BSEE has indicated NMFS will have opportunity to provide comments on Hilcorp's plan during a Federal agency public comment period. As noted above, Hilcorp did not request, and NMFS is not proposing to authorize, take of marine mammals incidental to oil spills. NMFS does not authorize incidental take from oil spills under section 101(a)(5)(A) of the MMPA in general, and oil spills are not part of the specified activity in this case.

Cetaceans

While direct mortality of cetaceans is unlikely, exposure to spilled oil could lead to skin irritation, baleen fouling (which might reduce feeding efficiency), respiratory distress from inhalation of hydrocarbon vapors, consumption of some contaminated prey items, and temporary displacement from contaminated feeding areas. Geraci and St. Aubin (1990) summarize effects of oil on marine mammals, and Bratton *et al.* (1993) provides a synthesis of knowledge of oil effects on bowhead whales. The number of whales that might be contacted by a spill would depend on the size, timing, and duration of the spill. Whales may not avoid oil spills, and some have been observed feeding within oil slicks (Goodale *et al.,* 1981).

The potential effects on cetaceans are expected to be less than those on seals (described later in this section of the document). Cetaceans tend to occur well offshore where cleanup activities (in the open-water season) are unlikely to be as concentrated. Also, cetaceans are transient and, during the majority of the year, absent from the area. Further, drilling would be postponed during the bowhead whale hunt every fall; therefore, the risk to cetaceans during this time, when marine mammal presence and subsistence use is high, has been fully mitigated.

Pinnipeds

Ringed, bearded, and spotted seals are present in open-water areas during summer and early autumn, and ringed seals remain in the area through the ice-covered season. Therefore, an oil spill from LDPI or its pipeline could affect seals. Any oil spilled under the ice also has the potential to directly contact seals. The most relevant data of pinnipeds exposed to oil is from the Exxon Valdez oil spill (EVOS).

The largest documented impact of a spill, prior to the EVOS, was on young seals in January in the Gulf of St. Lawrence (St. Aubin, 1990). Intensive and long-term studies were conducted after the EVOS in Alaska. There may have been a long-term decline of 36 percent in numbers of molting harbor seals at oiled haulout sites in Prince William Sound following EVOS (Frost *et al.,* 1994a). However, in a reanalysis of those data and additional years of surveys, along with an examination of assumptions and biases associated with the original data, Hoover-Miller *et al.* (2001) concluded that the EVOS effect had been overestimated. Harbor seal pup mortality at oiled beaches was 23% to 26%, which may have been higher than natural mortality, although no baseline data for pup mortality existed prior to EVOS (Frost *et al.,* 1994a).

Adult seals rely on a layer of blubber for insulation, and oiling of the external surface does not appear to have adverse thermoregulatory effects (Kooyman *et al.,* 1976, 1977; St. Aubin, 1990). However, newborn seal pups rely on their fur for insulation. Newborn ringed seal pups in lairs on the ice could be contaminated through contact with oiled mothers. There is the potential that newborn ringed seal pups that were contaminated with oil could die from hypothermia. Further, contact with oil on the external surfaces can potentially cause increased stress and irritation of the eyes of ringed seals (Geraci and Smith, 1976; St. Aubin, 1990). These effects seemed to be temporary and reversible, but continued exposure of eyes to oil could cause permanent damage (St. Aubin, 1990). Corneal ulcers and abrasions, conjunctivitis, and swollen nictitating membranes were observed in captive ringed seals placed in crude oil-covered water (Geraci and Smith, 1976), and in seals in the Antarctic after an oil spill (Lillie, 1954).

Marine mammals can ingest oil if their food is contaminated. Oil can also be absorbed through the respiratory tract (Geraci and Smith, 1976; Engelhardt *et al.,* 1977). Some of the ingested oil is voided in vomit or feces but some is absorbed and could cause toxic effects (Engelhardt, 1981). When returned to clean water, contaminated animals can depurate this internal oil (Engelhardt, 1978, 1982, 1985). In addition, seals exposed to an oil spill are unlikely to ingest enough oil to cause serious internal damage (Geraci and St. Aubin, 1980, 1982).

Since ringed seals are found year-round in the U.S. Beaufort Sea and more specifically in the project area, an oil spill at any time of year could potentially have effects on ringed seals. However, they are more widely dispersed during the open-water season. Spotted seals are unlikely to be found in the project area during late winter and spring. Therefore, they are more likely to be affected by a spill in the summer or fall seasons. Bearded seals typically overwinter south of the Beaufort Sea. However, some have been reported around Northstar during early spring (Moulton *et al.,* 2003b).

Oil Spill Cleanup Activities

Oil spill cleanup activities could increase disturbance effects on either whales or seals, causing temporary disruption and possible displacement (BOEM, 2018). General issues related to oil spill cleanup activities are discussed earlier in this section for cetaceans. In the event of a large spill contacting and extensively oiling coastal habitats, the presence of response staff, equipment, and the many aircraft involved in the cleanup could (depending on the time of the spill and the cleanup) potentially displace seals. If extensive cleanup operations occur in the spring, they could cause increased stress and reduced pup survival of ringed seals. Oil spill cleanup activity could exacerbate and increase disturbance effects on subsistence species, cause localized displacement of subsistence species, and alter or reduce access to those species by hunters. On the other hand, the displacement of marine mammals away from oil-contaminated areas by cleanup activities would reduce the likelihood of direct contact with oil. Impacts to subsistence uses of marine mammals are discussed later in this document (see the ''Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses'' section).

Potential Take From Oil Spills

Hilcorp did not request, and NMFS is not proposing to authorize, take of marine mammals incidental to oil spills. Should an oil spill occur and marine mammals are killed, injured, or harassed by the spill, the ''taking'' would be unauthorized. However, NMFS is including mitigation and reporting measures within these proposed regulations to minimize risk to marine mammals. Should an oil spill occur at the drill site and that oil enter the marine environment such that marine mammals are at risk of exposure, NMFS is proposing to include a mitigation measure that Hilcorp notify NMFS immediately and cease drilling until NMFS can assess the severity of the spill and potential impacts to marine mammals. Should the pipeline leak, crude oil transport via the pipeline would also cease immediately until the pipeline is repaired. In the case of any spill, Hilcorp would immediately initiate communication and response protocol per its Oil Spill Response Plan. Finally, Hilcorp must maintain the frequency of oil spill response training at no less than one two hour session per week.

Anticipated Effects on Marine Mammal Habitat

The footprint of the LPDI would result in permanent impacts to habitats used directly by marine mammals; however, the footprint is minimal compared to available habitat within Foggy Island Bay and, further, few cetaceans use Foggy Island Bay. BOEM has also required mitigation designed to reduce impacts to marine mammal habitat, including water quality and habitat disturbance. For example, initial island construction (fill placement phase) and pipeline installation/backfill will occur in winter when fewer fish species are present and when water currents are low, which will reduce total suspended solids (TSS) distribution. In addition, island armoring will serve to reduce erosion and the spread of silt or gravel over potential prey habitat. However, increased turbidity and suspended solids resulting from artificial island construction or exploratory drilling discharges could have adverse impacts on water quality and, if increases persisted for extended periods of time; these impacts would be localized but could be long term (NOAA, 2016). If oil and gas industry operators comply with the U.S. Environmental Protection Agency's Clean Water Act requirements, then elevations in turbidity and concentrations of total suspended solids resulting from exploratory drilling activity would not result in unreasonable degradation of the marine environment (NOAA, 2016).

The proposed activities could also affect acoustic habitat (see Auditory Masking discussion above), but meaningful impacts are unlikely given the low usage of the area by marine mammals and limited pile driving during open-water conditions (approximately 2 weeks). There are no known foraging hotspots, or habitats of significant biological importance to marine mammals present in the marine waters in Foggy Island Bay. Migratory pathways for cetaceans exist outside the McClure Island group; however, the majority of noise from the project would be confined to Foggy Island Bay with low levels potentially propagating outside of but close to the McClure Islands during vibratory pile driving only (see Figure 5 in Appendix A of Hilcorp's application). In addition, pile driving would not occur during the fall bowhead whale migration (see Proposed Mitigation section); therefore, no impacts to migratory habitats during use is anticipated during this time period.

Effects to Prey—Sound may affect marine mammals through impacts on the abundance, behavior, or distribution of prey species (*e.g.,* crustaceans, cephalopods, fish, zooplankton). Marine mammal prey varies by species, season, and location and, for some, is not well documented. Here, we describe studies regarding the effects of noise on known marine mammal prey.

Fish utilize the soundscape and components of sound in their environment to perform important functions such as foraging, predator avoidance, mating, and spawning (*e.g.,* Zelick *et al.,* 1999; Fay, 2009). Depending on their hearing anatomy and peripheral sensory structures, which vary among species, fishes hear sounds using pressure and particle motion sensitivity capabilities and detect the motion of surrounding water (Fay *et al.,* 2008). The potential effects of noise on fishes depends on the overlapping frequency range, distance from the sound source, water depth of exposure, and species-specific hearing sensitivity, anatomy, and physiology. Key impacts to fishes may include behavioral responses, hearing damage, barotrauma (pressure-related injuries), and mortality.

Fish react to sounds which are especially strong and/or intermittent low-frequency sounds, and behavioral responses such as flight or avoidance are the most likely effects. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. The reaction of fish to noise depends on the physiological state of the fish, past exposures, motivation (*e.g.,* feeding, spawning, migration), and other environmental factors. 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.,* Scholik and Yan, 2001, 2002; Popper and Hastings, 2009). Several studies have demonstrated that impulse sounds might affect the distribution and behavior of some fishes, potentially impacting foraging opportunities or increasing energetic costs (*e.g.,* Fewtrell and McCauley, 2012; Pearson *et al.,* 1992; Skalski *et al.,* 1992; Santulli *et al.,* 1999; Paxton *et al.,* 2017). However, some studies have shown no or slight reaction to impulse sounds (*e.g.,* Pena *et al.,* 2013; Wardle *et al.,* 2001; Jorgenson and Gyselman, 2009). More commonly, though, the impacts of noise on fish are temporary.

SPLs of sufficient strength have been known to cause injury to fish and fish mortality. However, in most fish species, hair cells in the ear continuously regenerate and loss of auditory function likely is restored when damaged cells are replaced with new cells. Halvorsen *et al.* (2012a) showed that a TTS of 4–6 dB was recoverable within 24 hours for one species. Impacts would be most severe when the individual fish is close to the source and when the duration of exposure is long. Injury caused by barotrauma can range from slight to severe and can cause death, and is most likely to occur in fish with swim bladders. Barotrauma injuries have been documented during controlled exposure to impact pile driving (Halvorsen *et al.,* 2012b; Casper *et al.,* 2013).

The most likely impact to fish from pile driving activities at the project areas would be temporary behavioral avoidance of the area. The duration of fish avoidance of an area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. In general, impacts to marine mammal prey species are expected to be minor and temporary due to the expected short daily duration of individual pile driving events and the relatively small areas being affected.

The area likely impacted by the activities is relatively small compared to the available habitat in inland waters in the region. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. As described in the preceding, the potential for the LDPI to affect the availability of prey to marine mammals or to meaningfully impact the quality of physical or acoustic habitat is considered to be insignificant.

Estimated Take

This section provides an estimate of the number of incidental takes proposed for authorization through this proposed rule, which will inform both NMFS' consideration of ''small numbers'' and the negligible impact determination.

Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines ''harassment'' as: Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Authorized takes would primarily be by Level B harassment, as use of pile hammers, drill rigs, and ice-based equipment (*e.g.,* augers, trucks) have the potential to result in disruption of behavioral patterns for individual marine mammals. There is also some potential for auditory injury (Level A harassment) to result during pile driving. The proposed mitigation and monitoring measures are expected to minimize the severity of such taking to the extent practicable.

No mortality or serious injury is anticipated as a result of exposure to acoustic sources; however, mortality and serious injury of ringed seals may occur from ice road construction, use, and maintenance conducted after March 1, annually. Below we describe how we estimated mortality and serious injury from ice road work followed by a detailed acoustic harassment estimation method.

Mortality/Serious Injury (Ice Seals)

The only species with the potential to incur serious injury or mortality during the proposed project are ringed seals during ice road construction, use, and maintenance. Other ice seal species are not known to use ice roads within the action area. As described in the Description of Marine Mammals section, pregnant ringed seals establish lairs in shorefast sea ice beginning in early March where pups are born and nursed throughout spring (March through May).

As described in the *Potential Effects of the Specified Activity on Marine Mammals and Their Habitat* section above, there have been only three documented interactions with ringed seals despite over 20 years of ice road construction on the North Slope; one mortality in 1998 and two non-lethal interactions in 2018. All three animals involved were seal pups in or near their lairs. The two recent interactions in 2018 led NMFS to work with the companies involved in the interactions, including Hilcorp, to better understand the circumstances behind the interactions and to develop a list of BMPs designed to avoid and minimize potential harassment. Hilcorp has adopted these BMPs (see *Proposed Mitigation and Monitoring* section); however, the potential for mortality remains, albeit low. Because lairs can include both a pup and its mother, but interactions with ringed seals are relatively uncommon, NMFS is proposing to authorize the taking, by mortality or serious injury, of two ringed seals over the course of five years of ice road construction.

