ENVIRONMENTAL ASSESSMENT FOR THE ISSUANCE OF AN INCIDENTAL HARASSMENT AUTHORIZATION FOR THE TAKE OF MARINE MAMMALS BY HARASSMENT INCIDENTAL TO THE COOK INLET PIPELINE CROSS INLET EXTENSTION PROJECT IN COOK INLET, ALASKA

LEAD AGENCY: U.S. Department of Commerce
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LOCATION: Cook Inlet, Alaska

ABSTRACT: National Marine Fisheries Service proposes to issue an Incidental Harassment Authorization (IHA) to Harvest Alaska for the take of marine mammals incidental to the Cook Inlet Pipeline Cross Inlet Extension Project, Cook Inlet, Alaska.

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Chapter 1 Introduction and Purpose and Need

1.0 Introduction and Background

The National Marine Fisheries Service (NMFS) received an application from Harvest Alaska (Harvest), a subsidiary of Hilcorp LLC., requesting incidental take of marine mammals from pipeline installation activities associated with the Cook Inlet Pipeline Extension project. NMFS is required to review applications and, if appropriate, issue Incidental Take Authorizations (ITAs) pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.). In addition, the National Environmental Policy Act (NEPA), 40 Code of Federal Regulations (CFR) Parts 1500 -1508, and the National Oceanic and Atmospheric Administration (NOAA) policy and procedures[1] require all proposals for major federal actions be reviewed with respect to environmental consequences on the human environment. Therefore, NMFS conducted an environmental review of Harvests application and determined an Environmental Assessment (EA) is appropriate for NMFS consideration to issue an Incidental Harassment Authorization (IHA) to Harvest.

This Chapter presents a summary of NMFS authority to authorize incidental take of marine mammals, a summary of the applicant's request, and identifies NMFS proposed action and purpose and need. This Chapter also explains the background and environmental review process associated with the applicant's request and provides other information relevant to the analysis in this EA, such as the scope of the analysis and compliance with environmental laws and regulations. The remainder of this EA is organized as follows:

- Chapter 2 describes the applicant's activities and the alternatives carried forward for analysis as well as alternatives not carried forward for analysis.
- Chapter 3 describes the baseline conditions of the affected environment.
- Chapter 4 describes the direct, indirect and cumulative impacts to the affected environment, specifically impacts to marine mammals and their habitat associated with NMFS's proposed action and alternatives.
- Chapter 5 lists document preparers and Chapter 6 lists references cited.

1.1 Marine Mammal Protection Act Overview

The MMPA prohibits, with certain exceptions, the "take[2]" of marine mammals in U.S. waters by U.S. citizens. The MMPA allows, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity within a specified geographic region.

Take of a marine mammal falls under three categories: mortality, serious injury, or harassment (i.e., injury and behavioral effects). Harassment is defined as any act of pursuit, torment or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment) or has the

[1] National Oceanic and Atmospheric Administration Administrative Order (NAO) 216-6A "Compliance with the National Environmental Policy Act and Executive Order 12114 Environmental Effects Abroad of Major Federal Actions 11988 and 13690 Floodplain Management; and 11990 Protection of Wetlands" and the Companion Manual for NAO 216-6A.

[2] "Take" means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.

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).

The exceptions to the prohibition on take in Sections 101(a)(5)(A) and (D) of the MMPA gives NMFS the authority to authorize the incidental but not intentional take of small numbers of marine mammals by harassment, provided certain determinations are made and statutory and regulatory procedures are met. The full text of the MMPA is available for review on NOAA Fisheries website: http://www.nmfs.noaa.gov/pr/laws/mmpa/

NMFS also promulgated regulations to implement the provisions of the MMPA governing the taking and importing of marine mammals, 50 Code of Federal Regulations (CFR) Part 216 and produced Office of Management and Budget (OMB)-approved application instructions (OMB Number 0648-0151) that prescribe the procedures necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the MMPA.

1.2 Summary of Harvest Incidental Take Authorization Request

NMFS has received a request from Harvest Alaska, LLC (Harvest), a subsidiary of Hilcorp LLC, for authorization to take marine mammals incidental to installing two pipelines in Cook Inlet. An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth.

The proposed CIPL project includes the installation of two new steel subsea pipelines in the waters of Cook Inlet. Work includes moving subsea obstacles out of the pipeline corridor, pulling two pipelines (one oil, one gas) into place on the seafloor, securing pipelines with sandbags, and connecting the pipelines to the existing Tyonek platform. The positioning and installation of the offshore pipeline would be accomplished using a variety of pipe pulling, positioning, and securing methods supported by dive boats, tug boats, and/or barges and winches. Work would be limited to the pipeline corridor from Ladd Landing to the Tyonek Platform and could occur for up to 108 days.

1.3 Purpose and Need

1.3.1 Description of Proposed Action

NMFS proposed action is the issuance of an IHA to Harvest pursuant to Section 101(a)(5)(D) of the MMPA and 50 CFR Part 216. The IHA will be valid for one year from date of issuance and would authorize takes of marine mammals, by Level B harassment, incidental to Harvests proposed pipeline installation activities. NMFS's proposed action is a direct outcome of Harvest's request for authorization. The proposed action is also described in the notice of proposed IHA published in the *Federal Register* (83 FR 8437, February 27, 2018), under "Summary of Request" and "Description of Specified Activities" and further explained in Chapter 2 of this EA.

1.3.2 Purpose

The purpose of NMFS's action is to authorize take of marine mammals incidental to the pipeline installation activities by Harvest, consistent with applicable legal requirements. NMFS may issue an incidental take authorization allowing the take of a small number of marine mammals only if the taking would have no more than a "negligible impact" on those marine mammal species or stocks, and not have an "unmitigable adverse impact" on the availability of the species or stock for "subsistence" uses. In issuing an ITA, NMFS must prescribe the permissible methods of taking and other means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat, paying particular attention to rookeries, mating grounds, and other areas of similar significance. NMFS must also prescribe means of effecting the least practicable impact on the availability of the species or stocks of marine mammals for subsistence uses. Finally, IHAs must include requirements or conditions pertaining to monitoring and reporting, in large part to increase NMFS understanding of the effects of such taking on the species.

1.3.3 Need

U.S. citizens seeking to obtain authorization for the incidental take of marine mammals under NMFS's jurisdiction must submit such a request in the form of an application. Because Harvest submitted an adequate and complete application demonstrating the need and potential eligibility for an IHA under the MMPA, NMFS has a corresponding duty to determine whether and how to authorize take of marine mammals incidental to the activities described in the application. Therefore, NMFS's responsibilities under section 101(a)(5)(D) of the MMPA and its implementing regulations establish and frame the need for NMFS proposed action.

1.4 Environmental Review Process

In accordance with NEPA and CEQ Regulations, NMFS, to the fullest extent possible, integrates the requirements of NEPA with other regulatory processes required by law or by agency practice so that all procedures run concurrently, rather than consecutively. This includes coordination within the National Oceanic Atmospheric and Administration (NOAA), (e.g., the Office of the National Marine Sanctuaries) and with other regulatory agencies (e.g., the U.S. Fish and Wildlife Service), as appropriate, during NEPA reviews prior to implementation of a proposed action to ensure that requirements are met. Regarding the issuance of IHAs, we rely substantially on the public process required by the MMPA for preparing proposed IHAs to develop and evaluate relevant environmental information and provide a meaningful opportunity for public participation when we prepare associated NEPA documents. We fully consider public comments received in response to the publication of proposed IHAs during the NEPA review process.

1.4.1 Scoping and Public Involvement

The NEPA process is intended to enable NMFS to make decisions based on an understanding of the environmental consequences and take actions to protect, restore, and enhance the environment. An integral part of the NEPA process is public involvement. Although agency procedures do not require publication of the draft EA prior to finalizing an EA, NMFS relied substantially on the public process pursuant to the MMPA to develop and evaluate environmental information relevant to an analysis under NEPA. NMFS

made the IHA application available for public review and comment and, separately, published the proposed IHAs in the *Federal Register* (FR) (83 FR 8437, February 27, 2018). There, NMFS alerted the public it intended to use the MMPA public review process for the proposed IHA to solicit relevant environmental information and provide the public an opportunity to submit comments.
We received one public comment letter from students at the University of Arizona on the draft EA during the 30-day public comment period containing three categories of comments:
1) the draft EA lacked enough data to estimate a proper amount of take of marine mammals;
2) potential impacts to marine mammals may be more severe than analyzed; and
3) other agencies, local communities, and tribes should be integrated into EA development to develop a more effective project plan that could lessen the Level B harassment on the marine mammals and allow for improved completion of the project.

In response to these comments and ones received specific to our notice of proposed IHA, NMFS re-evaluated multiple sources of marine mammal sighting data including NMFS aerial surveys and anecdotal sighting database and multiple years of oil and gas marine mammal monitoring reports (e.g., SAE 2012, 2014). As a result, NMFS increased the estimated amount of take for all but one species (humpback whale) and added two species authorized to be taken (gray whale and California sea lion). In general, the inability of Harvest to shutdown operations once they begin (e.g., pipe pulling, pushing the barge) led to the increase in take numbers and additional species.

NMFS disagrees marine mammals may incur more severe impacts from exposure to noise during pipeline installation activities than analyzed in the draft EA. The project would be conducted in stages with noise producing sources being clustered in an area on any given day, minimizing the acoustic footprint of the project. In addition, Harvest would implement of number of mitigation measures designed to reduce the acoustic footprint (e.g., power down vessels when not in use) and reduce exposure to marine mammals (e.g., delay commencement of operational should marine mammals be observed approaching or near the project area). In general, NMFS anticipates marine mammals, including beluga whales, may react to the operations by swimming around the work site, cease or reduce vocalizations, or increase swim speeds which would constitute no more than Level B harassment. Given the concentrated work area and width of the inlet at the work location, we do not anticipate any marine mammal would abandon its route to an intended destination (e.g., a foraging site near a river mouth). This analysis is supported by multiple years of marine mammal monitoring during construction at the Port of Anchorage where, despite construction work, beluga whales continued past the Port to foraging habitat.

While NMFS did not specifically consult with other agencies on development of the EA, the public comment period allowed for other agencies, local communities and tribes to comment on the draft EA and notice of proposed IHA. NMFS received no other comments on the draft EA.

1.5 Other Environmental Laws or Consultations

NMFS must comply with all applicable federal environmental laws and regulations necessary to implement a proposed action. NMFS evaluation of and compliance with environmental laws and regulations is based on the nature and location of the applicants proposed activities and NMFS proposed action. Therefore, this section only summarizes environmental laws and consultations applicable to NMFS' issuance of an IHA to Harvest.

1.5.1 The Endangered Species Act

The ESA established protection over and conservation of threatened and endangered species (T&E) and the ecosystems upon which they depend. An endangered species is a species in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered within the near future throughout all or in a significant portion of its range. The USFWS and NMFS jointly administer the ESA and are responsible for the listing of species (designating a species as either threatened or endangered) and designating geographic areas as critical habitat for T&E species. The ESA generally prohibits the "take" of an ESA-listed species unless an exception or exemption applies. The term "take" as defined in section 3 of the ESA means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Section 7(a)(2) requires each federal agency to ensure that any action it authorizes, funds or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. When a federal agency's action may affect a listed species, that agency is required to consult with NMFS and/or the USFWS under procedures set out in 50 CFR Part 402. NMFS and USFWS can also be action agencies under section 7. Informal consultation is sufficient for species the action agency determines are not likely to be adversely affected if NMFS or USFWS concurs with the action agency's findings, including any additional measures mutually agreed upon as necessary and sufficient to avoid adverse impacts to listed species and/or designated critical habitat.

NMFS' issuance of an IHA is a federal action that is also subject to the requirements of Section 7 of the ESA. As a result, we are required to ensure that the issuance of an IHA to Harvest is not likely to jeopardize the continued existence of any T&E species or result in the destruction or adverse modification of designated critical habitat for these species. Because the Cook Inlet beluga whale and Steller sea lion are ESA-listed species with confirmed or possible occurrence in Cook Inlet, NMFS OPR Permits and Conservation Division initiated consultation with the NMFS' Alaska Regional Protected Resources Division on the proposed issuance of the IHA to Harvest, pursuant to section 7 of the ESA, on February 12, 2018. On April 25, 2018, NMFS Alaska Regional Office issued a Biological Opinion and found the pipeline installation activities and NMFS action of issuing an IHA would not jeopardize the continued existence of species listed under the ESA or adversely affect critical habitat.

1.5.2 Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Federal agencies are required to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency which may adversely affect essential fish habitat (EFH) identified under the MSFCMA. Although EFH was identified in Cook Inlet for walleye Pollock, rock sole, Pacific cod, skate, weathervane scallop, Pacific salmon, and sculpin, we do not anticipate NMFS' proposed action of authorizing take of marine mammals and the associated mitigation and monitoring to impact EFH; therefore, an EFH consultation was not conducted.

1.6 Document Scope

This EA was prepared in accordance with NEPA (42 USC 4321, et seq.), CEQ Regulations CEQ Regulations (40 CFR 1500-1508) and NOAA policy and procedures (NAO 216-6A and the Companion

Manual for the NAO 216-6A).. The analysis in this EA addresses potential direct, indirect, and cumulative impacts to marine mammals and their habitat, resulting from NMFS' proposed action to authorize incidental take associated with the pipeline installation activities proposed by Harvest. However, the scope of this analysis is limited to the decision for which we are responsible (*i.e.*, whether to issue the IHA). This EA is intended to provide focused information on the primary issues and impacts of environmental concern, which is our issuance of the IHA authorizing the take of marine mammals incidental to Harvests pipeline installation activities, and the mitigation and monitoring measures to minimize the effects of that take. For these reasons, this EA does not provide a detailed evaluation of the effects to the elements of the human environment listed in Table 1 below.

Table 1. Elements of the Environment Not Carried Forward for Analysis

Biological	Physical	Socioeconomic/Cultural
Humans	Air Quality	Commercial Fishing
Fisheries Resources and Essential Fish Habitat	Farmland Geography	Historic and Cultural Resources
Invertebrates	Geology/sediments	Indigenous Cultural Resources
Invasive Species	Land Use	Low Income Populations
Marine and Coastal Birds	Oceanography	Military Activities
Sea Turtles	State Marine Protected Areas	Minority Populations
Threatened and Endangered Fishes	Federal Marine Protected Areas	National Historic Preservation Sites
Benthic Communities	National Estuarine Research Reserves	Other Marine Uses: Military activities, Shipping and marine transportation, and Boating
	National Marine Sanctuaries	Recreational Fishing
	National Wildlife Refuges	Public Health and Safety
	Park Land	
	Water Quality	
	Wetlands	
	Wild and Scenic Rivers	

Chapter 2 Alternatives

2.0 Introduction

As indicated in Chapter 1, the National Marine Fisheries Service (NMFS) Proposed Action is to issue an Incidental Harassment Authorization (IHA) to Harvest to authorize the take of small numbers of marine mammals incidental to pipeline installation activities. NMFS's Proposed Action is triggered by Harvest's request for an IHA per the MMPA of 1972, as amended (16 U.S.C. 1361 et seq.). In accordance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) Regulations, NMFS is required to consider a reasonable range of alternatives to a Proposed Action as well as the No action Alternative Reasonable alternatives are viable options for meeting the purpose and need for the proposed action. The evaluation of alternatives under NEPA assists NMFS with understanding, and as appropriate, minimizing impacts through an assessment of alternative ways to achieve the purpose and need for our Proposed Action. Reasonable alternatives are carried forward for detailed evaluation under NEPA while alternatives considered but determined not to meet purpose and need are not carried forward. For the purposes of this EA, an alternative will only meet the purpose and need if it satisfies the requirements under section 101(a)(5)(D) of the MMPA. Therefore, NMFS applied the screening criteria and considerations outlined in Section 2.1 to the alternatives to identify which alternatives to carry forward for analysis.

2.1 Criteria and Considerations for Selecting Alternatives

Under Section 101(a)(5)(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 adverse 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 ("least practicable adverse impact"). Consideration of the availability of marine mammal species or stocks for taking for subsistence uses pertains only to Alaska, and is therefore not relevant here. NMFS does not have a regulatory definition for "least practicable adverse impact." However, NMFS's implementing 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, we carefully consider two primary factors:

(1) The manner in which, and the degree to which, implementation of the measure(s) is expected to reduce impacts to marine mammal species or stocks, their habitat, and their availability for subsistence uses (when relevant). This analysis will consider such things as the nature of the potential adverse impact (such as likelihood, scope, and range), the likelihood that the measure will be effective if implemented, and the likelihood of successful implementation.

(2) The practicability of the measure for applicant implementation. Practicability of implementation may consider such things as cost, impact on operations, personnel safety, and practicality of implementation.

While the language of the least practicable adverse impact standard calls for minimizing impacts to affected species or stocks, we recognize that the reduction of impacts to those species or stocks accrues through the application of mitigation measures that limit impacts to individual animals. Accordingly, our analysis focuses on measures designed to avoid or minimize impacts on marine mammals from activities that are likely to increase the probability or severity of population-level effects, including auditory injury or disruption of important behaviors, such as foraging, breeding, or mother/calf interactions. In order to satisfy the MMPA's least practicable adverse impact standard, we propose a suite of basic mitigation protocols that are required regardless of the status of a stock. Additional or enhanced protections are proposed for species whose stocks are in poor health and/or are subject to some significant additional stressor that lessens that stock's ability to weather the effects of the specified activity without worsening its status.

In the evaluation of specific measures, the details of the specified activity will necessarily inform each of the two primary factors discussed above (expected reduction of impacts and practicability), and will be carefully considered to determine the types of mitigation that are appropriate under the least practicable adverse impact standard. Analysis of how a potential mitigation measure may reduce adverse impacts on a marine mammal stock or species and practicability of implementation are not issues that can be meaningfully evaluated through a binary lens. The manner in which, and the degree to which, implementation of a measure is expected to reduce impacts, as well as its practicability in terms of these considerations, can vary widely. For example, a time/area restriction could be of very high value for decreasing population-level impacts (e.g., avoiding disturbance of feeding females in an area of established biological importance) or it could be of lower value (e.g., decreased disturbance in an area of high productivity but of less firmly established biological importance). Regarding practicability, a measure might involve operational restrictions that completely impede the operator's ability to acquire necessary data (higher impact), or it could mean additional incremental delays that increase operational costs but still allow the activity to be conducted (lower impact). Expected effects of the activity and of the mitigation as well as status of the stock all weigh into these considerations. Accordingly, the greater the likelihood that a measure will contribute to reducing the probability or severity of adverse impacts to the species or stock, the greater the weight that measure is given when considered in combination with practicability to determine the appropriateness of the mitigation measure, and vice versa. No quantitative formula is provided by the MMPA or by regulation, and it is not reasonable to expect an assessment of the mitigation required to achieve the least practicable adverse impact other than as described here.

The emphasis given to a measure's ability to reduce the impacts on a species or stock considers the degree, likelihood, and context of the anticipated reduction of impacts to individuals as well as the status of the species or stock. The ultimate impact on any individual from a disturbance event (which informs the likelihood of adverse species- or stock-level effects) is dependent on the circumstances and associated contextual factors, such as duration of exposure to stressors. Though any proposed mitigation needs to be evaluated in the context of the specific activity and the species or stocks affected, measures with the following types of goals are often applied to reduce the likelihood or severity of adverse species- or stock-level impacts:

- avoiding or minimizing injury or mortality;
- limiting interruption of known feeding, breeding, mother/calf, or resting behaviors;
- minimizing the abandonment of important habitat (temporally and spatially);
- minimizing the number of individuals subjected to these types of disruptions; and

- limiting degradation of habitat.

Mitigating these types of effects is intended to reduce the likelihood that the activity will result in energetic or other types of impacts that are more likely to result in reduced reproductive success or survivorship. It is also important to consider the degree of impacts that were expected in the absence of mitigation in order to assess the benefit of any potential measures. Finally, because the least practicable adverse impact standard authorizes NMFS to weigh a variety of factors when evaluating appropriate mitigation measures, it does not compel mitigation for every kind of individual take, even when practicable for implementation by the applicant.

2.2 Description of Harvest's Proposed Activities

A thorough description of Harvest's proposed pipeline installation activities is in the notice of the proposed IHA (83 FR 8437) under "Summary of Request" and "Description of Specified Activities" and is incorporated by reference in the following subsections.

Harvest proposes to install the two pipelines from April through September, 2018. Operational activities necessary to install the pipelines will occur 24 hours per day for 108 days. The action area is limited to the proposed subsea pipeline corridor and immediate surrounding waters and land from Ladd Landing to the existing Tyonek Platform (Figure 1).

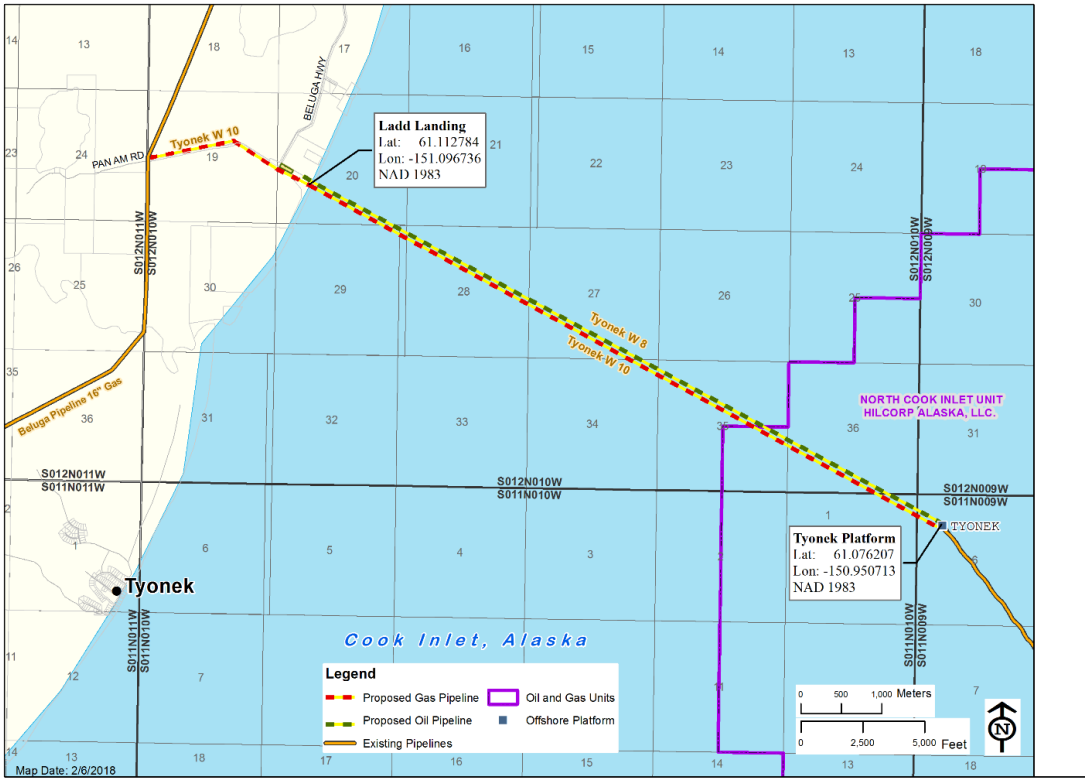

Figure 1. Pipeline Corridor between Ladd Landing and the Tyonek Platform.