Acoustic Harassment

Generally speaking, we estimate take by considering: (1) Acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) and the number of days of activities. We note that while these basic factors can contribute to a basic calculation to provide an initial prediction of 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 estimate.

Acoustic Thresholds

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment for non-explosive sources—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 (*e.g.,* frequency, predictability, duty cycle), the environment (*e.g.,* bathymetry), and the receiving animals (*e.g.,* hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.,* 2007, Ellison *et al.,* 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of Level B harassment. NMFS predicts that marine mammals are likely to be harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 μPa (rms) for continuous (*e.g.,* vibratory pile-driving, drilling) and above 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.,* seismic airguns) or intermittent (*e.g.,* scientific sonar) sources.

Hilcorp's Liberty Project includes the use of continuous, non-impulsive (vibratory pile driving, drilling, auguring) and intermittent, impulsive (impact pile driving) sources, and therefore the 120 and 160 dB re 1 μPa (rms) thresholds are applicable.

Level A harassment for non-explosive sources—NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Technical Guidance, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). Hilcorp's proposed activity includes the use of impulsive (*e.g.,* impact pile driving) and non-impulsive (*e.g.,* vibratory pile driving, slope shaping, trenching) sources.

These thresholds are provided in Table 3. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2018 Technical Guidance, which may be accessed at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance.*

TABLE 3—THRESHOLDS IDENTIFYING THE ONSET OF PERMANENT THRESHOLD SHIFT

Hearing Group	PTS onset acoustic thresholds * (received level)	
	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	*Cell 1:* $L_{pk,flat}$: 219 dB; $L_{E,LF,24h}$: 183 dB	*Cell 2:* $L_{E,LF,24h}$: 199 dB.
Mid-Frequency (MF) Cetaceans	*Cell 3:* $L_{pk,flat}$: 230 dB; $L_{E,MF,24h}$: 185 dB	*Cell 4:* $L_{E,MF,24h}$: 198 dB.
High-Frequency (HF) Cetaceans	*Cell 5:* $L_{pk,flat}$: 202 dB; $L_{E,HF,24h}$: 155 dB	*Cell 6:* $L_{E,HF,24h}$: 173 dB.
Phocid Pinnipeds (PW) (Underwater)	*Cell 7:* $L_{pk,flat}$: 218 dB; $L_{E,PW,24h}$: 185 dB	*Cell 8:* $L_{E,PW,24h}$: 201 dB.
Otariid Pinnipeds (OW) (Underwater)	*Cell 9:* $L_{pk,flat}$: 232 dB; $L_{E,OW,24h}$: 203 dB	*Cell 10:* $L_{E,OW,24h}$: 219 dB.

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential to exceed the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure (L_{pk}) has a reference value of 1 μPa, and cumulative sound exposure level (L_E) has a reference value of 1μPa²s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.,* varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

Ensonified Area

Here, we describe operational and environmental parameters of the activity that will feed into identifying the area ensonified above the acoustic thresholds, which include source levels and transmission loss coefficient.

In shallow water noise propagation is highly dependent on the properties of the bottom and the surface, among other things. Parameters such as depth and the bottom properties can vary with distance from the source. There is a low-frequency cut-off related to the water depth, below which energy is transferred directly into the sea floor. Overall, the transmission loss in shallow water is a combination of cylindrical spreading effects, bottom interaction effects at lower frequencies and scattering losses at high frequencies. To estimate ensonfied area, Hilcorp used the parabolic equation (PE) modelling algorithm RAMGeo (Collins, 1993) to calculate the transmission loss between the source and the receiver (SLR, 2017). The full modeling report, including details on modeling methodology and procedure and ensonification area figures, can be found in the Underwater and Airborne Noise Modelling Report attached as Appendix A in Hilcorp's application. We provide a summary here.

RAMGeo is an efficient and reliable PE algorithm for solving range-dependent acoustic problems with fluid seabed geo-acoustic properties. The noise sources were assumed to be omnidirectional and modelled as point sources. In practice many sources are directional, this assumption is conservative. To estimate Level A harassment and Level B harassment threshold distances, Hilcorp first obtained one-third octave source spectral levels via reference spectral curves with their subsequent corrections based on their corresponding overall source levels. Table 4 contains estimated source levels and Appendix B in Hilcorp's acoustic modeling report contains source spectrum shape used in the model (SLR, 2018).

TABLE 4—ESTIMATED SOURCE LEVELS AND DURATION

Activity	Underwater source levels (db re: 1 μPa)		Airborne (db re: 20μPa)	Number of piles per day	Max. duration per day
	Ice-covered season	Open-water season			
Pipeline installation (trucks on ice, backhoe, ditchwitch)	169.6–179.1	N/A	74.8–78 @100 m.	N/A	12 hrs.
Sheet pile—*vibratory*	221	185	81 @100 m	20	2.5 hrs.[1]
Sheet pile—*impact*	235.7	210	93 @160 m		40 min.[2]
Conductor pipe—*vibratory*				16	2.5 hrs (proxy from sheet piles).
Conductor pipes/foundation piles—*impact*	171.7	196			2 hrs.[3]
Slope shaping/armoring	n/a	167	64.7 @100 m	n/a	9.6 hrs.
Drilling and production	170.5	151	80 @200 m	n/a	24 hrs.

[1] Estimated based on 20 piles per day, 7.5 min per pile.
[2] Average duration estimate is 20 min per day.
[3] Hilcorp estimates 440–6,300 strikes per day.

Hilcorp relied on operational data from Northstar construction activities to estimate LDPI construction activity methods and durations. Greene *et al.* (2008) indicates impact pile driving at Northstar was required only to finish off each pile after vibratory driving it into the frozen material of old Seal Island. Since Liberty will be a newly constructed gravel island, driving sheet piles should be easier than was the case at Northstar. Impact sheet pile driving therefore may not be required at Liberty and is included in the application as a precaution. Hilcorp assumed approximately 2 minutes and 100 strikes per pile with a maximum of 20 piles installed per day. Blackwell *et al.* (2004a) observed impact pipe driving at Northstar. On most days, one conductor pipe was driven in a day over a period of 5 to 8.5 hours. The longest day of observation was 10.5 hours in which time two pipes were driven. The observation period each day included all pipe driving time, but driving was never continuous during the entire observation period. Hilcorp applied a correction factor to the Northstar duration, assuming pipe driving at the LDPI would actually occur for 20 percent of the total installation time logged at Northstar.

The scenarios with theoretical potential for PTS onset are slope shaping, vibratory driving, and impact pile driving and pipe driving during the open water season. Hilcorp did not model distances to PTS thresholds during ice-covered conditions because no cetaceans are present in the region during this time and noise levels are expected to attenuate very rapidly under ice conditions. Hilcorp did not request, nor does NMFS anticipate, take by Level A harassment (PTS) during island construction conducted under ice conditions. The following discussion on PTS potential is limited to the open-water season.

Table 5 summarizes Hilcorp's modeled distances to NMFS PTS thresholds using the maximum durations identified above (see also Tables 16 through 18 in Appendix A of Hilcorp's application for shorter durations). We note marine mammals would have to be extremely close to the island during slope shaping and pile driving for an extended period of time to potentially incur PTS. We find these durations at distance are highly unlikely and have concluded the potential for PTS from slope shaping and vibratory pile driving for any marine mammal hearing group does not exist. Table 6 summarizes distances and ensonified areas to NMFS Level B harassment thresholds during ice-covered and open water conditions.

TABLE 5—RADIAL DISTANCES TO NMFS LEVEL A HARASSMENT THRESHOLDS AND ENSONIFIED AREA DURING THE OPEN-WATER SEASON

Marine mammal hearing group (species)	Activity (duration) and distance to threshold (ensonified area)			
	Slope shaping (9.6 hrs)	Vibratory sheet piling (2.5 hrs)	Impact sheet piling (40 min)	Impact pipe driving (2 hrs)
Low frequency cetaceans (bowhead, gray whales).	<10 m (0 km^2)	50 m (164 ft)	1,940 (11.8 km^2)	87 m (2.38 km^2)
Mid frequency cetaceans (belugas).	n/a	<10 m (0 km^2)	60 m (0.01 km^2)	27 m (0.002 km^2)
Phocid Pinnipeds (bearded, ringed, spotted seals).	<10 m (0 km^2)	20 m (66 ft)	526 m (0.87 km^2)	240 m (0.18 km^2)

TABLE 6—RADIAL DISTANCES TO NMFS LEVEL B HARASSMENT THRESHOLDS AND ENSONIFIED AREA

Activity	Ice-covered	Open water [1]			Airborne noise
	Underwater noise—ice-covered (m)	Min (m)	Median (m)	Max (m)	
Ice road construction and maintenance	170	n/a	n/a	n/a	<15
Pipeline construction	210	n/a	n/a	n/a	<15
Sheet pile driving—vibratory	390	12,000	14,800	17,500	15
Sheet pile driving—impact	90	1,700	2,050	2,250	100
Conductor pipe/foundation pile driving—impact	11	300	315	400	100
Slope shaping/armoring	n/a	880	1,160	1,260	<15
Helicopter (take-off/landing)	n/a	n/a	n/a	n/a	67
Drilling and Production	230	20	55	85	30

[1] Open water results are minimum, median and maximum distance to the appropriate noise threshold across all depths calculated in the direction of maximum noise propagation from the source, away from shore. Median distances were used to estimate ensonified areas and take calculations.

Marine Mammal Occurrence

Each fall and summer, NMFS and BOEM conduct an aerial survey in the Arctic, the Aerial Survey of Arctic Marine Mammals (ASAMM) surveys. The goal of these surveys is to document the distribution and relative abundance of bowhead, gray, right, fin and beluga whales and other marine mammals in areas of potential oil and natural gas exploration, development, and production activities in the Alaskan Beaufort and northeastern Chukchi Seas. Traditionally, only fall surveys were conducted but then, in the summer of 2012 (mid-July), the first dedicated summer survey effort began in the ASAMM Beaufort Sea study area. Hilcorp used these ASAMM surveys as the data source to estimate seasonal densities of cetaceans (bowhead, gray and beluga whales) in the project area. The ASAMM surveys are conducted within blocks that overlay the Beaufort and Chukchi Seas oil and gas lease sale areas offshore of Alaska (Figure 6–1 in Hilcorp's application), and provide sighting data for bowhead, gray, and beluga whales during summer and fall months. During the summer and fall, NMFS observed for marine mammals on effort for 7,990 km and 9,244 km, respectively, from 2011 through 2016. Data from those surveys are used for this analysis. We note the location of the proposed LDPI 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 (*i.e.,* Foggy Island Bay) since bowhead whales, the focus of the surveys, are not likely to enter the bay. During ASAMM surveys in Foggy Island Bay, no marine mammals have been observed. Therefore, the density estimates provided here are an overestimate because they rely on offshore surveys where marine mammals are concentrated.

Bowhead Whale

Summer and fall bowhead whale densities were calculated using the results from ASAMM surveys from 2011 through 2017. The surveys provided sightings and effort data by month and season (summer and fall), as well as each survey block (Clarke *et al.,* 2012, 2013a, 2014, 2015, 2017). Bowhead whale densities were calculated in a two-step approach; they first calculated a sighting rate of whales per km, then they multiplied the transect length by the effective strip width using the modeled species-specific effective strip width for an aero commander aircraft calculated by Ferguson and Clarke (2013). Where the effective strip width is the half-strip width, it must be multiplied by 2 in order to encompass both sides of the transect line. Thus whale density was calculated as follows: Whales per km^2 = whales per kilometer/(2 × the effective strip width). The effective strip width for bowhead whales was calculated to be 1.15 km (CV=0.08). Table 7 contains pooled data from 2011 through 2017 Block 1 ASAMM surveys and resulting densities.

The resulting densities are expected to be overestimates for the LDPI analysis because data is based on sighting effort outside the barrier islands, and bowhead and gray whales rarely occur within the barrier islands, while belugas also are found in higher abundance outside of Foggy Island Bay.

TABLE 7—BOWHEAD WHALE SIGHTING DATA FROM 2011 THROUGH 2017 AND RESULTING DENSITIES

Year	Season	Month	Transect effort (km)	Number of whale sighted	Whale/km	Whale/km^2
2011	Summer	Jul–Aug	346	1	0.003	0.001
	Fall	Sept–Oct	1,476	24	0.016	0.007
2012	Summer	Jul–Aug	1,493	5	0.003	0.001
	Fall	Sept–Oct	1,086	14	0.013	0.006
2013	Summer	Jul–Aug	1,582	21	0.013	0.006
	Fall	Sept–Oct	1,121	21	0.019	0.008
2014	Summer	Jul–Aug	1,393	17	0.012	0.005
	Fall	Sept–Oct	1,538	79	0.051	0.022
2015	Summer	Jul–Aug	1,262	15	0.012	0.005
	Fall	Sept–Oct	1,663	17	0.010	0.004
2016	Summer	Jul–Aug	1,914	74	0.039	0.017
	Fall	Sept–Oct	2,360	19	0.008	0.004
2017	Summer	Jul–Aug	3,003	8	0.003	0.001

TABLE 7—BOWHEAD WHALE SIGHTING DATA FROM 2011 THROUGH 2017 AND RESULTING DENSITIES—Continued

Year	Season	Month	Transect effort (km)	Number of whale sighted	Whale/km	Whale/km²
	Fall	Sept–Oct	1,803	85	0.047	0.020
Total	Summer		10,993	141	[1] 0.012	[1] 0.005
	Fall		11,047	259	[1] 0.023	[1] 0.0010

[1] Value represents average, not total, across all years per relevant season.

Gray Whales

Gray whales are rare in the project area and ASAMM aerial survey block 1. From 2011 through 2017 only two gray whales have been observed during ASAMM block 1 surveys despite over 21,000 miles of trackline effort, for a resulting density of zero (Table 8). However, a group of baleen whales comprised of both bowhead and gray whales was observed during industry marine mammal surveys in Foggy Island Bay in 2008. Therefore, Hilcorp has requested, and NMFS proposes to authorize, take, by Level B harassment, of two gray whales annually during the effective period of the proposed regulations on the chance gray whales enter the ensonified zone during LDPI activities.

TABLE 8—GRAY WHALE SIGHTING DATA FROM 2011 THROUGH 2017 AND RESULTING DENSITIES

Year	Season	Month	Transect effort (km)	Number of whales sighted	Whale/km	Whale/km²
2011	Summer	Jul–Aug	346	0	0.000	0.000
	Fall	Sept–Oct	1,476	0	0.000	0.000
2012	Summer	Jul–Aug	1,493	0	0.000	0.000
	Fall	Sept–Oct	1,086	0	0.000	0.000
2013	Summer	Jul–Aug	1,582	0	0.000	0.000
	Fall	Sept–Oct	1,121	0	0.000	0.000
2014	Summer	Jul–Aug	1,393	0	0.000	0.000
	Fall	Sept–Oct	1,538	1	0.001	0.000
2015	Summer	Jul–Aug	1,262	0	0.000	0.000
	Fall	Sept–Oct	1,663	0	0.000	0.000
2016	Summer	Jul–Aug	1,914	1	0.001	0.000
	Fall	Sept–Oct	2,360	0	0.000	0.000
2017	Summer	Jul–Aug	3,003	0	0.001	0.000
	Fall	Sept–Oct	1,803	0	0.000	0.000
Total	Summer		10,993	1	0	0.000
	Fall		11,047	1	0	0.000

Beluga Whales

As with the large whales, beluga whale presence is anticipated to be higher outside the barrier islands. Sighting data collected during industry marine mammal surveys in Foggy Island Bay (as described in the *Description of Marine Mammals* section) are used to estimate likelihood of presence when deriving final proposed take numbers; however, these data were not collected in a manner that allows for a derivation of density inside the bay or integration into the ASAMM survey data. The ASAMM surveys were recently extended into Foggy Island Bay; however, no beluga whales or any other cetaceans were observed while within the Bay. Table 9 presents block 1 ASAMM survey data and resulting densities for beluga whales. We note the 2012 and 2013 ASAMM reports stratified beluga whale sightings by depth rather than by survey block. Because the final beluga whale take numbers presented in this proposed rule are adjusted based on expected presence in the entire bay based on marine mammal monitoring by industry in Foggy Island Bay, NMFS did not pursue investigating the raw data further and believe the values here are a reasonable and conservative representation of density in survey block 1 based on comparison to other ASAMM survey year sighting rates where sightings by blocks are available.

TABLE 9—BELUGA WHALE SIGHTING DATA FROM 2011 THROUGH 2017 AND RESULTING DENSITIES

Year	Season	Month	Transect effort (km)	Number of whales sighted	Whale/km	Whale/km²
2011	Summer	Jul–Aug	346	0	0.000	0.000
	Fall	Sept–Oct	1,476	0	0.000	0.000
2012	Summer	Jul–Aug	5,001	47	0.009	0.008
	Fall	Sept–Oct	4,868	5	0.001	0.001
2013	Summer	Jul–Aug	4,270	75	0.018	0.014
	Fall	Sept–Oct	3,372	2	0.001	0.0005
2014	Summer	Jul–Aug	1,393	13	0.009	0.008
	Fall	Sept–Oct	1,538	9	0.006	0.005

TABLE 9—BELUGA WHALE SIGHTING DATA FROM 2011 THROUGH 2017 AND RESULTING DENSITIES—Continued

Year	Season	Month	Transect effort (km)	Number of whales sighted	Whale/km	Whale/km²
2015	Summer	Jul–Aug	1,262	37	0.029	0.024
	Fall	Sept–Oct	1,663	3	0.002	0.001
2016	Summer	Jul–Aug	1,914	349	0.182	0.148
	Fall	Sept–Oct	2,360	15	0.006	0.005
2017	Summer	Jul–Aug	3,003	4	0.001	0.001
	Fall	Sept–Oct	1,803	0	0.000	0.000
Total	Summer		17,189	521	0	0.029
	Fall		17,080	34	0	0.002

Ringed Seals

Limited data are available on ringed seal densities in the southern Beaufort Sea during the winter months; however, ringed seals winter ecology studies conducted in the 1980s (Kelly *et al.,* 1986, Frost and Burns, 1989) and surveys associated with the Northstar development (Williams *et al.,* 2001) provide information on both seal ice-structure use (where ice structures include both breathing holes and subnivean lairs), and on the density of ice structures.

Kelly *et al.* (1986) found that in the southern Beaufort Sea and Kotzebue Sound, radio-tagged seals used between 1 and at least 4 subnivean lairs. The distances between lairs was up to 4 km (10 mi), with numerous breathing holes in-between (Kelly *et al.,* 1986). While Kelly *et al.* (1986) calculated the average number of lairs used per seal to be 2.85, they also suggested that this was likely to be an underestimate. To estimate winter ringed seal density within the project area, the average ice structure density of 1.45/km² was divided by the average number of ice structures used by an individual seal of 2.85 (SD=2.51; Kelly *et al.,* 1986). This results in an estimated density of 0.510 ringed seals/km² during the winter months. This density is likely to be overestimated due to Kelly *et al.* (1986)'s suggestion that their estimate of the average number of lairs used by a seal was an underestimate (the denominator used).

For spring ringed seal densities, aerial surveys flown in 1997 through 2002 over Foggy Island Bay and west of Prudhoe Bay during late May and early June (Frost *et al.,* 2002, Moulton *et al.,* 2002b, Richardson and Williams, 2003), when the greatest percentage of seals have abandoned their lairs and are hauled out on the ice (Kelly *et al.,* 2010), provides the best available information on ringed seal densities.

Because densities were consistently very low where water depth was less than 3 m (and these areas are generally frozen solid during the ice-covered season) densities have been calculated where water depth was greater than 3 m deep (Moulton *et al.,* 2002a, Moulton *et al.,* 2002b, Richardson and Williams, 2003). Based on the average density of surveys flown 1997 to 2002, the uncorrected average density of ringed seals during the spring is expected to be 0.548 ringed seals/km². Because the number of seals is expected to be much lower during the open water season, we estimated summer (open-water) ringed seal density to be 50 percent of the spring densities, resulting in an estimated density of 0.27 ringed seals/km². Ringed seals remain in the water through the fall and in to the winter, however, due to the lack of available data on fall densities within the LDPI action area we have assumed the same density of ringed seals as in the summer; 0.27 ringed seals/km² (see Hilcorp's application and NMFS (2018) for more data details).

Bearded Seals

Industry monitoring surveys for the Northstar development during the spring seasons in 1999 (Moulton *et al.,* 2000), 2000 (Moulton *et al.,* 2001), 2001 (Moulton *et al.,* 2002a), and 2002 (Moulton *et al.,* 2003) counted 47 bearded seals (annual mean of 11.75 seals during an annual mean of 3,997.5 km² of effort); these data were insufficient to calculate a reliable density estimate in each year, no other on bearded seal presence were available. Annual reports (Richardson, 2008) for years 2000 through 2002 include similar figures. A winter and spring density using the four years of Northstar development data equates to 0.003 bearded seals per km².

For the open-water season (summer and fall), bearded seal density was calculated as a proportion of the ringed seal summer density based on the percentage of pinniped sightings during monitoring surveys in 1996 (Harris *et al.,* 2001), 2008 (Aerts *et al.,* 2008, Hauser *et al.,* 2008), and 2012 (HDR, 2012). During these surveys, 63 percent were ringed seals, 17 percent were bearded seals and 20 percent were spotted seals. Thus, the density of bearded seals during the open water season (summer and fall) was calculated as 17 percent of the ringed seal density of 0.27 seals/km². This results in an estimated summer density for bearded seals of 0.05 seals/km².

Spotted Seals

Given their seasonal distribution and low numbers in the nearshore waters of the central Alaskan Beaufort Sea, no spotted seals are expected in the action area during late winter and spring, but a few individuals could be expected during the summer or fall. Using the same monitoring data described in the bearded seal section above, spotted seal density during the open water season (summer and fall) was calculated as 20 percent of the ringed seal summer density estimate (0.27 seals/km²) in the LDPI Project Area. This results in an estimated density of 0.05 seals/km².

A summary of marine mammal densities used to estimate exposures is provided, by season and species, in Table 10.

TABLE 10—SUMMARY OF MARINE MAMMAL DENSITIES

Species	Stock	Winter (Nov–Mar)	Spring (Apr–Jun)	Summer (Jul–Aug)	Fall (Sept–Oct)
Bowhead whale	Western Arctic	0	0	0.006	0.009

TABLE 10—SUMMARY OF MARINE MAMMAL DENSITIES—Continued

Species	Stock	Winter (Nov–Mar)	Spring (Apr–Jun)	Summer (Jul–Aug)	Fall (Sept–Oct)
Gray whale	Eastern N Pacific	0	0	0	0
Beluga whale	Beaufort Sea	0	0	0.029	0.002
Ringed seal	Alaska	0.51	0.548	0.27	0.27
Bearded seal	Alaska	0.003	0.003	0.05	0.05
Spotted seal	Alaska	0	0	0.05	0

Exposure Estimates

To quantitatively assess exposure of marine mammals to noise from the various activities associated with the Liberty Project, Hilcorp used the median range to which Level A harassment and Level B harassment thresholds were reached for ice road construction and maintenance, island construction, vibratory and impact sheet pile driving, impact conductor pipe driving, slope shaping, drilling, and production. Hilcorp considered the potential for take on any given day based on the largest Level B harassment zone for that day.

For each species, exposure estimates were calculated in a multi-step process. On any given day of the year, the expected take for that day per species was calculated as: *Density* × *ensonified area* (of the largest Level B harassment zone for that day). Results were then summed for the year to provide total exposure estimates per species.

In some cases, however, the calculated densities alone do not reflect the full potential of exposure. For example, beluga whale densities are quite low; however, previous marine mammal surveys in Foggy Island Bay have identified the potential for them to be there in greater numbers than reflected based on NMFS survey data alone. In other cases, the potential for exposure is almost discountable (*e.g.,* calculated gray whale takes are zero) but given they could appear in Foggy Island Bay, Hilcorp has requested take authorization. Hilcorp also requested take authorization for bowhead whales despite the lack of project-related noise above NMFS harassment thresholds extending much beyond the McClure Islands (*e.g.,* see Figure 02 in Appendix D of Hilcorp's application) where bowheads are more likely to be found. As described in the *Marine Mammal Occurrence* section, we used density based on surveys conducted outside of the McClure Islands; therefore, Hilcorp has likely overestimated potential take. However, given the sensitivities surrounding this species in the Arctic, we believe a precautionary approach is appropriate here to conservatively assess the potential effects on the stock and subsistence use.

Bowhead, gray, and beluga whales have the potential to be present and exposed to noise during the open-water season. Work during ice conditions (*e.g.,* pipeline installation, ice road construction) does not have the potential to harass cetaceans because they are not present in the action area. Hilcorp anticipates conducting a maximum of 15 days of open-water pile driving and could conduct slope shaping throughout the summer. The method described above was used to estimate take, by Level B harassment, in year 1 when the LDPI would be constructed.

There is a very low potential for large whale Level A harassment (PTS) from the specified activities given the rarity of bowhead and gray whales entering Foggy Island Bay. However, in an abundance of caution, Hilcorp has requested, and NMFS proposes to authorize, limited Level A harassment takes per year of each species potentially exposed to impact pile driving noise (Table 11). Group size was considered in Level B harassment take requests in cases where sighting data and group size indicate potential for a greater amount of take than calculated based on density (*e.g.,* beluga whale take request is higher than calculated take estimate). A small amount of the Level B harassment exposures were allocated to Level A harassment for the first year of work (*i.e.,* pile driving during open water).

For seals, a straight density estimate was used following the method described above. In assessing the calculated results; there was no need to adjust take numbers for Level B harassment.

The amount and manner of take Hilcorp requested, and NMFS proposes to authorize, for each species is summarized in Table 11 below. In addition to the takes listed below, Hilcorp requests, and NMFS is proposing to authorize, a total of two ringed seal mortalities over the life of the proposed regulations incidental to ice road construction, use, and maintenance.