2.2.1. Pipeline Installation Overview

The Project includes the installation of two new steel subsea pipelines in the waters of Cook Inlet: the 10-in. nominal diameter Tyonek W 10 gas pipeline (Tyonek W 10) between the Tyonek Platform and the Beluga Pipeline (BPL) Junction and the 8-in. nominal diameter Tyonek W 8 oil pipeline (Tyonek W 8) between Tyonek Platform and Ladd Landing. The length of the Tyonek W 10 would be approximately 11.1 kilometers (km, 6.9 miles [mi]) with 2.3 km (1.4 mi) onshore and 8.9 km (5.5 mi) offshore in Cook Inlet waters. The Tyonek W 8 would be approximately 8.9 km (5.5 mi) in Cook Inlet waters. The new 8 in. oil pipeline would be placed and capped for future service. The pipeline installation process would occur in phases constituting various construction scenarios (Table 2).

Table 2. Construction Scenarios, Associated Equipment and Estimated Source Levels during the 108-day CIPL project.

Project Component/Scenario	Noise Source	Approximate Duration (days)	Approximate hours per day
Obstruction Removal and Pipeline pulling[1] (subtidal)	Tug (120 ft) x 2 Dive boat[1] Sonar boat[2] Work boat (120 ft) Crew boat (48 ft) Barge anchoring[3]	68 28 9 68 68	10-12 9 12 9 9
Pipeline pulling (intertidal)	Tug x 2 Barge anchoring Crew boat	16 16	10-12
Trenching (transition zone)	Tug x 2 Backhoe/bucket dredge (beach-based)	10 10	12 12
Mid-line Pipeline Tie-In Work	Tug x 2 Dive boat Work boat Barge anchoring	7 4 7 7	10-12 9 12 6
Connections of Tyonek Platform	Tug x 2 Work boat Dive boat Underwater tools (hydraulic wrench, pneumatic grinder, and pressure washer)	7 7 7 7	10-12 8 9 30 minutes
Total Duration[4]	Tug x 2 Dive boat Sonar boat Work/crew boat	108 39 9 108	

[1]The dive boat, crew boat, and work boat durations are shorter because they would be tied to the barge most of the time. Main engines would not be running while tied up, but a generator and compressors would be running to support diving operations.
[2] Sonar boat engine noise only. Sonar equipment would operate at frequencies over 200 kHz.
[3] Barge is equipped with four anchors.
[4]Total time does not include allowance of 6 weather days because vessels would not be in the water during those days.

Mobilization of materials and equipment to pipe storage areas at Ladd Landing began in the fall of 2017. Land-based bluff stabilization at Ladd Landing and vegetation clearing at onshore pipe pulling and fabrication areas was also conducted. To prepare for pipeline installation and repairs beginning Spring 2018, preliminary mobilization of materials to the west side of Cook Inlet followed established shipping lanes and occurred in Fall of 2017. Additional equipment and material mobilization would occur sporadically through 2018 along these same lanes.

2.2.2 Obstacle Removal

Prior to initiating pulling activities, obstacles along the pipeline corridor would be repositioned. A subsea sonar survey was conducted in spring 2017 to identify any obstacles that could damage the pipe during installation or impede the pipe pulling activities. A number of items 5 feet (ft) (1.5 meters [m]) in diameter or greater were identified during the survey and would be relocated to a position that does not interfere with the pipeline route. Repositioning would occur over a 15-day period prior to the pulling activities in spring 2018. It is estimated that fewer than 50 obstacles would need to be moved. Equipment needed to move the obstacles would include a barge with crane (Manitowoc 4000 with 3.5 yard bucket) or winch, two tugs, and dive boat. If the barge winch is used, it would pull a wire cable onto a drum (i.e., bucket) to move the obstacle. The obstacle would be moved the minimum distance to clear the route. During slack tide, divers would attach the pull device to the boulder, which would then be repositioned using the crane or tug. The tug boat alone may be used to reposition smaller obstacles using main engines. No thrusters would be required. The wire cable attached to the obstacle would intermittently be in and out of the water for relatively short periods (i.e., long enough for divers to attach it to an obstacle, move it, and retract the wire). Slack wire would not remain in the water. The operation would occur 24 hours/day but tugs would only move the barge and anchors during slack tide. Four anchors would be used to secure the barge as it moves along the pipeline route.

2.2.3. Subsea Pipeline Installation

The new Tyonek W 10 and Tyonek W 8 pipelines would be installed concurrently, parallel to each other offshore from Ladd Landing to the Tyonek Platform. Pipeline sections would be constructed onshore at Ladd Landing fabrication area, and pulled offshore with additional sections added until the new pipeline reaches the Tyonek Platform. Additional pipe sections would be welded together, section splice welds inspected, and coatings applied to welds in the onshore fabrication area. The proposed method of construction is to fabricate the pipelines in approximately 0.5 mi (0.8 km) segments onshore in the cleared pull area. Additional segments would be connected on shore, and the entire section would be pulled offshore following connection of each new segment, until the pipeline section is approximately half of the entire offshore length of the pipeline (approximately 2.5 mi [4 km]). Then the entire 2.5-mile section would be pulled into place where the 10-in. line can be connected to Tyonek Platform. The 8-in. line would be capped subsea adjacent to the platform and would be connected to platform in the future. Following this, a second section would be constructed using the same technique as the first. It would be pulled into place where it can be connected to the first section using a subsea mechanical connection. Upon completion of pulling, the pipeline would be buried in the tidal transition zone.

Pipeline segments/sections would be pulled from shore using a winch mounted on an anchored pull barge, which would be repositioned by utilizing two tugs. The maximum velocity during pulling would be about 20 ft per minute or 0.2 knots. The barge would have four anchors, which would be set at slack tide. Each anchor weighs 35,000 pounds (lbs) (15,900 kilograms [kg]), with 15 ft (4.6 m) of chain and 4,200 ft (1280 m) of wire cable. Harvest estimates that about 100-110 anchor moves would be required intermittently over the 112-day construction period. Anchor handling would only occur during slack tide lasting for about 2 hours per tide period. Pulling would occur between slack tides and could take up to 21 days. Pulling into position mainly during slack tide would minimize cross currents and maximize control of pipeline routing. Tugs would be powered on for 24-hrs a day during the pipe pulling activities. However, the engines would only be at full power while actually pulling during the slack tide periods per day (about 12 hours total); otherwise they would be in stand-by mode. Tugs, other boats, and/or the shore-mounted winch would be used intermittently for pipeline positioning, or to adjust the routing of the pipeline if necessary due to impedance. A sonar array (operating above 200 kHz) would be used to confirm that the pipe is being installed in the correct position and location.

2.2.4 Trenching in Transition Zone

In the tidal transition zone, the exposed pipes would be buried to secure them and each pipeline would e connected to its respective onshore pipeline and shutdown valve station. The proposed method for pipeline burial in the transition zone is by trenching adjacent to the pipeline using the open cut method, placing the pipeline in the trench, followed by direct burial of the pipeline to a depth of approximately 6 ft (1.8 m). Each pipeline would be buried in a separate trench. The trench from the cut in the bluff would be continued into the tidal zone area and would be dug from the beach side as far offshore as possible. The barge *Ninilchik* would then be anchored as close to the beach as possible and the trench continued the required distance from shore to adequately protect the pipe from ice damage. This would be done from the barge with the crane equipped with a clam shell bucket or backhoe. Alternatively, an excavator could be utilized from the barge deck for this work. If the trench is filled in by the tidal action and prevents the pipe from being pulled a cofferdam may be required to prevent the trench filling prior to the completion of the pull. Trenching in the tidal transition zone would take place during low tide to allow shore-based excavators maximum distance into the tidal zone. Work in the intertidal zone in waters less than 30-ft (9-m) deep work would occur for approximately 2-4 hours per slack tide over a 4- to 6-week period.

2.2.5 Underwater Connection of Pipeline Segments and at Tyonek Platform

Once each 2.5-mi section of each pipeline (four sections total) have been pulled into place, divers would measure the specific distances between the sections. Steel spool sections with gaskets that would connect the two sections of each pipeline would be fabricated onshore; divers would use the spool sections to connect the pipeline segments underwater. The dive boat would be operating intermittently during the 9- day period needed to complete the underwater connections. The subsea gas pipeline (Tyonek W10) would be connected to new riser at the Tyonek Platform by new subsea connections. In addition to modifications to existing piping, a shutdown valve would be installed. An existing pipeline lateral (from platform to subsea flange) would be capped and abandoned in place; it would be available for future use. The connections would be fabricated onshore, transported to the platform on a workboat, and lowered to the seafloor. A dive boat, tugs, workboat and barge would facilitate the connection from new pipeline to the base of the new gas riser.

During the connections, the dive boat and work boat would likely be secured to the pull barge and no engines running. The Tyonek W 8 oil pipeline would not be connected to the Tyonek Platform at this time. Work in the transition zone would occur over a period of about 8 days in late Summer/Fall of 2018. A set of underwater tools may be used for a brief period to expose the location where the new subsea gas pipeline would be connected to the existing pipeline and prepare the pipeline for connection. These tools may include a hydraulic wrench, pneumatic grinder, and a hydraulic breaker and pressure washer (e.g., Garner Denver Series Pressure Washer) for removing concrete from existing infrastructure. The use of the these tools would occur during one dive for a short duration (i.e., less 30 minutes).

2.3 Description of Alternatives

2.3.1 Alternative 1 – Issuance of Authorization with Mitigation, Monitoring, and Reporting Measures

Under this alternative, NMFS would issue an IHAs to Harvest allowing the incidental take, by Level A harassment and Level B harassment, of marine mammals consistent with the activities described in Section 2.2 and more thoroughly in the proposed IHAs, subject to additional mitigation and monitoring requirements prescribed by NMFS.

Proposed Mitigation Measures :

(1) Establish a 2,200 m safety zone from any of the vessels on-site and employ a NMFS-approved protected species observer (PSO) to conduct marine mammal monitoring for the duration of the project. Prior to commencing activities for the day or if there is a 30 minute lapse in operational activities, the PSO will monitor the safety zone for marine mammals for 30 minutes. If no marine mammals are observed, operations may commence. If a marine mammal(s) is observed within the safety zone during the clearing, the PSO will continue to watch until the animal(s) is outside of and on a path away from the safety zone or 15 minutes have elapsed if the species was a pinniped or cetacean other than a humpback whale; for humpback whales the watch will extend to 30 minutes. Once the PSO has cleared the area, operations may commence.

(2) Monitoring and carefully record any marine mammal behavior if a marine mammal is observed with the project area during pipe pulling. No new operational activities would be started until the animal leaves the area. PSOs will also collect behavioral information on marine mammals beyond the safety zone.