TABLE 11—ANNUAL AND TOTAL AMOUNT OF PROPOSED TAKE INCIDENTAL TO HILCORP'S LDPI PROJECT

Year	Species (stock)					
	Bowhead (W Arctic)	Gray (ENP)	Beluga (Beaufort)	Ringed seal (AK)	Bearded seal (AK)	Spotted seal (AK)
Level A harassment						
1	2	2	10	5	2	2
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
Total Level A harassment	2	2	10	5	2	2
Level B harassment						
1	6	1	40	336	58	58

TABLE 11—ANNUAL AND TOTAL AMOUNT OF PROPOSED TAKE INCIDENTAL TO HILCORP'S LDPI PROJECT—Continued

Year	Species (stock)					
	Bowhead (W Arctic)	Gray (ENP)	Beluga (Beaufort)	Ringed seal (AK)	Bearded seal (AK)	Spotted seal (AK)
2	1	1	20	8	1	1
3	1	1	20	22	1	1
4	1	1	20	18	1	1
5	1	1	20	17	1	1
Total Level B harassment	10	5	120	401	62	62

Proposed Mitigation

In order to issue an IHA under Section 101(a)(5)(A) and (D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such 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 such 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, we carefully consider 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, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

The mitigation measures presented here are a product of Hilcorp's application, recommendations from the Arctic peer review panel (available at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*), NMFS' recommendations, and public comments on the **Federal Register** Notice of Receipt.

Construction Mitigation Measures

Hilcorp will aim to construct the island, including completing all pile driving, during the ice-covered season (as was done for Northstar). Should an ice seal be observed on or near the LDPI by any Hilcorp personnel, the sighting will be reported to Hilcorp's Environmental Specialist. No construction activity should occur within 10 m of an ice seal and any vehicles used should use precaution and not approach any ice seal within 10 m.

During the open-water season, the following mitigation measures apply: Hilcorp will station two protected species observers (PSOs) on elevated platforms on the island during all pile driving in open-water conditions (see Proposed Monitoring and Reporting for more details). Marine mammal monitoring shall take place from 30 minutes prior to initiation of pile driving activity through 30 minutes post-completion of pile driving activity. Pre-activity monitoring shall be conducted for 30 minutes to ensure that the shutdown zone is clear of marine mammals, and pile driving may commence when observers have declared the shutdown zone (which equates to the Level A harassment zone in Table 5) is clear of marine mammals. In the event of a delay or shutdown of activity resulting from marine mammals in the shutdown zone, animals shall be allowed to remain in the shutdown zone (*i.e.,* must leave of their own volition) and their behavior shall be monitored and documented.

If a marine mammal is approaching a Level A harassment zone and pile driving has not commenced, pile driving shall be delayed. Pile driving may not commence or resume until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone; 15 minutes have passed without subsequent detections of small cetaceans and pinnipeds; or 30 minutes have passed without subsequent detections of large cetaceans. NMFS may adjust the shutdown zones pending review and approval of an acoustic monitoring report (see Monitoring and Reporting).

Hilcorp will use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of strikes at reduced energy, followed by a thirty-second waiting period, then two subsequent reduced energy strike sets. A soft start must 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 thirty minutes or longer.

In the unlikely event a low frequency cetacean (bowhead or gray whale) approaches or enters the Level A harassment zone, pile driving would be shut down. If a mid-frequency cetacean (beluga) or pinniped (seal) enters the Level A harassment zone during pile driving, Hilcorp proposes to complete setting the pile (which takes ten to fifteen minutes from commencement) but not initiate additional pile driving of new piles until the marine mammal has left and is on a path away from the Level A harassment zone. Hilcorp would not commence pile driving if any species is observed approaching or within the Level A harassment zone during the pre-construction monitoring period.

If a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the monitoring zone (which equates to the Level B harassment zone in Table 6), pile driving and removal activities must shut down immediately using delay and shut-down procedures. Activities must not resume until the animal has been confirmed to have left the area or the observation time period, as indicated in above, has elapsed.

Hilcorp shall install the pipeline during the ice-covered season, thereby minimizing noise impacts to marine mammals as noise does not propagate well in ice and cetaceans are not present in the action area during winter.

Proposed Mitigation for Ice Road Construction, Maintenance, and Use

During ice road construction, Hilcorp would follow several BMPs recently developed through a collaborative effort with NMFS. These BMPs are informed by the best available information on how ice roads are constructed and maintained and ice seal lairing knowledge. They are designed to minimize disturbance and set forth a monitoring and reporting plan to improve knowledge. The complete BMP document is available on our website at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act.*

The ice road BMPs are applicable to construction and maintenance of Liberty sea ice roads and sea ice trails in areas where water depth is greater than 10 feet (ft) (the minimum depth required to establish ringed seal lairs) as well as any open leads in the sea ice requiring a temporary bridge during the ice road season. They are organized into the following categories: (1) Wildlife training; (2) general BMPs implemented throughout the ice road season; (3) BMPs to be implemented prior to March 1st; (4) BMPs to be implemented after March 1; and (4) reporting. We refer the reader to the complete BMP document on our website but provide a summary of provisions here.

Timing—Hilcorp will construct sea ice roads as early as possible (typically December 1 through mid-February) so that the entire corridor is disturbed prior to March 1, the known onset of lairing season. Blading and snow blowing of ice roads/trails will be limited to the previously disturbed and delineated areas to the extent safe and practicable. Snow will be plowed or blown from the ice surface so as to preserve the safety and integrity of the ice surface for continued use.

After March 1, annually, blading and snow blowing of ice roads will be limited to the previously disturbed ice road/shoulder areas to the extent safe and practicable. However, when safety requires a new ice trail to be constructed after March 1st, construction activities such as drilling holes in the ice to determine ice quality and thickness, will be conducted only during daylight hours with good visibility. Ringed seal structures will be avoided by a minimum of 150 ft during ice testing and new trail construction.

Personnel—Hilcorp will employ a NMFS-approved, trained environmental field specialist who will serve as the primary ice seal monitor and main point of contact for any ice seal observations made by other Hilcorp staff, employees, or contractors. This person shall be in charge of conducting monitoring surveys every other day while the ice road is being actively used. The specialist will also be responsible for alerting all crew to ice seal sightings and reporting to the appropriate officials.

Training—Prior to initiation of annual sea ice road activities, all project personnel associated with ice road construction or use (*i.e.,* construction workers, surveyors, vehicle drivers security personnel, and the environmental team) will receive annual training on these BMPs. Annual training also includes reviewing the company's Wildlife Interaction Plan which has been modified to include reference to the BMPs and reporting protocol. In addition to the BMPs, other topics in the training may include ringed seal reproductive ecology (*e.g.,* temporal and spatial lairing behavior, habitat characteristics, potential disturbance effect, etc.) and summary of applicable laws and regulatory requirements including, but not limited to, MMPA incidental take authorization requirements.

General BMPs To Be Implemented Throughout Season—Hilcorp would establish ice road speed limits, delineate the roadways with highly visible markers (to avoid vehicles from driving off roadway where ice seals may be more likely to lair), and clearly mark corners of rig mats, steel plates, and other materials used to bridge sections of hazardous ice (to allow for easy location of materials when removed, minimizing disturbance to potentially nearby ice seals). Construction, maintenance or decommissioning activities associated with ice roads and trails will not occur within 150 ft of the observed ring seal, but may proceed as soon as the ringed seal, of its own accord, moves farther than 150 ft distance away from the activities or has not been observed within that area for at least 24 hours. All personnel would be prohibited from closely approaching any seal and would be required to report all seals sighted within 150 ft of the center of the ice road to the designated Environmental Specialist.

Once the new ice trail is established, tracked vehicle operation will be limited to the disturbed area to the extent practicable and when safety of personnel is ensured. If an ice road or trail is being actively used under daylight conditions with good visibility, a dedicated observer (not the vehicle operator) will conduct a survey along the sea ice road/trail to observe if any ringed seals are within 500 ft of the roadway corridor.

Mitigation for Subsistence Uses of Marine Mammals or Plan of Cooperation

Regulations at 50 CFR 216.104(a)(12) further require incidental take authorization (ITA) applicants conducting activities that take place in Arctic waters to provide a Plan of Cooperation (POC) or information that identifies what measures have been taken and/or will be taken to minimize adverse effects on the availability of marine mammals for subsistence purposes. A plan must include the following:

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

Hilcorp submitted a POC to NMFS, dated April 18, 2018, which includes all the required elements included in the aforementioned regulations (available at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*). The POC documents Hilcorp's stakeholder engagement activities, which began in 2014 for this project, with subsistence communities within the North Slope Region including Nuiqsut, Barrow and Kaktovik, the closest villages to the Project Area. The POC includes a description of the project, how access to the Project Area will occur, pipeline and island construction techniques, and drilling operations. The plan also describes the ongoing community outreach cooperation and coordination and measures that will be implemented by Hilcorp to minimize adverse effects on marine mammal subsistence. The POC is a living document and will be updated throughout the LDPI review and permitting process. As such, Hilcorp intends to maintain open communication with all stakeholders throughout the Liberty permitting and development process. In addition, Hilcorp, along with several other North Slope Industry participants, has entered into a Conflict Avoidance Agreement (CAA) with the AEWC for all North Slope oil and gas activities to minimize potential interference with bowhead subsistence hunting. By nature of the measures, the mitigation described above also minimizes impacts to subsistence users and is not repeated here. Additional mitigation measures specific to subsistence use include:

- Avoid impact pile driving during the Cross Island bowhead whale hunt which usually occurs from the last week of August through mid-September;
- Schedule all non-essential boat, hovercraft, barge, and air traffic to avoid conflicting with the timing of the Cross Island bowhead hunt; and
- Adhere to all communication and coordination measures described in the POC.

During the comment period on BOEM's EIS for this project and our NOR announcing receipt of Hilcorp's application, the AEWC submitted comments pertaining to potential effects on subsistence use. The AEWC indicated Hilcorp's continued participation in the Open Water Season CAA and the Good Neighbor Policy (GNP), along with its willingness to work with the Nuiqsut Whaling Captains to mitigate subsistence harvest concerns are central to the AEWC's support for the Liberty Project. Further, recommendations from the peer-review panel recommended the existing POC and CAA should be renewed and implemented annually to ensure that project activities are coordinated with the North Slope Borough and Alaska Native whaling captains. Therefore, in addition to the activity specific mitigation measures above, NMFS is requiring Hilcorp to abide by the POC, and remain committed to the GNP throughout the life of the regulations. In addition, Hilcorp has committed to following the CAA.

Based on our evaluation of the applicant's proposed measures, NMFS has preliminarily determined that the proposed mitigation measures provide the means effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for subsistence uses.

Proposed Monitoring and Reporting

In order to issue an LOA for an activity, Section 101(a)(5)(A) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of the authorized taking. NMFS' MMPA implementing regulations further describe the information that an applicant should provide when requesting an authorization (50 CFR 216.104(a)(13)), including the means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and the level of taking or impacts on populations of marine mammals.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of significant interactions with marine mammal species in action area (*e.g.,* animals that came close to the vessel, contacted the gear, or are otherwise rare or displaying unusual behavior);
- 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 action; 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 important physical components of marine mammal habitat); and
- Mitigation and monitoring effectiveness.

Marine Mammal Monitoring During the Open-Water Season

Hilcorp shall employ NMFS approved PSOs and conduct marine mammal monitoring per the Marine Mammal Monitoring Plan, dated February 12, 2019. Two PSOs will be placed on either side of the island where pile/pipe-driving or slope shaping activities are occurring. For example, one PSO would be placed on the side where construction activities are taking place and the other placed on the opposite side to provide complete observer coverage around the island. PSO stations will be moved around the island as needed during construction activities to provide full coverage. PSOs will be switched out such that they will observe for no more than 4 hours at a time and no more than 12 hours in a 24-hour period.

A third island-based PSO will work closely with an aviation specialist to monitor the Level B harassment zone during all open-water pile and pipe driving using an unmanned aircraft system (UAS). This third PSO and the UAS pilot will be located on the island. UAS monitoring will also be used during slope shaping, which may occur in open water intermittently until August 31 the first year the proposed regulations are valid. Should foundation piles be installed the subsequent year, the requirement for UAS will be dependent upon the success of the program in the previous year and results of any preliminary acoustic analysis during year 1 construction (*e.g.,* impact driving conductor pipes). Should UAS not be deemed effective and construction is ongoing during the open-water season, a vessel-based PSO shall observe the monitoring zone during pile and pipe driving.

During the open-water season, marine mammal monitoring will take place from 30 minutes prior to initiation of pile and pipe driving activity through 30 minutes post-completion of pile driving activity. Pile driving may commence when observers have declared the shutdown zone clear of marine mammals. In the event of a delay or shutdown of activity resulting from marine mammals in the shutdown zone, animals must be allowed to remain in the shutdown zone (*i.e.,* must leave of their own volition) and their behavior must be monitored and documented.

During the ice-covered season, in addition to ice road monitoring (see below), Hilcorp personnel will report any ice seal sightings on or near the LDPI to Hilcorp's Environmental Specialist.

Acoustic Monitoring During the Open-Water Season

Hilcorp will conduct acoustic monitoring of island construction activities during the open-water season in accordance with its Acoustic

Monitoring Plan available on our website. In summary, Hilcorp proposes to annually conduct underwater acoustic monitoring during the open water season (July through the beginning of October) using Directional Autonomous Seafloor Acoustic Recorders (DASARs). One or more DASARs will be deployed at a pre-determined GPS location(s) away from the LDPI. Each DASAR will be connected by a ground line to an anchor on the seafloor. At the end of the open water season, the DASAR will be retrieved by dragging grappling hooks on the seafloor, perpendicular to and over the location of the ground line, as defined by the GPS locations of the anchor and DASAR. All activities conducted during the open water season will be monitored. Goals of the acoustic monitoring plan are to characterize LDPI construction and operation noises, ambient sound levels, and verify (or amend) modeled distances to NMFS harassment thresholds. Recorder arrangement will be configured each year based on the anticipated activities for that season and the modelled sound propagation estimates for the relevant sources. Hilcorp's acoustic monitoring plan can be found at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act.*

Marine Mammal Monitoring During Ice Road Construction, Maintenance and Use

Hilcorp has prepared a comprehensive ice seal monitoring and mitigation plan via development of a BMP document which is available at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act.* Hilcorp would be required to implement these BMPs; we provide a summary here but encourage the public to review the full BMP document.

Seal surveys will be conducted every other day during daylight hours. Observers for ice road activities need not be trained PSOs, but they must have received the species observation training and understand the applicable sections of Hilcorp's Wildlife Management Plan. In addition, they must be capable of detecting, observing and monitoring ringed seal presence and behaviors, and accurately and completely recording data. Observers will have no other primary duty than to watch for and report observations related to ringed seals during this survey. If weather conditions become unsafe, the observer may be removed from the monitoring activity.

Construction, maintenance or decommissioning activities associated with ice roads and trails will not occur within 150 ft of the observed ring seal, but may proceed as soon as the ringed seal, of its own accord, moves farther than 150 ft distance away from the activities or has not been observed within that area for at least 24 hours. Transport vehicles (*i.e.,* vehicles not associated with construction, maintenance or decommissioning) may continue their route within the designated road/trail without stopping.

If a ringed seal structure (*i.e.,* breathing hole or lair) is observed within 150 ft of the ice road/trail, the location of the structure will be reported to the Environmental Specialist who will then carry out a notification protocol. A qualified observer will monitor the structure every six hours on the day of the initial sighting to determine whether a ringed seal is present. Monitoring for the seal will occur every other day the ice road is being used unless it is determined the structure is not actively being used (*i.e.,* a seal is not sighted at that location during monitoring).

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, upon receipt of a complete monitoring plan, and at its discretion, NMFS will either submit the plan to members of a peer review panel for review or within 60 days of receipt of the proposed monitoring plan, schedule a workshop to review the plan (50 CFR 216.108(d)).

NMFS established an independent peer review panel (PRP) to review Hilcorp's 4MP for the proposed LDPI project in Foggy Island Bay. NMFS provided the PRP with Hilcorp's ITA application and monitoring plan and asked the panel 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 above? If not, how should the objectives be modified to better accomplish the goals above?

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 their stated 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 their stated 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 and comprehensive report)?

The PRP met in May 2018 and subsequently provided a final report to NMFS containing recommendations that the panel members felt were applicable to Hilcorp's monitoring plans. The PRP concluded the objectives for both the visual and acoustic monitoring are appropriate, and agrees that the objective of real-time mitigation of potential disturbance of marine mammals would be met through visual monitoring. 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/permit/incidental-take-authorizations-under-marine-mammal-protection-act.*

The PRP recommended Hilcorp consult with biologists at the NMFS Marine Mammal Laboratory and other scientists and users familiar with the use and limitations of UAS technology for studying marine mammals at sea regarding appropriate protocols and procedures for the proposed project. Hilcorp has worked, and will continue to work, with NMFS to develop a safe, effective UAS monitoring program.

The PRP noted marine mammal monitoring would not be conducted during the ice-covered season. Since the PRP met, Hilcorp has developed a marine mammal monitoring plan that would be enacted during ice-covered months along the ice roads and ice trails. These roads lead up to the LDPI; therefore, marine mammal monitoring would occur during the ice-covered season and occur at the LDPI. NMFS has also included a provision that should ice seals be observed on or near the LDPI, they shall be reported to Hilcorp's Environmental Specialist and no personnel shall approach or operate equipment within 10 m of the seal.

The PRP was concerned no acoustic monitoring would be conducted during the winter months and recommended Hilcorp deploy multiple acoustic recorders during ice-covered periods to obtain data on both presence of marine mammals and sound levels generated during pile driving activities. Hilcorp is not proposing to deploy long-term bottom mounted hydrophones but will collect measurements using hand-held hydrophones lowered in a hole drilled through the ice.

The PRP also encouraged Hilcorp to consider deployment of additional acoustic recorders during the open-water season approximately 15 km northwest of the project area to facilitate a broader, multi-year approach to analyzing the effect of sound exposure on marine mammals by various LDPI and non-LDPI sources. The deployment of multiple recorders would provide a measure of redundancy and avoid the risk of losing all of the season's data if the recorders are lost or malfunction. Hilcorp is proposing to position multiple recorders simultaneously to record sound levels at multiple ranges from the project activities. Data recorded during times with no project activities, if such times exist, will be analyzed for ambient sound level statistics. The recorder arrangement will be configured each year based on the anticipated activities for that season.

The PRP recommended that the existing POC and CAA be renewed and implemented annually to ensure that project activities are coordinated with the North Slope Borough and Alaska Native whaling captains. Hilcorp is required to implement the POC and has agreed to implement a CAA with the AEWC.

Reporting

General—A draft report would be submitted to NMFS within 90 days of the completion of monitoring for each year the regulations are valid. The report will include marine mammal observations pre-activity, during-activity, and post-activity during pile driving days, and will also provide descriptions of any behavioral responses to construction activities by marine mammals and a complete description of all mitigation shutdowns and the results of those actions and an extrapolated total take estimate based on the number of marine mammals observed during the course of construction. A final report must be submitted within 30 days following resolution of comments on the draft report. Hilcorp would also submit a comprehensive annual summary report covering all activities conducted under the incidental take regulations no more than 90 days after the regulations expire.

Ice Road Reporting

On an annual basis, Hilcorp will also submit a draft report to NMFS AKR and OPR compiling all ringed seal observations within 90 days of decommissioning the ice road and ice trails. The report will include information about activities occurring at time of sighting, ringed seal age class and behavior, and actions taken to mitigate disturbance. In addition the report will include an analysis of the effectiveness of the BMPs recently developed in coordination with NMFS and any proposed updates to the BMPs or Wildlife Management Plan as a result of the encounter. A final report shall be prepared and submitted within thirty days following resolution of comments on the draft report from NMFS.

NMFS is also proposing to require Hilcorp to submit more immediate reports should a marine mammal be unexpectantly killed or seriously injured by the specified activity or a dead or injured marine mammal is observed by a PSO or Hilcorp personnel. These are standard measures required by NMFS; details on reporting timelines and information can be found in the proposed regulations.

LDPI Construction and Operation Reporting

Each day of marine mammal monitoring, PSOs will complete field sheets containing information NMFS typically requires for pile driving and construction activities. The full list of data is provided in Hilcorp's Marine Mammal Monitoring and Mitigation Plan and in the proposed regulations below. Data include, but are not limited to, information on daily activities occurring, marine mammal sighting information (*e.g.,* species, group size, and behavior), manner and amount of take, and any mitigation actions taken. Data in these field sheets will be summarized and Hilcorp will provide a draft annual report to NMFS no later than 90 days post marine mammal monitoring efforts. Hilcorp would also submit an annual acoustic monitoring report no later than 90 days after acoustic recorders are recovered each season. The acoustic monitoring reports shall contain measured dB rms, SEL and peak values as well as ambient noise levels, per the Acoustic Monitoring Plan and as described below in the proposed regulations.

Hilcorp will also submit to NMFS a draft final report on all marine mammal monitoring conducted under the proposed regulations no later than ninety calendar days of the completion of marine mammal and acoustic monitoring or sixty days prior to the issuance of any subsequent regulations, if necessary, for this project, whichever comes first. A final report shall be prepared and submitted within thirty days following resolution of comments on the draft report from NMFS.

Negligible Impact Analysis and Determination

Introduction

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" by mortality, serious injury, and Level A harassment or Level B harassment, we consider other factors, such as the likely nature of any behavioral responses (*e.g.,* intensity, duration), the context of any such responses (*e.g.,* critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of 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 environmental 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, and specific consideration of take by M/SI previously authorized for other NMFS research activities).

Serious Injury and Mortality

NMFS is proposing to authorize a very small number of serious injuries or mortalities that could occur incidental to ice road construction, use, and maintenance. We note here that the takes from ice road construction, use, and maintenance enumerated below could result in non-serious injury, but their worst potential outcome (mortality) is analyzed for the purposes of the negligible impact determination.

In addition, we discuss here the connection, and differences, between the legal mechanisms for authorizing incidental take under section 101(a)(5) for activities such as LDPI construction and operation, and for authorizing incidental take from commercial fisheries. In 1988, Congress amended the MMPA's provisions for addressing incidental take of marine mammals in commercial fishing operations. Congress directed NMFS to develop and recommend a new long-term regime to govern such incidental taking (see MMC, 1994). The need to develop a system suited to the unique circumstances of commercial fishing operations led NMFS to suggest a new conceptual means and associated regulatory framework. That concept, PBR, and a system for developing plans containing regulatory and voluntary measures to reduce incidental take for fisheries that exceed PBR were incorporated as sections 117 and 118 in the 1994 amendments to the MMPA. In *Conservation Council for Hawaii* v. *National Marine Fisheries Service,* 97 F. Supp.3d 1210 (D. Haw. 2015), which concerned a challenge to NMFS' regulations and LOAs to the Navy for activities assessed in the 2013—2018 HSTT MMPA rulemaking, the Court ruled that NMFS' failure to consider PBR when evaluating lethal takes in the negligible impact analysis under section 101(a)(5)(A) violated the requirement to use the best available science.

PBR is defined in section 3 of 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 (OSP) and, although not controlling, can be one measure considered among other factors when evaluating the effects of M/SI on a marine mammal species or stock during the section 101(a)(5)(A) process. OSP is defined in section 3 of the MMPA as the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element. Through section 2, an overarching goal of the statute is to ensure that each species or stock of marine mammal is maintained at or returned to its OSP.

PBR values are calculated by NMFS as the level of annual removal from a stock that will allow that stock to equilibrate within OSP at least 95 percent of the time, and is the product of factors relating to the minimum population estimate of the stock (N_{min}), the productivity rate of the stock at a small population size, and a recovery factor. Determination of appropriate values for these three elements incorporates significant precaution, such that application of the parameter to the management of marine mammal stocks may be reasonably certain to achieve the goals of the MMPA. For example, calculation of the minimum population estimate (N_{min}) incorporates the level of precision and degree of variability associated with abundance information, while also providing reasonable assurance that the stock size is equal to or greater than the estimate (Barlow *et al.,* 1995), typically by using the 20th percentile of a log-normal distribution of the population estimate. In general, the three factors are developed on a stock-specific basis in consideration of one another in order to produce conservative PBR values that appropriately account for both imprecision that may be estimated, as well as potential bias stemming from lack of knowledge (Wade, 1998).

Congress called for PBR to be applied within the management framework for commercial fishing incidental take under section 118 of the MMPA. As a result, PBR cannot be applied appropriately outside of the section 118 regulatory framework without consideration of how it applies within the section 118 framework, as well as how the other statutory management frameworks in the MMPA differ from the framework in section 118. PBR was not designed and is not used as an absolute threshold limiting commercial fisheries. Rather, it serves as a means to evaluate the relative impacts of those activities on marine mammal stocks. Even where commercial fishing is causing M/SI at levels that exceed PBR, the fishery is not suspended. When M/SI exceeds PBR in the commercial fishing context under section 118, NMFS may develop a take reduction plan, usually with the assistance of a take reduction team. The take reduction plan will include measures to reduce and/or minimize the taking of marine mammals by commercial fisheries to a level below the stock's PBR. That is, where the total annual human-caused M/SI exceeds PBR, NMFS is not required to halt fishing activities contributing to total M/SI but rather utilizes the take reduction process to further mitigate the effects of fishery activities via additional bycatch reduction measures. In other words, under section 118 of the MMPA, PBR does not serve as a strict cap on the operation of commercial fisheries that may incidentally take marine mammals.

Similarly, to the extent PBR may be relevant when considering the impacts of incidental take from activities other than commercial fisheries, using it as the sole reason to deny (or issue) incidental take authorization for those activities would be inconsistent with Congress's intent under section 101(a)(5), NMFS' long-standing regulatory definition of ''negligible impact,'' and the use of PBR under section 118. The standard for authorizing incidental take for activities other than commercial fisheries under section 101(a)(5) continues to be, among other things that are not related to PBR, whether the total taking will have a negligible impact on the species or stock. Nowhere does section 101(a)(5)(A) reference use of PBR to make the negligible impact finding or authorize incidental take through multi-year regulations, nor does its companion provision at 101(a)(5)(D) for authorizing non-lethal incidental take under the same negligible-impact standard. NMFS' MMPA implementing regulations state that take has a negligible impact when it does not ''adversely affect the species or stock through effects on annual rates of recruitment or survival''—likewise without reference to PBR. When Congress amended the MMPA in 1994 to add section 118 for commercial fishing, it did not alter the standards for authorizing non-commercial fishing incidental take under section 101(a)(5), implicitly acknowledging that the negligible impact standard under section 101(a)(5) is separate from the PBR metric under section 118. In fact, in 1994 Congress also amended section 101(a)(5)(E) (a separate provision governing commercial fishing incidental take for species listed under the ESA) to add compliance with the new section 118 but retained the standard of the negligible impact finding under section 101(a)(5)(A) (and section 101(a)(5)(D)), showing that Congress understood that the determination of negligible impact and application of PBR may share certain features but are, in fact, different.