(3) Minimize the acoustic footprint of the project by securing vessels to the barge or anchor with engines off when practicable; all vessel engines will be placed in stand-by mode when not working if they cannot be tied up to the barge or anchored with engines off; all sonar equipment will operate at or above 200 kilohertz (kHz).

(4) Abide by NMFS marine mammal viewing guidelines while operating vessels or land-based personnel (for hauled-out pinnipeds), including not actively approaching marine mammals within 100 yards and slowing vessels to the minimum speed necessary. NMFS Alaska Marine Mammal Viewing Guidelines may be found at https://alaskafisheries.noaa.gov/pr/mm-viewing-guide.

Proposed monitoring and reporting measures:

(1) Utilize a NMFS-qualified, vessel-based Protected Species Observer (PSO) to visually watch for and monitor marine mammals from one of the tugs or the barge during daytime operations (from nautical twilight-dawn to nautical twilight-dusk). When practicable, an unmanned aerial system (UAS) will also be used to monitor for marine mammals in the project area.

(2) In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by these Authorizations, such as an injury (Level A harassment), serious injury or mortality, all applicants shall immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, and the Alaska Regional Stranding Coordinators. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- The name and type of vessel involved (if ship strike);
- The vessel's speed during and leading up to the incident (if ship strike);
- Description of the incident;
- Status of all operational activities;
- Water depth;
- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- The fate of the animal(s); and
- Photographs or video footage of the animal (if equipment is available).

(3) Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS shall work with the applicants to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. Applicants may not resume their activities until notified by NMFS via letter or email, or telephone.

(4) In the event that an applicant discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), applicants would immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, designees, and the NMFS Alaska Stranding Hotline. The report must include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS would work with applicants to determine whether modifications in the activities are appropriate.

(5) In the event that an applicant discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the authorized activities (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger

damage), applicants shall report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, the NMFS Alaska Stranding Hotline, and the Alaska Regional Stranding Coordinators within 24 hours of the discovery. Applicants shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. Activities may continue while NMFS reviews the circumstances of the incident.

(6) Harvest will submit a monthly report to NMFS' Permits and Conservation Division and a final report within 90 days after the end of the project. The monthly shall include a summary of marine mammal sightings and operations as well as PSO observer log sheets. The annual report will include:

- Summaries of monitoring effort (e.g., total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals);
- Analyses of the effects of various factors influencing detectability of marine mammals (e.g., sea state, number of observers, and fog/glare);
- Species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover; and
- Analyses of the effects of pipeline operations.

(7) NMFS will review the draft annual report. Applicants must submit a final annual report to the Chief, Permits and Conservation Division, Office of Protected Resources, NMFS, within 30 days after receiving comments from NMFS on the draft annual report. If NMFS decides that the draft annual report needs no comments, the draft report shall be considered to be the final report.

2.3.2. Alternative 2 – No Action Alternative

In accordance with NOAAs implementing procedures, the Companion Manual (CM) for NAO 216-6A, Section 6.B.i ,NMFS is defining the No Action alternative as not authorizing the requested incidental take of marine mammals under Section 101(a)(5)(D) of the MMPA. This is consistent with our statutory obligation under the MMPA to either: (1) deny the requested authorization or (2) grant the requested authorization and prescribe mitigation, monitoring, and reporting requirements. Under the No Action Alternative, NMFS would not issue the IHA to Harvest, in which case we assume this applicant would not proceed with their proposed pipeline installation activities as described in the application. The requested take would not occur and mitigation, monitoring and reporting for marine mammals would not be implemented. Although the No Action Alternative would not meet the purpose and need to allow incidental takes of marine mammals under certain conditions (i.e., when the statutory requirements are satisfied), the CEQ Regulations require consideration and analysis of a No Action Alternative for the purposes of presenting a comparative analysis to the action alternatives. The No Action Alternative, consistent with CEQ Guidance and the CM, serves as a baseline against which the impacts of the Preferred Alternative will be compared and contrasted.

2.3.3. Alternatives Considered but Rejected from Further Consideration

In developing the Proposed Action, variations of the Preferred Alternative were identified during the preparation of the proposed IHA. The variations of the Preferred Alternative included issuing IHAs without mitigation, monitoring and reporting required by NMFS or requiring Harvest to use alternative technologies associated with their pipeline installation activities. However, NMFS determined these alternatives did not meet the purpose and need for the Proposed Action or merit further analysis for the reasons noted below. Thus, the analyses of alternatives in this EA are limited to the Preferred Alternative and the No Action Alternative.

- Not requiring mitigation, monitoring or reporting would be in violation of the MMPA and its implementing regulations
- NMFS is not aware of alternative techniques available that would allow Harvest to install pipelines without generating noise, which is the primary activity that has the potential to take marine mammals by harassment.

Chapter 3 Affected Environment

NMFS reviewed all possible environmental, cultural, historical, social, and economic resources based on the geographic location associated with NMFS proposed action and alternatives and the applicant's request for an incidental take authorization for the proposed installation of two steel subsea pipelines in Cook Inlet. Based on this review, this section describes the affected environment and existing (baseline) conditions for select resource categories (e.g., marine environment). As explained in Chapter 1, certain resource categories not affected by NMFS proposed action and alternatives were not carried forward for further consideration or evaluation in this EA (See Table 1) and where appropriate, the analysis in the proposed IHA related to the marine environment is incorporated by reference. Chapter 4 provides an analysis and description of environmental impacts associated with the affected environment.

3.1 Physical Environment

As discussed in Chapter 1, our proposed action and alternatives relate only to the authorization of incidental take of marine mammals and not to the physical environment. However, marine mammal habitat is one aspect of the physical environment that is relevant to our proposed action.

Cook Inlet is a complex Gulf of Alaska estuary (as described in BOEM 2016) that covers roughly 7,700 square miles (mi^2; 20,000 square kilometers (km^2)), with approximately 840 miles (mi) (1,350 linear kilometer (km)) of coastline (Rugh *et al.*, 2000). The physical oceanography of Cook Inlet is characterized by complex circulation with variability at tidal, seasonal, annual, and inter-annual timescales (Musgrave and Statscewich, 2006). This region has the fourth largest tidal range in the world and as a result, extensive tidal mudflats that are exposed at low tides occur throughout Cook Inlet, especially in the upper reaches.The project area is located a few kilometers north of the village of Tyonek between Ladd Landing and the Tyonek Platform.

3.1.1. Marine Mammal Habitat

We present information on marine mammal habitat and the potential impacts to marine mammal habitat in the Federal Register notice of the proposed IHA. In summary, several marine mammal species use the waters of Cook Inlet for foraging, calving, and other important life history functions. The mouths of river streams are important beluga whale feeding habitat. Harbor seals also haul-out along the Cook Inlet shoreline. Killer whales, humpback whales, and Steller sea lions more commonly use the lower Cook Inlet area, but can venture into the upper Inlet where the proposed project would occur.

Pursuant to the ESA, critical habitat has been designated for Cook Inlet beluga. The proposed actions fall within critical habitat designated in Cook Inlet for beluga whales. On April 11, 2011, NMFS announced he two areas of critical habitat (76 FR 20180) comprising 7,800 km^2 (3,013 mi^2) of marine habitat (Figure 2). Critical habitat includes two areas (Areas 1 and 2) that encompass 7,800 km^2 of marine and estuarine habitat in Cook Inlet1. Designated beluga whale Critical Habitat Area 1 consists of 1,909 km2 of Cook Inlet, north of Three Mile Creek and Point Possession. Critical Habitat Area 1 contains shallow tidal flats or mudflats and mouths of rivers that provide important areas for foraging, calving, molting, and escape from predators. High concentrations of beluga whales are often observed in these areas from spring through fall. Additionally, anthropogenic threats have the greatest potential to adversely impact beluga whales and their habitat in Critical Habitat Area 1. Critical Habitat Area 2 consists of 5,891 km^2 located south of Critical

Habitat Area 1 and includes nearshore areas along western Cook Inlet and Kachemak Bay. Critical Habitat Area 2 is known fall and winter foraging and transit habitat for beluga whales, as well as spring and summer habitat for smaller concentrations of beluga whales. Harvest's activities would occur in the northern portion of Critical Habitat Area 2 from April through September.

[1] For national security reasons, critical habitat excludes all property and waters of JBER and waters adjacent to the Port of Anchorage.

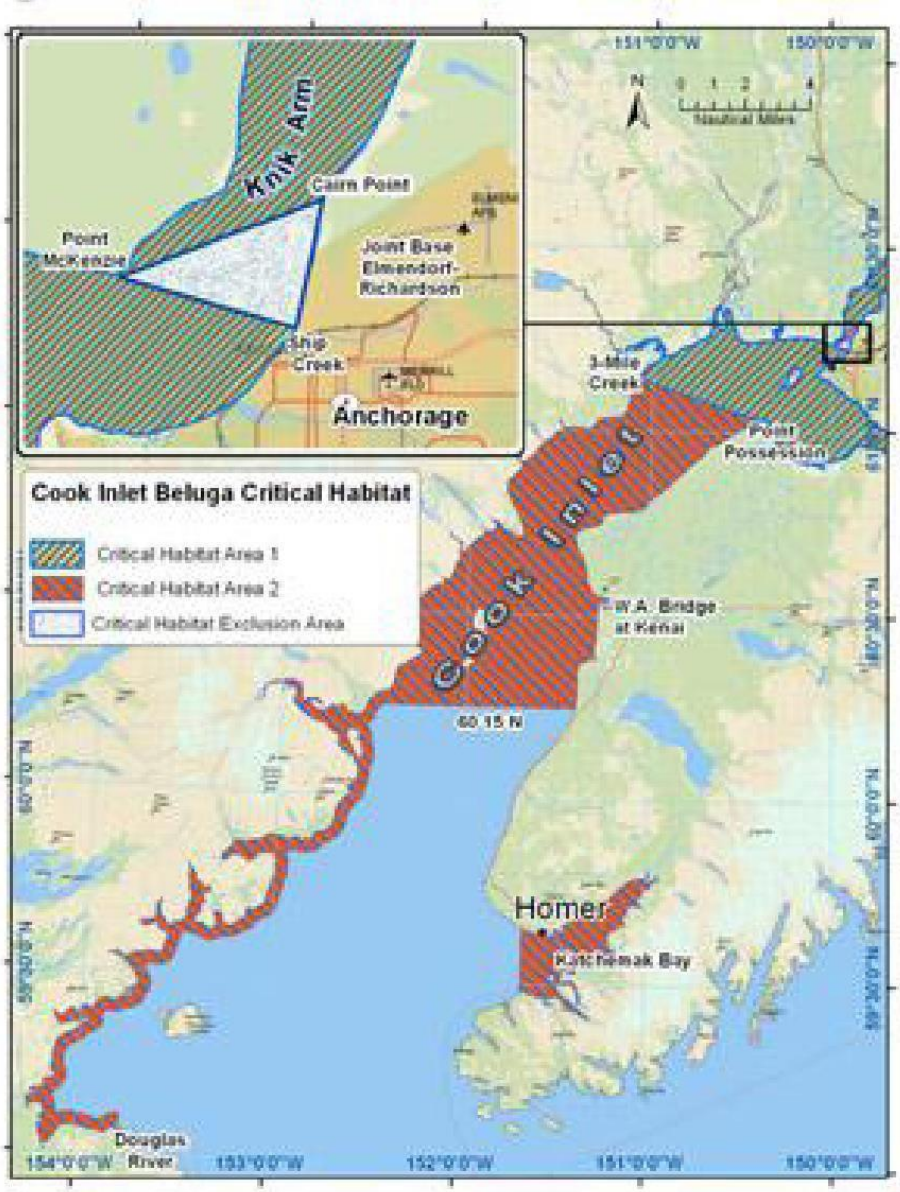

Figure 2. Final critical habitat of Cook Inlet beluga whales (76 FR 20180, April 11, 2011).