Since the introduction of PBR in 1994, NMFS had used the concept almost entirely within the context of implementing sections 117 and 118 and other commercial fisheries management-related provisions of the MMPA. Prior to the Court's ruling in *Conservation Council for Hawaii* v. *National Marine Fisheries Service* and consideration of PBR in a series of section 101(a)(5) rulemakings, there were a few examples where PBR had informed agency deliberations under other MMPA sections and programs, such as playing a role in the issuance of a few scientific research permits and subsistence takings. But as the Court found when reviewing examples of past PBR consideration in *Georgia Aquarium* v. *Pritzker,* 135 F. Supp. 3d 1280 (N.D. Ga.

2015), where NMFS had considered PBR outside the commercial fisheries context, ''it has treated PBR as only one 'quantitative tool' and [has not used it] as the sole basis for its impact analyses.'' Further, the agency's thoughts regarding the appropriate role of PBR in relation to MMPA programs outside the commercial fishing context have evolved since the agency's early application of PBR to section 101(a)(5) decisions. Specifically, NMFS' denial of a request for incidental take authorization for the U.S. Coast Guard in 1996 seemingly was based on the potential for lethal take in relation to PBR and did not appear to consider other factors that might also have informed the potential for ship strike in relation to negligible impact (61 FR 54157; October 17, 1996).

The MMPA requires that PBR be estimated in SARs and that it be used in applications related to the management of take incidental to commercial fisheries (*i.e.,* the take reduction planning process described in section 118 of the MMPA and the determination of whether a stock is ''strategic'' as defined in section 3), but nothing in the statute requires the application of PBR outside the management of commercial fisheries interactions with marine mammals. Nonetheless, NMFS recognizes that as a quantitative metric, PBR may be useful as a consideration when evaluating the impacts of other human-caused activities on marine mammal stocks. Outside the commercial fishing context, and in consideration of all known human-caused mortality, PBR can help inform the potential effects of M/SI requested to be authorized under 101(a)(5)(A). As noted by NMFS and the U.S. Fish and Wildlife Service in our implementation regulations for the 1986 amendments to the MMPA (54 FR 40341, September 29, 1989), the Services consider many factors, when available, in making a negligible impact determination, including, but not limited to, the status of the species or stock relative to OSP (if known); whether the recruitment rate for the species or stock is increasing, decreasing, stable, or unknown; the size and distribution of the population; and existing impacts and environmental conditions. In this multi-factor analysis, PBR can be a useful indicator for when, and to what extent, the agency should take an especially close look at the circumstances associated with the potential mortality, along with any other factors that could influence annual rates of recruitment or survival.

When considering PBR during evaluation of effects of M/SI under section 101(a)(5)(A), we first calculate a metric for each species or stock that incorporates information regarding ongoing anthropogenic M/SI from all sources into the PBR value (*i.e.,* PBR minus the total annual anthropogenic mortality/serious injury estimate in the SAR), which is called ''residual PBR.'' (Wood *et al.,* 2012). We first focus our analysis on residual PBR because it incorporates anthropogenic mortality occurring from other sources. If the ongoing human-caused mortality from other sources does not exceed PBR, then residual PBR is a positive number, and we consider how the anticipated or potential incidental M/SI from the activities being evaluated compares to residual PBR using the framework in the following paragraph. If the ongoing anthropogenic mortality from other sources already exceeds PBR, then residual PBR is a negative number and we consider the M/SI from the activities being evaluated as described further below.

When ongoing total anthropogenic mortality from the applicant's specified activities does not exceed PBR and residual PBR is a positive number, as a simplifying analytical tool we first consider whether the specified activities could cause incidental M/SI that is less than 10 percent of residual PBR (the ''insignificance threshold,'' see below). If so, we consider M/SI from the specified activities to represent an insignificant incremental increase in ongoing anthropogenic M/SI for the marine mammal stock in question that alone (*i.e.,* in the absence of any other take) will not adversely affect annual rates of recruitment and survival. As such, this amount of M/SI would not be expected to affect rates of recruitment or survival in a manner resulting in more than a negligible impact on the affected stock unless there are other factors that could affect reproduction or survival, such as Level A and/or Level B harassment, or other considerations such as information that illustrates the uncertainty involved in the calculation of PBR for some stocks. In a few prior incidental take rulemakings, this threshold was identified as the ''significance threshold,'' but it is more accurately labeled an insignificance threshold, and so we use that terminology here, as we did in the AFTT Proposed (83 FR 10954; March 13, 2017) and Final Rules (83 FR 57076; November 14, 2018). Assuming that any additional incidental take by Level A or Level B harassment from the activities in question would not combine with the effects of the authorized M/SI to exceed the negligible impact level, the anticipated M/SI caused by the activities being evaluated would have a negligible impact on the species or stock. However, M/SI above the 10 percent insignificance threshold does not indicate that the M/SI associated with the specified activities is approaching a level that would necessarily exceed negligible impact. Rather, the 10 percent insignificance threshold is meant only to identify instances where additional analysis of the anticipated M/SI is not required because the negligible impact standard clearly will not be exceeded on that basis alone.

Where the anticipated M/SI is near, at, or above residual PBR, consideration of other factors (positive or negative), including those outlined above, as well as mitigation is especially important to assessing whether the M/SI will have a negligible impact on the species or stock. PBR is a conservative metric and not sufficiently precise to serve as an absolute predictor of population effects upon which mortality caps would appropriately be based. For example, in some cases stock abundance (which is one of three key inputs into the PBR calculation) is underestimated because marine mammal survey data within the U.S. EEZ are used to calculate the abundance even when the stock range extends well beyond the U.S. EEZ. An underestimate of abundance could result in an underestimate of PBR. Alternatively, we sometimes may not have complete M/SI data beyond the U.S. EEZ to compare to PBR, which could result in an overestimate of residual PBR. The accuracy and certainty around the data that feed any PBR calculation, such as the abundance estimates, must be carefully considered to evaluate whether the calculated PBR accurately reflects the circumstances of the particular stock. M/SI that exceeds PBR may still potentially be found to be negligible in light of other factors that offset concern, especially when robust mitigation and adaptive management provisions are included.

In *Conservation Council for Hawaii* v. *National Marine Fisheries Service,* which involved the challenge to NMFS' issuance of LOAs to the Navy in 2013 for activities in the HSTT Study Area, the Court reached a different conclusion, stating, ''Because any mortality level that exceeds PBR will not allow the stock to reach or maintain its OSP, such a mortality level could not be said to have only a 'negligible impact' on the stock.'' As described above, the Court's statement fundamentally misunderstands the two terms and incorrectly indicates that these concepts (PBR and ''negligible impact'') are directly connected, when in fact nowhere in the MMPA is it indicated that these two terms are equivalent.

Specifically, PBR was designed as a tool for evaluating mortality and is defined as the number of animals that can be removed while ''allowing that stock to reach or maintain its OSP.'' OSP is defined as a population that falls within a range from the population level that is the largest supportable within the ecosystem to the population level that results in maximum net productivity, and thus is an aspirational management goal of the overall statute with no specific timeframe by which it should be met. PBR is designed to ensure minimal deviation from this overarching goal, with the formula for PBR typically ensuring that growth towards OSP is not reduced by more than 10 percent (or equilibrates to OSP 95 percent of the time). As PBR is applied by NMFS, it provides that growth toward OSP is not reduced by more than 10 percent, which certainly allows a stock to ''reach or maintain its OSP'' in a conservative and precautionary manner—and we can therefore clearly conclude that if PBR were not exceeded, there would not be adverse effects on the affected species or stocks. Nonetheless, it is equally clear that in some cases the time to reach this aspirational OSP level could be slowed by more than 10 percent *(i.e.,* total human-caused mortality in excess of PBR could be allowed) without adversely affecting a species or stock through effects on its rates of recruitment or survival. Thus even in situations where the inputs to calculate PBR are thought to accurately represent factors such as the species' or stock's abundance or productivity rate, it is still possible for incidental take to have a negligible impact on the species or stock even where M/SI exceeds residual PBR or PBR.

As noted above, PBR is helpful in informing the analysis of the effects of mortality on a species or stock because it is important from a biological perspective to be able to consider how the total mortality in a given year may affect the population. However, section 101(a)(5)(A) of the MMPA indicates that NMFS shall authorize the requested incidental take from a specified activity if we find that the total of such taking *i.e.,* from the specified activity will have a negligible impact on such species or stock. In other words, the task under the statute is to evaluate the applicant's anticipated take in relation to their take's impact on the species or stock, not other entities' impacts on the species or stock. Neither the MMPA nor NMFS' implementing regulations call for consideration of other unrelated activities and their impacts on the species or stock. In fact, in response to public comments on the implementing regulations NMFS explained that such effects are not considered in making negligible impact findings under section 101(a)(5), although the extent to which a species or stock is being impacted by other anthropogenic activities is not ignored. Such effects are reflected in the baseline of existing impacts as reflected in the species' or stock's abundance, distribution, reproductive rate, and other biological indicators.

NMFS guidance for commercial fisheries provides insight when evaluating the effects of an applicant's incidental take as compared to the incidental take caused by other entities. Parallel to section 101(a)(5)(A), section 101(a)(5)(E) of the MMPA provides that NMFS shall allow the incidental take of ESA-listed endangered or threatened marine mammals by commercial fisheries if, among other things, the incidental M/SI from the commercial fisheries will have a negligible impact on the species or stock. As discussed earlier, the authorization of incidental take resulting from commercial fisheries and authorization for activities other than commercial fisheries are under two separate regulatory frameworks. However when it amended the statute in 1994 to provide a separate incidental take authorization process for commercial fisheries, Congress kept the requirement of a negligible impact determination for this one category of species, thereby applying the standard to both programs. Therefore, while the structure and other standards of the two programs differ such that evaluation of negligible impact under one program may not be fully applicable to the other program (*e.g.,* the regulatory definition of ''negligible impact'' at 50 CFR 216.103 applies only to activities other than commercial fishing), guidance on determining negligible impact for commercial fishing take authorizations can be informative when considering incidental take outside the commercial fishing context. In 1999, NMFS published criteria for making a negligible impact determination pursuant to section 101(a)(5)(E) of the MMPA in a notice of proposed permits for certain fisheries (64 FR 28800; May 27, 1999). Criterion 2 stated If total human-related serious injuries and mortalities are greater than PBR, and fisheries-related mortality is less than 0.1 PBR, individual fisheries may be permitted if management measures are being taken to address non-fisheries-related serious injuries and mortalities. When fisheries-related serious injury and mortality is less than 10 percent of the total, the appropriate management action is to address components that account for the major portion of the total. This criterion addresses when total human-caused mortality is exceeding PBR, but the activity being assessed is responsible for only a small portion of the mortality. In incidental take authorizations in which NMFS has recently articulated a fuller description of how we consider PBR under section 101(a)(5)(A), this situation had not arisen, and NMFS' description of how we consider PBR in the section 101(a)(5) authorization process did not, therefore, include consideration of this scenario. However, the analytical framework we use here appropriately incorporates elements of the one developed for use under section 101(a)(5)(E) and because the negligible impact determination under section 101(a)(5)(A) focuses on the activity being evaluated, it is appropriate to utilize the parallel concept from the framework for section 101(a)(5)(E).

Accordingly, we are using a similar criterion in our negligible impact analysis under section 101(a)(5)(A) to evaluate the relative role of an applicant's incidental take when other sources of take are causing PBR to be exceeded, but the take of the specified activity is comparatively small. Where this occurs, we may find that the impacts of the taking from the specified activity may (alone) be negligible even when total human-caused mortality from all activities exceeds PBR if (in the context of a particular species or stock): The authorized mortality or serious injury would be less than or equal to 10 percent of PBR and management measures are being taken to address serious injuries and mortalities from the other activities (*i.e.,* other than the specified activities covered by the incidental take authorization under consideration). We must also determine, though, that impacts on the species or stock from other types of take (*i.e.,* harassment) caused by the applicant do not combine with the impacts from mortality or serious injury to result in adverse effects on the species or stock through effects on annual rates of recruitment or survival.

As discussed above, however, while PBR is useful in informing the evaluation of the effects of M/SI in section 101(a)(5)(A) determinations, it is just one consideration to be assessed in combination with other factors and is not determinative, including because, as explained above, the accuracy and certainty of the data used to calculate PBR for the species or stock must be considered. And we reiterate the considerations discussed above for why it is not appropriate to consider PBR an absolute cap in the application of this guidance. Accordingly, we use PBR as a trigger for concern while also considering other relevant factors to provide a reasonable and appropriate means of evaluating the effects of potential mortality on rates of recruitment and survival, while acknowledging that it is possible to exceed PBR (or exceed 10 percent of PBR in the case where other human-caused mortality is exceeding PBR but the specified activity being evaluated is an incremental contributor, as described in the last paragraph) by some small amount and still make a negligible impact determination under section 101(a)(5)(A).