3.2 Biological Environment

3.2.1. Marine Mammals

The marine mammals most likely to be harassed incidental to conducting the proposed activities are: Cook Inlet beluga whale, harbor seal, killer whale, harbor porpoise, humpback whale, and Steller sea lion (Shelden et al. 2003). In addition, NMFS has included take for gray whales and California sea lions in the rare event they enter the project area because some operational activities are not able to be stopped once they commence due to safety concerns (*e.g.*, pipe pulling, pushing the barge). Cook Inlet beluga whales, harbor porpoises, and harbor seals are the species most likely to be present during the proposed activities. Recent passive acoustic

monitoring research has indicated that harbor porpoises occur more frequently in the project area than was previously. Estimates based solely on visual observations (NMML 2011, personal communication). Table 2 provides a summary of the abundance and status of the species likely to occur in the operation areas of the proposed activities.

Table 2. Abundance estimates, conservation status, and population trends of the marine mammal species for which take is proposed to be authorized.

Species	Stock	ESA/MMPA status[1]; Strategic (Y/N)	Stock abundance (CV, N_{min}, most recent abundance survey)[2]	Relative occurrence in Cook Inlet; season of occurrence
Humpback whale	Central North Pacific	E/D;Y	10,103 (0.3, 7890, 2006)	Occasionally seen in Lower Inlet, summer
Gray whale	Eastern North Pacific	-; N	20,990 (0.05, 20125, 2011)	Rare migratory visitor; late winter
Killer whale	Alaska Resident	-;N	2,347 (N/A; 2,084; 2009)	Occasionally sighted in Lowe Cook Inlet
	Alaska Transient	-:N	587 (N/A; 587; 2003)	
Beluga whale	Cook Inlet	E/D;Y	312 (0.10; 287; 2014)	Use upper Inlet in summer and lower in winter: annual
Harbor porpoise	Gulf of Alaska	-;Y	31,046 (0.214; unk; 1998)	Widespread in the Inlet: annual (less in winter)
Steller sea lion	Western DPS	E/D;Y	50,983 (-, 50,983, 2015)	Primarily found in lower Inlet
Harbor seal	Cook Inlet/Shelikof	-;N	27,386 (-, 25,651, 2011)	Frequently found in upper and lower inlet; annual (more in northern Inlet in summer)
California sea lion	U.S.	-; N	27,386 (unk, 25,651, 2011)	Rare

NMFS (2016) describes 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 the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al*. (2007) retained. The hearing groups and the associated frequencies are indicated in Table 3 (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).

Table 3. Marine Mammal Hearing Groups (NMFS 2016).

Hearing Group	Generalized Hearing Range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz

***** Represents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall et al. 2007) and PW pinniped (approximation).

3.2.2. ESA Listed Marine Mammals

Cook Inlet Beluga Whale

Beluga whales appear seasonally throughout Alaskan waters, except in the Southeast region and the Aleutian Islands. Five stocks are recognized in Alaska: Beaufort Sea stock, eastern Chukchi Sea stock, eastern Bering Sea stock, Bristol Bay stock, and Cook Inlet stock (Allen and Angliss 2013). The Cook Inlet stock is the most isolated of the five stocks, as it is separated from the others by the Alaska Peninsula and resides year round in Cook Inlet (Laidre et al. 2000). Only the Cook Inlet stock inhabits the proposed project area.

NMFS began comprehensive, systematic aerial surveys on beluga whales in Cook Inlet in 1994. Unlike previous efforts, these surveys included the upper, middle, and lower inlet. These surveys documented a decline in abundance of nearly 50 percent between 1994 and 1998, from an estimate of 653 to 347 whales (Rugh et al. 2000). In response to this decline, NMFS initiated a status review on the Cook Inlet beluga whale stock pursuant to the MMPA and the ESA in 1998 (63 FR 64228, November 19, 1998). The annual abundance surveys conducted each June since 1999 provide the following abundance estimates: 357 beluga whales in 1999, 435 beluga whales in 2000, 386 beluga whales in 2001, 313 beluga whales in 2002, 357 beluga whales in 2003, 366 beluga whales in 2004, 278 beluga whales in 2005, 302 beluga whales in 2006, 375 beluga whales in 2007; 321 beluga whales in 2009; 340 beluga whales in 2010; 284 whales in 2011; 312 whales in 2012 (Hobbs et al. 2000; Rugh et al. 2003, 2004a, 2004b, 2005a, 2005b, 2005c, 2006, 2007, 2010; NMFS 2010; Hobbs et al. 2011, Shelden et al. 2012). The overall population trend for the past 10 years for Cook Inlet beluga whales shows them not recovering and still in decline at an annual rate of 0.4 percent (NMFS, 2016a).

Figure 3 depicts the distribution of beluga whales in upper Cook Inlet and is based upon NMML data including NMFS aerial surveys. Additional information on beluga whale distribution is known from NMFS data from satellite-tagged belugas, and opportunistic sightings (NMML 2004); baseline studies of beluga whale occurrence in Knik Arm conducted for KABATA (Funk et al. 2005); baseline studies of beluga whale occurrence in Turnagain Arm conducted in preparation for Seward Highway improvements (Markowitz et al. 2007); marine mammal surveys conducted at Ladd Landing to assess a coal shipping project (Prevel Ramos et al. 2008); and marine mammal surveys off Granite Point, the Beluga River, and further down the inlet at North Ninilchik (e.g., Brueggeman et al. 2007, 2008).

The collective NMFS aerial survey results show that beluga whales have been consistently found near or in river mouths along the northern shores of upper Cook Inlet (i.e., north of East and West Foreland). In particular, beluga whale groups are seen in the Susitna River Delta, Knik Arm, and along the shores of Chickaloon Bay. Small groups were reported farther south in Kachemak Bay, Redoubt Bay (Big River),

and Trading Bay (McArthur River) prior to 1996, but very rarely thereafter. Since the mid-1990s, most (96 to 100 percent) beluga whales in upper Cook Inlet have been concentrated in shallow areas near river mouths, no longer occurring in the central or southern portions of Cook Inlet (Hobbs et al. 2008). Based on these aerial surveys, the concentration of beluga whales in the northernmost portion of Cook Inlet appears to be fairly consistent from June to October (Rugh et al. 2000, 2004a, 2005a, 2006, 2007; Shelden et al. 2008, 2009, 2010).

Other studies and monitoring programs have revealed additional information about beluga whale distribution in Cook Inlet. Studies for KABATA in 2004 and 2005 confirmed the use of Knik Arm by beluga whales from July to October (Funk et al. 2005). Data from tagged whales (14 tags between July and March 2000 through 2003) show beluga whales use upper Cook Inlet intensively between summer and late autumn (Hobbs et al. 2005). As late as October, beluga whales tagged with satellite transmitters continued to use Knik Arm and Turnagain Arm and Chickaloon Bay, but some ranged into lower Cook Inlet south to Chinitna Bay, Tuxedni Bay, and Trading Bay (McArthur River) in the fall (Hobbs et al. 2005). In November, beluga whales moved between Knik Arm, Turnagain Arm, and Chickaloon Bay, similar to patterns observed in September (Hobbs et al. 2005). By December, beluga whales were distributed throughout the upper to mid-inlet. From January into March, they moved as far south as Kalgin Island and slightly beyond in central offshore waters. Beluga whales also made occasional excursions into Knik Arm and Turnagain Arm in February and March in spite of ice cover greater than 90 percent (Hobbs et al. 2005). While they moved widely around Cook Inlet there was no indication from the tagged whales (Hobbs et al. 2005) that beluga whales had a seasonal migration in and out of Cook Inlet.

Depending upon the season, beluga whales can occur in both offshore and coastal waters. Although they remain in the general Cook Inlet area during the winter, they disperse throughout the upper and mid-inlet areas. Data from NMFS aerial surveys, opportunistic sighting reports, and satellite-tagged beluga whales confirm they are more widely dispersed throughout Cook Inlet during the winter months (November-April), with animals found between Kalgin Island and Point Possession. Based upon monthly surveys (e.g., Rugh et al. 2000), opportunistic sightings, and satellite-tag data, there are generally fewer observations of these whales in the Anchorage and Knik Arm area from November through April (NMML 2004; Rugh et al. 2004a).

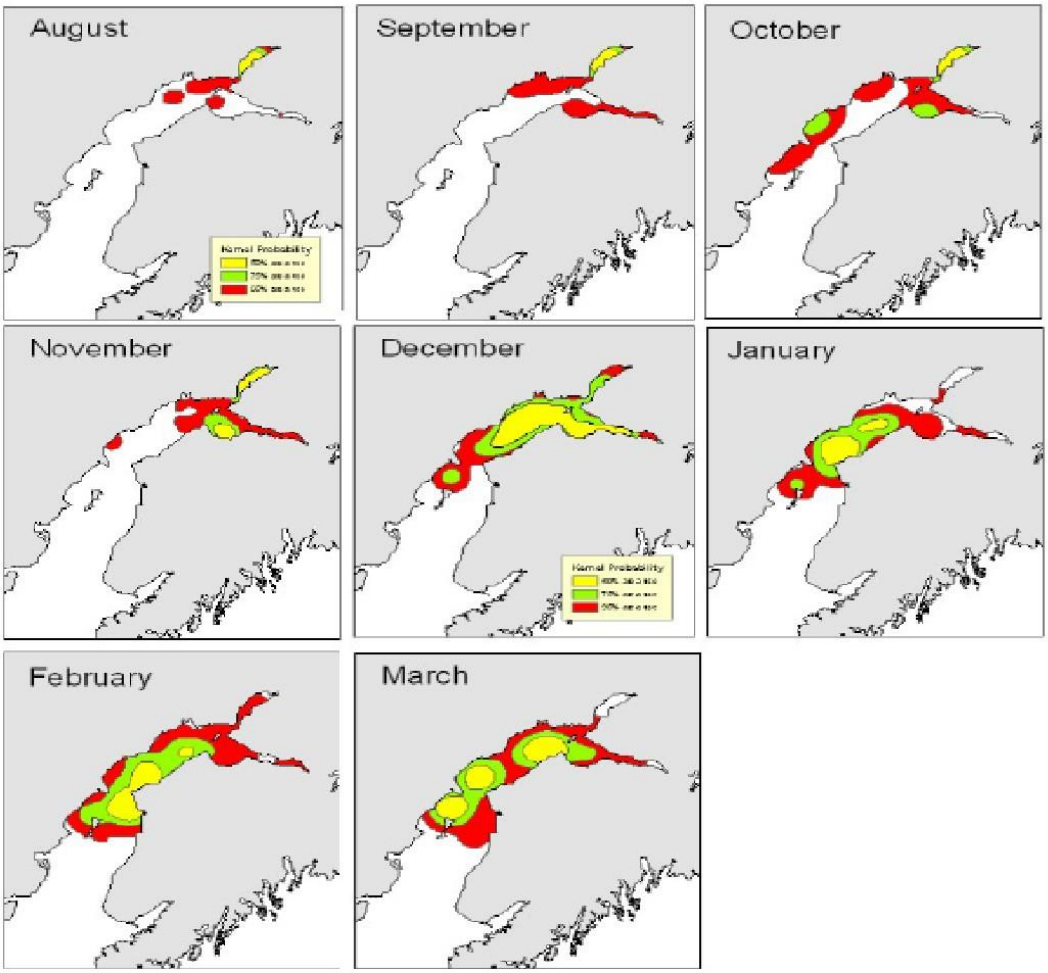

Figure 3. Predicted beluga distribution by month based upon known locations of 14 satellite tagged belugas (predictions derived via kernel probability estimates; Hobbs et al. 2005). Note the large increase in total area use and offshore locations beginning in December and continuing through March. The red area (95 percent probability) encompasses the green (75 percent) and yellow (50 percent) regions. From NMFS 2008b.