A stock-wide PBR is unknown since data is only available for the Bering Sea. However, PBR for ringed seals in the Bearing Sea alone, considering an N_{min} of 5,100. Total annual mortality and serious injury is 1,054 for an r-PBR of 4,046 (Muto *et al.,* 2018), which means that the insignificance threshold is 405. No mortality or serious injury of ringed seals is currently authorized under any other incidental take authorization issued pursuant to section 101(a)(5)(A) of the MMPA. In the case of Liberty, the proposed authorized taking, by mortality, of two ringed seals over the course of 5 years, which equates to 0.4 mortality takes annually, is less than 10 percent r-PBR when considering mortality and serious injuring caused by other anthropogenic sources.

Harassment

Hilcorp requested, and NMFS proposes, to authorize take, by Level A harassment and Level B harassment, of six species of marine mammals. The amount of taking proposed to be authorized is low compared to marine mammal abundance. Potential impacts of LDPI activities include PTS, TTS, and behavioral changes due to exposure to construction and operation noise. The potential for Level A harassment occurs during impact pile driving. As discussed in the *Potential Effects of the Specified Activity on Marine Mammals and Their Habitat* section, PTS is a permanent shift in hearing threshold and the severity of the shift is determined by a myriad of factors. Here, we expect cetaceans to incur only a slightly elevated shift in hearing threshold because we do not except them to be close to the source (especially large whales who primarily stay outside the McClure Island group) and that impact pile driving (the source with greatest potential to cause PTS) would only occur for a maximum of 40 minutes per day. Therefore, the potential for large threshold shifts in unlikely. Further, the frequency range of hearing that may be impaired is limited to the frequency bands of the source. Pile driving exhibits energy in lower frequencies. While low frequency baleen whales are most susceptible to this, these are the species that are unlikely to come very close to the source. Mid-frequency cetaceans and phocids do not have best hearing within these lower frequency bands of pile driving; therefore, the resulting impact of any threshold shift is less likely to impair vital hearing. All other noise generated from the project is expected to be low level from activities such as slope-shaping and drilling and not result in PTS.

Cetaceans are infrequent visitors to Foggy Island Bay with primary habitat use outside of the McClure Islands. Any taking within Foggy Island Bay is not expected to impact reproductive or survival activities as the bay is not known to contain critical areas such as rookeries, mating grounds, or other areas of similar significance. Some ringed seals do lair in Foggy Island Bay; however, the area impacted by the project is small compared to available habitat. Further, to offset impacts to reproductive behaviors by ringed seals (*e.g.,* lairing, pupping), Hilcorp would follow a number of ice road BMPs developed in coordination with NMFS ringed seal experts. Hilcorp would also not impact pile drive during the bowhead whale hunt, thereby minimizing impacts to whales during peak migration periods (we note the peak migratory pathway for bowhead whales is well outside the McClure Islands). Finally, for reasons described above, the taking of two ringed seals, by mortality, over the course of 5 years is not expected to have impacts on the species' rates of recruitment and survival.

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 the species or stock through effects on annual rates of recruitment or survival:

- Only two ringed seals are authorized to be taken by mortality over 5 years;
- Any PTS would be of a small degree;
- The amount of takes, by harassment, is low compared to population sizes;
- The area ensonified by Hilcorp's activities does not provide important areas and is a de minimis subset of habitat used by and available to marine mammals;
- Critical behaviors such as lairing and pupping by ringed seals would be avoided and minimized through implementation of ice road BMPs; and
- Hilcorp would avoid noise-generating activities during the bowhead whale hunt; thereby minimizing impact to critical behavior (*i.e.,* migration).

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 above, only small numbers of incidental take may be authorized under Section 101(a)(5)(A) of the MMPA for specified 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. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

The amount of total taking (*i.e.,* Level A harassment, Level B harassment, and, for ringed seals, mortality) of any marine mammal stock over the course of 5 years, is less than one percent of any population (Table 12).

TABLE 12—AMOUNT OF PROPOSED AUTHORIZED TAKE RELATIVE TO POPULATION ESTIMATES (N_{best})

Species	Stock	Population estimate	Total take	Percent of population
Bowhead whale	Arctic	16,820	12	<1

TABLE 12—AMOUNT OF PROPOSED AUTHORIZED TAKE RELATIVE TO POPULATION ESTIMATES (N_{best})—Continued

Species	Stock	Population estimate	Total take	Percent of population
Gray whale	ENP	20,990	7	<1
Beluga whale	Beaufort Sea	39,258	130	<1
Ringed seal	Alaska	170,000	406	<1
Bearded seal	Alaska	299,174	64	<1
Spotted seal	Alaska	423,625	64	<1

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 will be taken relative to the population sizes of the affected species or stocks.

Impact on Availability of Affected Species for Taking for Subsistence Uses

As described in the Marine Mammal section of the document, all species potentially taken by Hilcorp's specified activities are key subsistence species, in particular the bowhead whales and ice seals. Hilcorp has proposed and NMFS has included several mitigation measures to address potential impacts on the availability of marine mammals for subsistence use. The AEWC provided comments during the public comment period on the Notice of Receipt of Hilcorp's application and as a member of the peer review panel. NMFS incorporated appropriate mitigation to address AEWC's concerns, including requirements for Hilcorp to remain a signatory to a follow protocols contained with the POC. Hilcorp has also indicated they would abide by a CAA. In addition, mitigation measures designed to minimize impacts on marine mammals also minimize impacts to subsistence users (*e.g.,* avoid impact pile driving during the fall bowhead whale hunt). Hilcorp and NMFS have also developed a comprehensive set of BMPs to minimize impacts to ice seals during ice-covered months. In consideration of coordination with the AEWC, Hilcorp's proposed work schedule (*i.e.,* conducting the majority of work in winter when bowhead whales are not present) and the incorporation of several mitigation measures, we have preliminarily determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Adaptive Management

The regulations governing the take of marine mammals incidental to Hilcorp's LPDI construction and operational activities would contain an adaptive management component.

The reporting requirements associated with this proposed rule are designed to provide NMFS with monitoring data from the previous year to allow consideration of whether any changes are appropriate. The use of adaptive management allows NMFS to consider new information from different sources to determine (with input from Hilcorp regarding practicability) on an annual or biennial basis if mitigation or monitoring measures should be modified (including additions or deletions). Mitigation measures could be modified if new data suggests that such modifications would have a reasonable likelihood of reducing adverse effects to marine mammals and if the measures are practicable.

The following are some of the possible sources of applicable data to be considered through the adaptive management process: (1) Results from monitoring reports, as required by MMPA authorizations; (2) results from general marine mammal and sound research; and (3) any information which reveals that marine mammals may have been taken in a manner, extent, or number not authorized by these regulations or subsequent LOAs.

Endangered Species Act (ESA)

The bowhead whale, ringed seal, and bearded seal (Beringia DPS) are listed under the ESA (Table 2). On July 31, 2018, NMFS Alaska Region (AKR) issued a Biological Opinion to BOEM, Environmental Protection Agency (EPA), and U.S. Army Corps of Engineers (USACE) for the permitting of the LDPI Project in its entirety (mobilization to decommissioning). The Biological Opinion concluded construction, operation, and decommissioning of the LDPI would not jeopardize the continued existence of the aforementioned species or adversely modify critical habitat. OPR has requested consultation with NMFS Alaska Regional Office under section 7 of the ESA on the promulgation of five-year regulations and the subsequent issuance of LOAs to Hilcorp under section 101(a)(5)(A) of the MMPA. This consultation will be concluded prior to issuing any final rule.

Request for Information

NMFS requests interested persons to submit comments, information, and suggestions concerning Hilcorp's request and the proposed regulations (see **ADDRESSES**). All comments will be reviewed and evaluated as we prepare a final rule and make final determinations on whether to issue the requested authorization. This notice and referenced documents provide all environmental information relating to our proposed action for public review.

Classification

Pursuant to the procedures established to implement Executive Order 12866, the Office of Management and Budget has determined that this proposed rule is not significant.

Pursuant to section 605(b) of the Regulatory Flexibility Act (RFA), the Chief Counsel for Regulation of the Department of Commerce has certified to the Chief Counsel for Advocacy of the Small Business Administration that this proposed rule, if adopted, would not have a significant economic impact on a substantial number of small entities. Hilcorp is the sole entity that would be subject to the requirements in these proposed regulations, and the Hilcorp is not a small governmental jurisdiction, small organization, or small business, as defined by the RFA. Because of this certification, a regulatory flexibility analysis is not required and none has been prepared.

Notwithstanding any other provision of law, no person is required to respond to nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act (PRA) unless that collection of information displays a currently valid OMB control number. This proposed rule contains collection-of-information requirements subject to the provisions of the PRA. These requirements have been approved by OMB under control number 0648–0151 and include applications for regulations, subsequent LOAs, and reports.

List of Subjects in 50 CFR Part 218

Marine mammals, Wildlife, Endangered and threatened species, Alaska, Oil and gas exploration, Indians, Reporting and recordkeeping requirements, Administrative practice and procedure.

Dated: May 21, 2019.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For reasons set forth in the preamble, 50 CFR part 217 is proposed to be amended as follows:

PART 217—REGULATIONS GOVERNING THE TAKING AND IMPORTING OF MARINE MAMMALS

■ 1. The authority citation for part 217 continues to read as follows:

Authority: 16 U.S.C. 1361 *et seq.*

■ 2. Add subpart D to part 217 to read as follows:

Subpart D—Taking Marine Mammals Incidental to Construction and Operation of the Liberty Drilling and Production Island

Subpart D—Taking Marine Mammals Incidental to Construction and Operation of the Liberty Drilling and Production Island

§ 217.30 Specified activity and specified geographical region.

(a) Regulations in this subpart apply only to Hilcorp LLC (Hilcorp) and those persons it authorizes or funds to conduct activities on its behalf for the taking of marine mammals that occurs in the areas outlined in paragraph (b) of this section and that occurs incidental to construction, maintenance, and operation of the Liberty Drilling and Production Island (LDPI) and associated infrastructure.

(b) The taking of marine mammals by Hilcorp may be authorized in a Letter of Authorization (LOA) only if it occurs within the Beaufort Sea, Alaska.

§ 217.31 Effective dates.

Regulations in this subpart are effective from December 1, 2020, through November 30, 2025.

§ 217.32 Permissible methods of taking.

Under LOAs issued pursuant to §§ 216.106 of this chapter and 217.36, the Holder of the LOA (hereinafter ''Hilcorp'') may incidentally, but not intentionally, take marine mammals within the area described in § 217.30(b) by mortality, serious injury, Level A harassment, or Level B harassment associated with the LDPI construction and operation activities, including associated infrastructure, provided the activities are in compliance with all terms, conditions, and requirements of the regulations in this subpart and the appropriate LOA.

§ 217.33 Prohibitions.

Notwithstanding takings contemplated in § 217.32 and authorized by a LOA issued under §§ 216.106 of this chapter and 217.36, no person in connection with the activities described in § 217.30 may:

(a) Violate, or fail to comply with, the terms, conditions, and requirements of this subpart or a LOA issued under §§ 216.106 of this chapter and 217.36;

(b) Take any marine mammal not specified in such LOAs;

(c) Take any marine mammal specified in such LOAs in any manner other than as specified;

(d) Take a marine mammal specified in such LOAs if NMFS determines such taking results in more than a negligible impact on the species or stocks of such marine mammal; or

(e) Take a marine mammal specified in such LOAs if NMFS determines such taking results in an unmitigable adverse impact on the species or stock of such marine mammal for taking for subsistence uses.

§ 217.34 Mitigation requirements.

When conducting the activities identified in § 217.30(a), the mitigation measures contained in any LOA issued under § 216.106 of this chapter must be implemented. These mitigation measures shall include but are not limited to:

(a) *General conditions.* (1) Hilcorp must renew, on an annual basis, the Plan of Cooperation (POC), throughout the life of the regulations;

(2) A copy of any issued LOA must be in the possession of Hilcorp, its designees, and work crew personnel operating under the authority of the issued LOA;

(3) Hilcorp must conduct briefings for construction and ice road supervisors and crews, and the marine mammal and acoustic monitoring teams prior to the start of annual ice road or LDPI construction, and when new personnel join the work, in order to explain responsibilities, communication procedures, the marine mammal monitoring protocol, and operational procedures;

(4) Hilcorp must allow subsistence hunters to use the LDPI for safe harbor during severe storms, if requested by hunters;

(5) In the unanticipated event of an oil spill during LDPI operational years, Hilcorp must notify NMFS of the spill within 48 hours, regardless of size, and implement measures contained within the Liberty Oil Spill Response Plan; and

(6) Hilcorp must strive to complete pile driving and pipeline installation during the ice-covered season.

(b) *Ice road construction, maintenance, and operation.* (1) Hilcorp must implement the NMFS-approved Ice Road and Ice Trail Best Management Practices (BMPs) and the Wildlife Action Plan. These documents may be updated as needed throughout the life of the regulations, in consultation with NMFS.

(2) [Reserved]

(c) *Liberty Drilling Production Island Construction.* (1) For all pile driving, Hilcorp shall implement a minimum shutdown zone of a 10 meter (m) radius from piles being driven. If a marine mammal comes within or is about to enter the shutdown zone, such operations shall cease immediately;

(2) For all pile driving activity, Hilcorp shall implement shutdown zones with radial distances as identified in any LOA issued under §§ 216.106 of this chapter and 217.36. If a marine mammal comes within or is about to enter the shutdown zone, such operations must cease immediately;

(3) Hilcorp must employ NMFS-approved protected species observers (PSOs) and designate monitoring zones with radial distances as identified in any LOA issued under §§ 216.106 of this chapter and 217.36. NMFS may adjust the shutdown zones pending review and approval of an acoustic monitoring report (see § 217.35 Requirements for Monitoring and Reporting);

(4) If a bowhead whale or other low frequency cetacean enters the Level A harassment zone, pile or pipe driving must be shut down immediately. If a beluga whale or pinniped enters the Level A harassment zone while pile driving is ongoing, work may continue until the pile is completed (estimated to require approximately 15–20 minutes), but additional pile driving must not be initiated until the animal has left the

Level A harassment zone. During this time, PSOs must monitor the animal and record behavior;

(5) If a marine mammal is approaching a Level A harassment zone and pile driving has not commenced, pile driving shall be delayed. Pile driving may not commence or resume until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone; 15 minutes have passed without subsequent detections of small cetaceans and pinnipeds; or 30 minutes have passed without subsequent detections of large cetaceans;

(6) If a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the monitoring zone (which equates to the Level B harassment zone), pile driving and removal activities must shut down immediately using delay and shut-down procedures. Activities must not resume until the animal has been confirmed to have left the area or the observation time period, as indicated in 217.34(c)(5), has elapsed;

(7) Hilcorp will use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of strikes at reduced energy, followed by a thirty-second waiting period, then two subsequent reduced energy strike sets. A soft start must 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 thirty minutes or longer;

(8) No impact driving must occur during the Nuiqsut Cross Island bowhead whale hunt. Hilcorp must coordinate annually with subsistence users on the dates of these hunts; and

(9) Should an ice seal be observed on or near the LDPI by any Hilcorp personnel, during construction or operation, the sighting must be reported to Hilcorp's Environmental Specialist. No construction activity should occur within 10 m of an ice seal and any vehicles used should use precaution and not approach any ice seal within 10 m.

(d) *Vessel restrictions.* When operating vessels, Hilcorp must:

(1) Reduce vessel speed to 5 knots (kn) if a whale is observed with 500 m (1641 feet (ft)) of the vessel and is on a potential collision course with vessel, or if a whale is within 275 m (902 ft) of whales, regardless of course relative to the vessel;

(2) Avoid multiple changes in vessel direction;

(3) Not approach within 800 m (2,624 ft) of a North Pacific right whale or within 5.6 km (3 nautical miles) of Steller sea lion rookeries or major haulouts; and

(4) Avoid North Pacific right whale critical habitat or, if critical habitat cannot be avoided, reduce vessel speed during transit.

§ 217.35 Requirements for monitoring and reporting.

(a) All marine mammal and acoustic monitoring must be conducted in accordance to Hilcorp's Marine Mammal Mitigation and Monitoring Plan (4MP). This plan may be modified throughout the life of the regulations upon NMFS review and approval.

(b) Monitoring must be conducted by NMFS-approved PSOs, who must have no other assigned tasks during monitoring periods. At minimum, two PSOs must be placed on elevated platforms on the island during the open-water season when island construction activities are occurring. These observers will monitor for marine mammals and implement shutdown or delay procedures when applicable through communication with the equipment operator.

(c) One PSO will be placed on the side where construction activities are taking place and the other placed on the opposite side of the LDPI; both observers will be on elevated platforms.

(d) PSOs will rotate duties such that they will observe for no more than 4 hours at a time and no more than 12 hours in a 24-hour period.

(e) An additional island-based PSO will work with an aviation specialist to use an unmanned aircraft system (UAS) to detect marine mammals in the monitoring zones during pile and pipe driving and slope shaping. Should UAS monitoring not be feasible or deemed ineffective, a boat-based PSO must monitor for marine mammals during pile and pipe driving.

(f) During the open-water season, marine mammal monitoring must take place from 30 minutes prior to initiation of pile and pipe driving activity through 30 minutes post-completion of pile driving activity. Pile driving may commence when observers have declared the shutdown zone clear of marine mammals. In the event of a delay or shutdown of activity resulting from marine mammals in the shutdown zone, animals must be allowed to remain in the shutdown zone (*i.e.,* must leave of their own volition) and their behavior must be monitored and documented.

(g) After island construction is complete but drilling activities are occurring, a PSO will be stationed on the LDPI for approximately 4 weeks during the month of August to monitor for the presence of marine mammals around the island in the monitoring zone.

(1) Marine mammal monitoring during pile driving and removal must be conducted by NMFS-approved PSOs in a manner consistent with the following:

(i) At least one observer must have prior experience working as an observer;

(ii) Other observers may substitute education (degree in biological science or related field) or training for experience;

(iii) Where a team of three or more observers are required, one observer must be designated as lead observer or monitoring coordinator. The lead observer must have prior experience working as an observer; and

(iv) Hilcorp must submit PSO CVs for approval by NMFS prior to the onset of pile driving;

(2) PSOs must have the following additional qualifications:

(i) Ability to conduct field observations and collect data according to assigned protocols;

(ii) Experience or training in the field identification of marine mammals, including the identification of behaviors;

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

(iv) Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals 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

(v) 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.

(h) Hilcorp must deploy autonomous sound recorders on the seabed to conduct underwater passive acoustic monitoring in the open water season the first four years of the project such that island construction activities, including pile driving, and drilling operations are recorded. Acoustic monitoring will be conducted for the purposes of sound source verification, to verify distances from noise sources at which underwater sound levels reach thresholds for potential marine mammal harassment.

(i) Hilcorp must submit incident and monitoring reports.

(1) Hilcorp must submit a draft annual marine mammal and acoustic summary

report to NMFS not later than 90 days following the end of each calendar year. Hilcorp must provide a final report within 30 days after receipt of NMFS' comments on the draft report. The reports must contain, at minimum, the following:

(i) Date and time that monitored activity begins or ends;

(ii) Description of construction activities occurring during each observation period;

(iii) Weather parameters (*e.g.,* wind speed, percent cloud cover, visibility);

(iv) Water conditions (*e.g.,* sea state, tide state);

(v) Species, numbers, and, if possible, sex and age class of marine mammals;

(vi) Description of any observable marine mammal behavior patterns, including bearing and direction of travel and distance from construction activity;

(vii) Distance from construction activities to marine mammals and distance from the marine mammals to the observation point;

(viii) Histograms of the perpendicular distance at which marine mammals were sighted by the PSOs;

(ix) Description of implementation of mitigation measures (*e.g.,* shutdown or delay);

(x) Locations of all marine mammal observations;

(xi) An estimate of the effective strip width of the island-based PSOs and the UAS imagery; and

(xii) Sightings and locations of marine mammals associated with acoustic detections.

(2) Annually, Hilcorp must submit a report within 90 days of ice road decommissioning. The report must include the following:

(i) Date, time, location of observation;

(ii) Ringed seal characteristics (*i.e.,* adult or pup, behavior (avoidance, resting, etc.));

(iii) Activities occurring during observation including equipment being used and its purpose, and approximate distance to ringed seal(s);

(iv) Actions taken to mitigate effects of interaction emphasizing: (A) Which BMPs were successful; (B) which BMPs may need to be improved to reduce interactions with ringed seals; (C) the effectiveness and practicality of implementing BMPs; (D) any issues or concerns regarding implementation of BMPs; and (E) potential effects of interactions based on observation data;

(v) Proposed updates (if any) to the NMFS-approved Wildlife Management Plan(s) or the ice-road BMPs;

(vi) Reports should be able to be queried for information;

(3) Hilcorp must submit a final 5-year comprehensive summary report to NMFS not later than 90 days following expiration of these regulations and LOA.

(4) Hilcorp must submit acoustic monitoring reports per the Acoustic Monitoring Plan.

(5) Hilcorp must report on observed injured or dead marine mammals.

(i) In the unanticipated event that the activity defined in § 217.30 clearly causes the take of a marine mammal in a prohibited manner, Hilcorp must immediately cease such activity and report the incident to the Office of Protected Resources (OPR), NMFS, and to the Alaska Regional Stranding Coordinator, NMFS. Activities must not resume until NMFS is able to review the circumstances of the prohibited take. NMFS will work with Hilcorp to determine what measures are necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. Hilcorp may not resume their activities until notified by NMFS. The report must include the following information:

(A) Time, date, and location (latitude/longitude) of the incident;

(B) Description of the incident;

(C) Environmental conditions (*e.g.,* wind speed and direction, Beaufort sea state, cloud cover, visibility);

(D) Description of all marine mammal observations in the 24 hours preceding the incident;

(E) Species identification or description of the animal(s) involved;

(F) Fate of the animal(s); and

(G) Photographs or video footage of the animal(s). Photographs may be taken once the animal has been moved from the waterfront area.

(H) In the event that Hilcorp discovers an injured or dead marine mammal and determines that the cause of the injury or death is unknown and the death is relatively recent (*e.g.,* in less than a moderate state of decomposition), Hilcorp must immediately report the incident to OPR and the Alaska Regional Stranding Coordinator, NMFS. The report must include the information identified in paragraph (k)(5) of this section. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with Hilcorp to determine whether additional mitigation measures or modifications to the activities are appropriate.

(ii) In the event Hilcorp discovers an injured or dead marine mammal and determines that the injury or death is not associated with or related to the activities defined in § 217.30 (*e.g.,* previously wounded animal, carcass with moderate to advanced decomposition, scavenger damage), Hilcorp must report the incident to OPR and the Alaska Regional Stranding Coordinator, NMFS, within 24 hours of the discovery. Hilcorp must provide photographs or video footage or other documentation of the stranded animal sighting to NMFS. Photographs may be taken once the animal has been moved from the waterfront area.

§ 217.36 Letters of Authorization.

(a) To incidentally take marine mammals pursuant to these regulations, Hilcorp must apply for and obtain an LOA.

(b) An LOA, unless suspended or revoked, may be effective for a period of time not to exceed the expiration date of these regulations.

(c) If an LOA expires prior to the expiration date of these regulations, Hilcorp may apply for and obtain a renewal of the LOA.

(d) In the event of projected changes to the activity or to mitigation and monitoring measures required by an LOA, Hilcorp must apply for and obtain a modification of the LOA as described in § 217.37.

(e) The LOA shall set forth:

(1) Permissible methods of incidental taking;

(2) Means of effecting the least practicable adverse impact (*i.e.,* mitigation) on the species, its habitat, and on the availability of the species for subsistence uses; and

(3) Requirements for monitoring and reporting.

(f) Issuance of the LOA shall be based on a determination that the level of taking will be consistent with the findings made for the total taking allowable under these regulations.

(g) Notice of issuance or denial of an LOA shall be published in the **Federal Register** within thirty days of a determination.

§ 217.37 Renewals and modifications of Letters of Authorization.

(a) An LOA issued under §§ 216.106 of this chapter and 217.36 for the activity identified in § 217.30(a) shall be renewed or modified upon request by the applicant, provided that:

(1) The proposed specified activity and mitigation, monitoring, and reporting measures, as well as the anticipated impacts, are the same as those described and analyzed for these regulations (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section); and

(2) NMFS determines that the mitigation, monitoring, and reporting measures required by the previous LOA under these regulations were implemented.

(b) For LOA modification or renewal requests by the applicant that include changes to the activity or the mitigation, monitoring, or reporting (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section) that do not change the findings made for the regulations or result in no more than a minor change in the total estimated number of takes (or distribution by species or years), NMFS may publish a notice of proposed LOA in the **Federal Register**, including the associated analysis of the change, and solicit public comment before issuing the LOA.

(c) An LOA issued under §§ 216.106 of this chapter and 217.36 for the activity identified in § 217.30(a) may be modified by NMFS under the following circumstances:

(1) *Adaptive management.* NMFS may modify (including augment) the existing mitigation, monitoring, or reporting measures (after consulting with Hilcorp regarding the practicability of the modifications) if doing so creates a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring set forth in the preamble for these regulations.

(i) Possible sources of data that could contribute to the decision to modify the mitigation, monitoring, or reporting measures in an LOA:

(A) Results from Hilcorp's monitoring from the previous year(s).

(B) Results from other marine mammal and/or sound research or studies.

(C) Any information that reveals marine mammals may have been taken in a manner, extent or number not authorized by these regulations or subsequent LOAs.

(ii) If, through adaptive management, the modifications to the mitigation, monitoring, or reporting measures are substantial, NMFS will publish a notice of proposed LOA in the **Federal Register** and solicit public comment.

(2) *Emergencies.* If NMFS determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in LOAs issued pursuant to §§ 216.106 of this chapter and 217.36, an LOA may be modified without prior notice or opportunity for public comment. Notice would be published in the **Federal Register** within thirty days of the action.

§§ 217.38–217.39 [Reserved]

[FR Doc. 2019–10965 Filed 5–28–19; 8:45 am]

BILLING CODE 3510–22–P