During the spring and summer, beluga whales are generally concentrated near the warmer waters of river mouths where prey availability is high and predator occurrence is low (Moore et al. 2000). Most beluga whale calving in Cook Inlet occurs from mid-May to mid-July in the vicinity of the river mouths, although Native hunters have described calving as early as April and as late as August (Huntington 2000).

Beluga whale concentrations in upper Cook Inlet during April and May correspond with eulachon migrations to rivers and streams in the northern portion of upper Cook Inlet (NMFS 2003; Angliss and Outlaw 2005). Data from NMFS aerial surveys, opportunistic sightings, and satellite-tagged beluga whales confirm that they are concentrated along the rivers and nearshore areas of upper Cook Inlet (Susitna River Delta, Knik Arm, and Turnagain Arm) from May through October (NMML 2004; Rugh et al. 2004a). Beluga whales are commonly seen from early July to early October at the mouth of Ship Creek where they feed on salmon and other fish, and also in the vicinity of the Port (e.g., alongside docked ships and within

300 ft of the docks) (Blackwell and Greene 2002; NMML 2004). Beluga whales have also been observed feeding immediately offshore of the tidelands north of the Port and south of Cairn Point (NMFS 2004).

Steller Sea Lion

Steller sea lions occur in Cook Inlet but south of Anchor Point around the offshore islands and along the west coast of the upper inlet in the bays (Chinitna Bay, Iniskin Bay, etc.) (Rugh et al. 2005a). Portions of the southern reaches of the lower inlet are designated as critical habitat, including a 20-nautical mile buffer around all major haul out sites and rookeries. Rookeries and haulout sites in lower Cook Inlet include those near the mouth of the inlet, which are far south of the project area. Presence of Steller sea lions in the proposed project areas is anticipated to be rare. The western distinct population segment (DPS) is the one that occurs in the proposed area and is the only one listed under the ESA.

Humpback whale

On October 11, 2016, NMFS revised the listing status of the humpback whale into 14 DPSs and the species-level endangered listing was removed (81 FR 62259). Now, 2 DPSs are listed as endangered, 2 DPSs are threatened, and the remaining 10 DPSs are no longer listed under the ESA. Three DPSs of humpback whales occur in waters off the coast of Alaska: the Western North Pacific DPS, listed as endangered under the ESA; the Mexico DPS, a threatened species; and the Hawaii DPS, which is no longer listed as endangered or threatened under the ESA. Humpback whales in the Gulf of Alaska are most likely to be from the Hawaii DPS (89 percent probability) (Wade *et al.*, 2016). Humpback whales that occur in Cook Inlet, albeit infrequently, are considered part of the Hawaii DPS.

Humpback whales occur occasionally in Cook Inlet, particularly in the South toward Barren Islands, as the Central North Pacific stock of humpbacks is known to migrate to Alaska for summer feeding. Some of the whales that summer in Alaska have been tagged and known to migrate in winter to Hawaii. NMFS aerial surveys have sighted as many as 47 whales in a single survey period, however they have not sighted more than 10 whales in a survey since 2006 (NMFS, 2012). Humpbacks maintain a seasonal presence in the south of the Inlet, although humpbacks are occasionally sighted as far north as Anchorage in summer months.

3.2.3. Non-ESA Listed Marine Mammals

Harbor Seal

Harbor seals inhabit the coastal and estuarine waters of Cook Inlet. In general, harbor seals are more abundant in lower Cook Inlet than in upper Cook Inlet, but they do occur in the upper inlet throughout most of the year (Rugh et al. 2005). Harbor seals are non-migratory; their movements are associated with tides, weather, season, food availability, and reproduction. The major haulout sites for harbor seals are located in lower Cook Inlet, and their presence in the upper inlet coincides with seasonal runs of prey species. For example, harbor seals are commonly observed along the Susitna River and other tributaries along upper Cook Inlet during the eulachon and salmon migrations (NMFS, 2003). During aerial surveys of upper Cook Inlet in 2001, 2002, and 2003, harbor seals were observed 24 to 96 km (15 to 60 mi) south- southwest of Anchorage at the Chickaloon, Little Susitna, Susitna, Ivan, McArthur, and Beluga Rivers (Rugh et al., 2005). During a 2D test program in March 2011, two harbor seals were observed by vessel- based PSOs.

Harbor seals haul out on rocks, reefs, beaches, and drifting glacial ice, and feed on capelin, eulachon, cod, pollock, flatfish, shrimp, octopus, and squid in marine, estuarine, and occasionally fresh waters.

Killer Whale

Numbers of killer whales in Cook Inlet are small compared to the overall population and most are recorded in the lower Cook Inlet. Killer whales are rare in upper Cook Inlet, where transient killer whales are known to feed on beluga whales, and resident killer whales are known to feed on anadromous fish (Shelden et al. 2003). The availability of these prey species largely determines the likeliest times for killer whales to be in the area. Twenty-three sightings of killer whales were reported in the lower Cook Inlet between 1993 and 2004 in aerial surveys by Rugh et al. (2005a). Surveys over 20 years by Shelden et al. (2003) reported 11 sightings in upper Cook Inlet between Turnagain Arm, Susitna Flats, and Knik Arm. No killer whales were spotted during surveys by Funk et al. (2005), Ireland et al. (2005), Brueggeman et al. (2007a, 2007b, 2008), or Prevel Ramos et al. (2006, 2008). Eleven killer whale strandings have been reported in Turnagain Arm, six in May 1991, and five in August 1993. Very few killer whales, if any, are expected to approach or be in the vicinity of the operation areas.

Harbor Porpoise

The most recent estimated density of animals in Cook Inlet is 7.2 per 1,000 km^2 (386 mi^2) (Dahlheim et al. 2000) indicating that only a small number use Cook Inlet. Harbor porpoise have been reported in lower Cook Inlet from Cape Douglas to the West Foreland, Kachemak Bay, and offshore (Rugh et al. 2005a). Small numbers of harbor porpoises have been consistently reported in the Upper Cook Inlet between April and October, except for a recent survey that recorded higher numbers than typical. Highest monthly counts include 17 harbor porpoises reported for spring through fall 2006 by Prevel Ramos et al. (2008), 14 for spring of 2007 by Brueggeman et al. (2007a), 12 for fall of 2007 by Brueggeman et al. (2008), and 129 for spring through fall in 2007 by Prevel Ramos et al. (2008) between Granite Point and the Susitna River during 2006 and 2007; the reason for the recent spike in numbers (129) of harbor porpoises in the upper Cook Inlet is unclear and quite disparate with results of past surveys, suggesting it may be an anomaly. The spike occurred in July, which was followed by sightings of 79 harbor porpoise in August, 78 in September, and 59 in October in 2007. The number of porpoises counted more than once was unknown. Therefore, because we lack information regarding double counting, it is possible that the actual numbers are smaller than reported. On the other hand, recent passive acoustic research in Cook Inlet by the Alaska Department of Fish and Game (ADF&G) and the National Marine Mammal Laboratory (NMML) have indicated that harbor porpoises occur more frequently than expected, particularly in the West Foreland area in the spring (NMFS 2011, personal communication), although overall numbers are still unknown at this time. In 2012, Apache marine mammal observers recorded 137 sightings of 190 estimated individuals; a similar count to the 2007 spike previously observed. The increase of sightings in the upper Cook Inlet may reflect movement of harbor porpoise distribution than previously known.

Gray Whale

Each spring, the Eastern North Pacific stock of gray whale migrates 8,000 kilometers (5,000 miles) northward from breeding lagoons in Baja California to feeding grounds in the Bering and Chukchi seas, reversing their travel again in the fall (Rice and Wolman 1971). Their migration route is for the most part coastal until they reach the feeding grounds. A small portion of whales do not annually complete the full

circuit, as small numbers can be found in the summer feeding along the Oregon, Washington, British Columbia, and Alaskan coasts (Rice et al. 1984, Moore et al. 2007).

Most gray whales migrate past the mouth of Cook Inlet to and from northern feeding grounds. However, small numbers of summering gray whales have been observed within Cook Inlet, mostly in the lower inlet (e.g., Owl Ridge, 2014). Gray whales have not been observed in the upper inlet; however, seismic surveys bordering the lower and upper inlet (including the project area) have observed gray whales. On June 1, 2012, there were three gray whale sightings during marine mammal monitoring for a seismic survey; the survey area include the pipeline project area (SAE, 2012). It is not known if this was the same animal observed multiple times or multiple individuals. A lone gray whale was also observed near the middle inlet in 2014 and in May 2015, what was believed to be a gray whale based on blow shape was observed during marine mammal monitoring conducted for seismic surveys (SAE 2014, 2015).

California Sea Lion

California sea lions (*Zalophus californianus*) are distributed along the North Pacific waters from central Mexico to southeast Alaska, with breeding areas restricted primarily to island areas off southern California (the Channel Islands), Baja California, and in the Gulf of California (Wright *et al.*, 2010). The population is comprised of five genetically distinct populations: the United States population that breeds on offshore islands in California; the western Baja California population that breeds offshore along the west coast of Baja California, Mexico; and three populations (southern, central and northern) that breed in the Gulf of California, Mexico. Males migrate long distances from the colonies during the winter whereas females and juveniles remain close the breeding areas. The approximate growth rate for this species is 5.4 percent annually (Caretta *et al.*, 2004).

California sea lions are very rare in Cook Inlet and typically are not observed farther north than southeast Alaska. However, NMFS' anecdotal sighting database contains four California sea lion sightings in Seward and Kachemak Bay. In addition, an industry survey report contains a sighting of two California sea lions in lower Cook Inlet; however, it is unclear if these animals were indeed California sea lions or a mis-identified Steller sea lions (SAE, 2012).

3.3 Socioeconomic Environment

3.3.1 Subsistence

Tyonek, located just south of the project area, is a Dena'ina Athabascan village practicing a subsistence lifestyle. The Village of Tyonek lies on a bluff on the northwest shore of Cook Inlet and has no interconnected road access. According to Census 2010, there were 144 housing units in the community and 70 were occupied. Its population was 88.3 percent American Indian or Alaska Native; 5.3 percent white; 6.4 percent of the local residents had multi-racial backgrounds (ADCCE 2010).

The principal wild foods harvested and consumed by Dena'ina communities are fish, land mammals (moose), and marine mammals. Salmon consistently provides the major portion of the region's subsistence food, and sockeye is the most harvested. Shellfish, plants, and birds and eggs each make up approximately 2% of the total annual harvest (BOEM 2003).

Native hunters historically have hunted beluga whales and harbor seals for food. The subsistence harvest of beluga transcends nutritional and economic value of the whale as the harvest is an integral part of the cultural identity of the region's Alaska Native communities. Inedible parts of the whale provide Native artisans with materials for cultural handicrafts, and the hunting perpetuates Native traditions by transmitting traditional skills and knowledge to younger generations. However, due to dramatic declines in the Cook Inlet beluga whale population, on May 21, 1999, legislation was passed to temporarily prohibit (until October 1, 2000) the taking of Cook Inlet belugas under the subsistence harvest exemption in section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected Alaska Native Organizations (ANOs) (Public Law No. 106-31, section 3022, 113 Stat. 57,100). That prohibition was extended indefinitely on December 21, 2000 (Public Law No. 106-553, section 1(a)(2), 114 Stat. 2762). NMFS subsequently entered into six annual co-management agreements (2000-2003, 2005-2006) with the Cook Inlet Marine Mammal Council, an ANO representing Cook Inlet beluga hunters, which allowed for the harvest of 1-2 belugas.

On October 15, 2008, NMFS published a final rule that established long-term harvest limits on Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibits harvest for a 5-year interval period if the average stock abundance of Cook Inlet beluga whales over the prior five-year interval is below 350 whales. Harvest levels for the current 5-year planning interval (2013-2017) are zero because the average stock abundance for the previous five-year period (2008-2012) was below 350 whales. Based on the average abundance over the 2002-2007 period, no hunt occurred between 2008 and 2012 (NMFS, 2008a, b). The Cook Inlet Marine Mammal Council, which managed the Alaska Native Subsistence fishery with NMFS, was disbanded by a unanimous vote of the Tribes' representatives on June 20, 2012. No harvest occurred in 2015 or is expected in 2016.

Although marine mammals remain an important subsistence resource in Cook Inlet, the number of animals annually harvested is low, and are primarily harbor seals. Much of the harbor seal harvest occurs incidental to other fishing and hunting activities, and at areas outside of the project area such as the Susitna Delta or the west side of lower Cook Inlet.

Chapter 4 Environmental Consequences

The National Marine Fisheries Service (NMFS) reviewed all possible direct, indirect, cumulative, short-term, and long-term impacts to marine mammals and their habitat associated with NMFS's action and alternatives. This chapter describes the potential environmental consequences for the affected resources described in Chapter 3 for each alternative

4.1.1. Effects of Alternative 1 – Issuance of Authorizations with Mitigation Measures

Alternative 1 is the Preferred Alternative where we would issue an IHA to Harvest allowing the incidental take, by Level B harassment, of six species of marine mammals, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the IHA (see Section 2.3.1), if issued.

4.1.2. Impacts to Marine Mammal Habitat

The proposed activities would not result in substantial damage to ocean and coastal habitats that might constitute marine mammal habitat. Pipeline installation activities (e.g., trenching, pulling the pipes, dive work, etc.) would minimally and briefly (limited to when work is occurring at a particular location) impact physical habitat features, such as substrates and/or water quality. The pipelines and seacrete bags would be permanent structures on the sea floor; however, any impact from the presence of the pipeline remaining on the seafloor is limited to the footprint of the pipeline and we expect benthic organisms to grow on the material left in place. Vessels used for the project would originate from the Alaska area; therefore, the potential for ballast water to contain non-indigenous species that may be introduced or spread into the marine environment is low.

4.1.3. Impacts to Marine Mammals

In general, NMFS uses several quantitative and qualitative methodologies for assessing impact to marine mammal stocks and their habitat associated with our proposed action and alternatives. NMFS evaluates impact through its negligible impact determinations, small numbers analyses, consideration of the number of takes of marine mammals by Level A and Level B harassment, status of stocks, how animals are using habitat when potentially harassed, geospatial consideration of habitat area where takes could occur, known impacts from the stressor being analyzed, and, among other things, qualitative reviews of mitigation measures and effectiveness at reducing impacts. We relied on and incorporated information regarding the proposed pipeline installation activities affects from Harvest's application and the notice of the proposed IHA for the analysis in this EA. Harvest's application and the proposed IHA is available for review on NOAA Fisheries website at *https://www.fisheries.noaa.gov/node/23111*.

The primary impact to marine mammals is exposure to noise from the use of vessels and barges to install pipelines. Acoustic stimuli generated by vessels and other pipeline installation activities (*e.g*., pushing and anchoring the barge, pulling the pipeline, removing obstacles) may result in one or more of the following marine mammal reactions: avoidance, masking, tolerance, and behavioral disturbance (Richardson et al. 1995). For reasons described below, we do not anticipate hearing impairment. The potential effects on marine mammals resulting from Harvests proposed pipeline installation activities is described in detail in the notice of

the proposed IHA and is incorporated by reference in this section and the following subsections.

With exposure to noise, there is a risk of hearing threshold shift that NMFS defines 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, 2016b). There are two types of threshold shift: permanent (PTS) and temporary (TTS). The potential for PTS from exposure to Harvest's pipeline operations is discountable. Using NMFS Technical Guidance (NMFS, 2016b), a marine mammal would have to remain within 1 to 33 meters of a noise source (e.g., tug) for 24 hours for there to be the potential for PTS onset. There is also discountable potential for TTS as marine mammals are not expected to remain in the area long enough to cause a threshold shift. Belugas are expected to be headed to, or later in the season, away from, the concentrated foraging areas near the Beluga River, Susitna Delta, and Knik and Turnigan Arms. Similarly, humpback whales, killer whales, harbor porpoise and Steller sea lions are not expected to remain in the area. Harbor seals; however, may linger or haul-out in the area but they are not known to do so in any large number or for extended periods of time (there are no known major haul-outs or rookeries in the project area).

The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography) and is also difficult to predict (Southall *et al.*, 2007). Currently NMFS uses a received level of 160 dB re 1 micro Pascal (μPa) root mean square (rms) to predict the onset of behavioral harassment from impulse noises (such as impact pile driving), and 120 dB re 1 μPa (rms) for continuous noises (such as operating dynamic positioning (DP) thrusters). No impulse noise within the hearing range of marine mammals is expected from the pipeline installation activities; therefore, only the 120 dB re 1 μPa (rms) threshold is considered. Given most marine mammals are likely transiting through the area, exposure is expected to be brief but, in combination with the actual presence of working equipment, may result in avoidance, changing durations of surfacing and dives, number of blows per surfacing, changing direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where noise sources are located; and/or flight responses (e.g., pinnipeds flushing into water from haul-out). We do not expect any abandonment of the transiting route for belugas, as supported by data indicating belugas regularly pass by industrialized areas such as the Port of Anchorage. The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography) and is also difficult to predict (Richardson et al. 1995; Southall et al. 2007).

Masking is the obscuring of sounds of interest by other sounds, often at similar frequencies. Marine mammals are highly dependent on sound, and their ability to recognize sound signals amid other noise is important in communication, predator and prey detection, and, in the case of toothed whales, echolocation. Although some degree of masking is inevitable when high levels of manmade broadband sounds are introduced into the sea, marine mammals have evolved systems and behavior that function to reduce the impacts of masking. Structured signals, such as the echolocation click sequences of small toothed whales, may be readily detected even in the presence of strong background noise because their frequency content and temporal features usually differ strongly from those of the background noise (Au and Moore, 1988, 1990). The components of background noise that are similar in frequency to the sound

signal in question primarily determine the degree of masking of that signal.

Masking effects of underwater sounds from Harvest's proposed activities on marine mammal calls and other natural sounds are expected to be limited. For example, beluga whales primarily use high-frequency sounds to communicate and locate prey; therefore, masking by low-frequency sounds associated with operations is not expected to occur (Gales, 1982). There is evidence of other marine mammal species continuing to call in the presence of industrial activity. Annual acoustical monitoring near BP's Northstar production facility during the fall bowhead migration westward through the Beaufort Sea has recorded thousands of calls each year (for examples, see Richardson et al., 2007; Aerts and Richardson, 2008). Construction, maintenance, and operational activities have been occurring from this facility for over 10 years. To compensate and reduce masking, some mysticetes may alter the frequencies of their communication sounds (Richardson et al., 1995; Parks et al., 2007).

Based on received levels and spatial and temporal prevalence of anthropogenic sound in Cook Inlet, Castelotte et al. (2016) suggest that human-induced noise has the potential mask beluga communication and hearing in most of the locations sampled. This masking may result in a range reduction of effective communication and echolocation. However, masking from the operations is expected to be low because frequencies of noise produced during operations is low, belugas typically go silent when in the presence of anthropogenic sound, and marine mammals are likely transiting through the area; therefore, no impacts to important behaviors such as foraging or mating are expected.

In summary, we interpret these effects on all marine mammals as falling within the MMPA definition of Level B (behavioral) harassment. We expect these impacts to be minor because we do not anticipate measurable changes to the population or impacts to rookeries, mating grounds, and other areas of similar significance. Under the Preferred Alternative, we would authorize incidental take, by Level B harassment only, of six species of marine mammals, depending upon the proposed activity. We expect no long-term or substantial adverse effects on marine mammals, their habitats, or their role in the environment.

Harvest proposed a number of monitoring and mitigation measures for marine mammals. In consideration of the potential effects of the proposed action, we determined that the mitigation and monitoring measures described in Section 2.3. of this EA would be appropriate for the preferred alternative to meet the Purpose and Need.

4.1.3. Estimated Take of Marine Mammals by Level B Incidental Harassment

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 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. Using the best available science, NMFS uses 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).

Because we consider the potential for take from the combination of multiple sources (and not any given single source), we estimate the ensonified area to be a rectangle centered along the pipeline corridor which

encompasses all in-water equipment and a buffer around the outside of the cluster of activities constituting the distance calculated to the 120 dB threshold from one tug (*i.e.*, 2,200 m). NMFS determined a tug source level (170 dB re: 1 µPa) for the duration of the project would be a reasonable step in identifying an ensonified zone since tugs would be consistently operating in some manner, and other sources of noise (e.g., trenching, obstacle removal, underwater tools) are all expected to produce less noise. Anchor handling during barge relocation is also a source of noise during the project; however, we believe using the tug is most appropriate. NMFS is aware of anchor handling noise measurements made in the Arctic during a Shell Oil exploratory drilling program that produced a noise level of 143 dB re 1 µPa at 860 m (LGL *et al*., 2014). However, that measurement was during deployment of 1 of 12 anchors in an anchor array system associated with a large drill rig and it would be overly conservative to adopt here.

Although vessels and equipment (*e.g*., tugs, support vessels, barge) spacing would vary during the course of operations, a single layout must be assumed for modeling purposes. We assume the barge used for pipe pulling and supporting trenching and stabilization is placed in the middle of a group of vessels and directly in line with the pipeline corridor. The sonar and dive boats would also be concentrated along the pipeline corridor path. We conservatively assume tugs would be spaced approximately 0.5 km from the barge/pipeline corridor during stand-by mode and could be on opposite sides of the corridor. Also, vessels and equipment would shift from nearshore to offshore as the project progresses. For simplicity, we divided the pipeline corridor (8.9 km) in half for our ensonified area model because each pipe pulled would be approximately 4.45 km each. We then considered the estimated distance to the 120 dB threshold from the tug (2.2 km). We then doubled that distance and adjusted for a 0.5 km distance from the pipeline corridor to account for noise propagating on either side of a tug. We used those distances to calculate the area of the rectangle centered around the pipeline corridor (Area = length x width or A = 4.45 km x ((2.2 km + 0.5km) x 2) for a Level B ensonified area of 24.03 km^2. As the work continues, this area would gradually shift from nearshore to farther offshore, terminating at the Tyonek platform.

Take estimates were generated in consideration of species density in the action area (Table 4), number of days pipeline installation activities would occur, the extent of ensonified area, and group size and frequency of assumed occurrence. The two latter parameters were considered if the calculated take estimate based on density was not representative of group size. For example, if calculated take was one animal but that species is typically observed in groups of 5 animals, we increased the number of take to represent a certain number of groups. Calculated take is the product of daily ensonified area (24.03 km^2), number of project days (108), and the density of a species, absent mitigation measures or other requirements and limiting factors. More details on how takes were derived can be found in our notice of proposed IHA. Take by harassment NMFS is proposing to authorize in its IHA (Table 5). These take numbers have been adjusted from the draft EA stage (see Table footnotes).

Table 4. Density Estimates for Marine Mammals Potentially Present within the Action Area based on Cook Inlet-wide NMFS aerial surveys 2001-2016.

Species	No. of Animals	Area (km^2)	Estimated Density (No. Animals/km^2)
CI beluga whale	-	-	0.001[1]
Humpback whale	204	87,123	0.0023
Killer whale	70	87,123	0.0008
Harbor porpoise	377	87,123	0.004
Harbor seal	23,912	87,123	0.2745
Steller sea lion	74.1[2]	87,123	0.00085

[1] CI beluga whale density based on Goetz et al. (2012).

[2] Actual counts of Steller sea lions was 741; however, it is well documented this species almost exclusively inhabits the lower inlet south of the Fordlands with rare sightings in the northern inlet. Therefore, we adjusted the number of animals observed during the NMFS surveys (which cover the entire inlet) by 1/10 to account for this skewed concentration.

Table 5. Quantitative Assessment Results of Proposed Take, by Level B harassment.

Species	Density	Calculated Take[1]	Average group size	Authorized Take (Level B)
CI beluga whale	0.001	2.59	8	40[2]
Humpback whale	0.0023	5.07	1-2	5
Killer whale	0.0008	1.77	5	10[3]
Harbor porpoise	0.004	8.83	1-3[4]	100[4]
Harbor seal	0.2745	605.67	1-10[5]	972[6]
Steller sea lion	0.00085	1.88	1-2	6[7]
Gray whale	0.00011	0.285	1	5[8]
California sea lion	0	0	1	5[9]

[1] Calculate Take = density x ensonifed area (24.03 km^2) x # of project days (108).

[2] The proposed take amount was 29 beluga whales which reflected the potential for one group of eight belugas per month or two groups of four animals per month. We increased to 40 authorized takes to account for possibility animals may be more frequent than originally assessed and to account for potential for one to two large group (up to 20 whales) to come within ensonified area during activities.

[3] Adjusted take is based on two groups of five animals.

[4] Average group size from Sheldon *et al*. 2014. Authorized take adjusted to account for known increase in harbor porpoise occurrence in upper Cook Inlet in recent years and is approximately 50% of the number of harbor porpoise observed during industry marine mammal surveys (n=190) near the action area.

[5] Represents range of group sizes observed during a seismic survey in the middle Inlet from May 6 through September 30, 2012 (Lomac-MacNair *et al*., 2012).

[6] The proposed IHA used density-based method for proposed take; however, we have adjusted based on the maximum of 9 harbor seals observed during aerial surveys in the project area based on NMFS aerial surveys from 1997-2011 (9 seals/day x 108 days = 972).

[7] As in the proposed IHA, we consider the potential for 1-2 Steller sea lions to remain in the area for multiple days.

[8] We have added five takes of gray whales in the rare chance they enter the ensonified area and operations cannot be shut down.

[9] We have added five takes of California sea lions in the rare chance they enter the ensonified area and operations cannot be shut down.

4.1.4. Impacts on Subsistence

Under the Alternative 1 (the Preferred Alternative), Harvest's pipeline installation activities in in Cook Inlet are not expected to affect subsistence uses of wildlife and marine mammals in the area because subsistence use is limited to a small number of marine mammals and not within the project area. The background and additional information about subsistence users within or near Cook Inlet is summarized below.

Residents of the Native Village of Tyonek are the primary marine mammal subsistence users in Knik Arm area. However, due to dramatic declines in the Cook Inlet beluga whale population, on May 21, 1999, legislation was passed to temporarily prohibit (until October 1, 2000) the taking of Cook Inlet belugas under the subsistence harvest exemption in section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected Alaska Native Organizations (ANOs) (Public Law No. 106-31, section 3022, 113 Stat. 57,100).. That prohibition was extended indefinitely on December 21, 2000 (Public Law No. 106-553, section 1(a)(2), 114 Stat. 2762). NMFS subsequently entered into six annual co-management agreements (2000-2003, 2005-2006) with the Cook Inlet Marine Mammal Council, an ANO representing Cook Inlet beluga hunters, which allowed for the harvest of 1-2 belugas. On October 15, 2008, NMFS published a final rule that established long-term harvest limits on the Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibits harvest for a five-year period (2008-2012), if the average abundance for the Cook Inlet beluga whales from the prior five years (2003-2007) is below 350 whales. The more recent five-year period that could have allowed for a harvest (2013-2017), would have required the previous five-year average (2008-2012) to be above 350 whales, which it was not. Tyonek Natives occasionally harvest harbor seals, but their primary source of red meat is moose.

The only data available for subsistence harvest of harbor seals, harbor porpoises, and killer whales in Alaska are in the marine mammal stock assessments. However, these numbers are for the entire Gulf of Alaska not just Cook Inlet, and they are not indicative of the harvest in Cook Inlet. The number harvested is expected to be extremely low. For example, there is a low level of subsistence hunting for harbor seals in Cook Inlet. Seal hunting occurs opportunistically among Alaska Natives who may be fishing or travelling in the upper Inlet near the mouths of the Susitna River, Beluga River, and Little Susitna River.

Harvest concluded, and NMFS agrees, that the size of the affected area, mitigation measures, and consideration of subsistence use should result in the proposed action having no unmitigable adverse impact on the availability of marine mammals for subsistence uses. Harvest and NMFS recognize the importance of ensuring that Alaska Native Organizations (ANOs) and federally recognized tribes are informed, engaged, and involved during the permitting process and will continue to work with the ANOs and tribes to discuss their operations and activities.

In summary, NMFS anticipates that any effects from Harvest's proposed activities on marine mammals, would be short-term, site specific, and limited to inconsequential changes in behavior. NMFS does not anticipate authorized taking of affected species or stocks would reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (1) Causing the marine mammals to abandon or avoid hunting areas; (2) directly displacing subsistence users; or (3) placing physical barriers between the marine mammals and the subsistence hunters; and that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

4.2. **Effects of Alternative 2 – No Action Alternative**

Where a choice of "no action" by the agency would result in predictable actions by others, this consequence of the "no action" alternative should be included in the analysis." (CEQ, Forty Questions, 3.A). NMFS' view is that it is likely that the applicant would choose to undertake its action in compliance with the law rather than proceed without the take authorization. Under the No Action Alternative, NMFS would not issue the IHA to Harvest authorizing take of marine mammals. As a result, the exceptions to the prohibition on take of marine mammals per the MMPA would not apply and Harvest would not conduct the pipeline installation activities as described in the application. There would be no direct or indirect impacts to marine mammals or their habitat resulting from no action. The marine mammal species and their habitat conditions would remain substantially similar to the condition described in Chapter 3, "Affected Environment"..

4.3. Cumulative Effects

NEPA defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR §1508.7). Cumulative impacts can result from individually minor but collectively significant actions that take place over of time.

For purposes of this analysis, the range of past, present, and reasonably foreseeable activities that result in cumulative impacts to marine mammal populations in the proposed project area include the following: subsistence hunting, marine pollution, fisheries interactions, vessel traffic; oil and gas development; coastal zone development, marine mammal research, and climate change.

4.3.1. Subsistence Hunting

In Cook Inlet, Native hunters historically have hunted beluga whales and harbor seals for food. The subsistence harvest of beluga transcends nutritional and economic value of the whale as the harvest is an integral part of the cultural identity of the region's Alaska Native communities. Inedible parts of the whale provide Native artisans with materials for cultural handicrafts, and the hunting perpetuates Native traditions by transmitting traditional skills and knowledge to younger generations. However, due to dramatic declines in the Cook Inlet beluga whale population, on May 21, 1999, legislation was passed to temporarily prohibit (until October 1, 2000) the taking of Cook Inlet belugas under the subsistence harvest exemption in section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected ANOs (Public Law No. 106-31, section 3022, 113 Stat. 57,100). That prohibition was extended indefinitely on December 21, 2000 (Public Law No. 106-553, section 1(a)(2), 114 Stat. 2762). NMFS subsequently entered into six annual co-management agreements (2000-2003, 2005-2006) with the Cook Inlet Marine Mammal Council, an ANO representing Cook Inlet beluga hunters, which allowed for the harvest of 1-2 belugas.

On October 15, 2008, NMFS published a final rule that established long-term harvest limits on Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibits harvest for a 5-year interval period if the average stock abundance of Cook Inlet beluga whales over the prior five-year interval is below 350 whales. Harvest levels for the current 5-year planning interval (2013-2017) are zero because the average stock abundance for the previous five-year period

(2008-2012) was below 350 whales. Based on the average abundance over the 2002-2007 period, no hunt occurred between 2008 and 2012 (NMFS, 2008). The Cook Inlet Marine Mammal Council, which managed the Alaska Native Subsistence fishery with NMFS, was disbanded by a unanimous vote of the Tribes' representatives on June 20, 2012. Additional information on the Cook Inlet beluga harvest can be found in NMFS (2008a).

There is a low level of subsistence hunting for harbor seals in Cook Inlet. Seal hunting occurs opportunistically among Alaska Natives who may be fishing or travelling in the upper Inlet near the mouths of the Susitna River, Beluga River, and Little Susitna. Some detailed information on the subsistence harvest of harbor seals is available from past studies conducted by the Alaska Department of Fish & Game (Wolfe et al., 2009). In 2008, 33 harbor seals were taken for harvest in the Upper Kenai-Cook Inlet area. In the same study, reports from hunters stated that harbor seal populations in the area were increasing (28.6%) or remaining stable (71.4%). The specific hunting regions identified were Anchorage, Homer, Kenai, and Tyonek, and hunting generally peaks in March, September, and November (Wolfe et al., 2009). The timing and location of subsistence harvest of Cook Inlet harbor seals would not coincide with active hunting and this subsistence hunt is conducted opportunistically and at low levels (NMFS, 2013c); therefore, no cumulative effects from subsistence hunting are anticipated.

4.3.2. Pollution

As the population in urban areas continue to grow, an increase in amount of pollutants that enter Cook Inlet is likely to occur. Sources of pollutants in urban areas include runoff from streets and discharge from wastewater treatment facilities. Gas, oil, and coastal zone development projects (*e.g*., the Chuitna Coal Mine) also contribute to pollutants that enter Cook Inlet through discharge. Gas, oil, and coastal zone development will continue to take place in Cook Inlet; therefore, it would be expected that pollutants could increase in Cook Inlet. However, the EPA and the ADEC will continue to regulate the amount of pollutants that enter Cook Inlet from point and non-point sources through NPDES permits. As a result, permittees will be required to renew their permits, verify they meet permit standards and potentially upgrade facilities. Additionally, the extreme tides and strong currents in Cook Inlet may contribute in reducing the amount of pollutants found in the Inlet.

4.3.3. Fisheries Interaction

Fishing is a major industry in Alaska. As long as fish stocks are sustainable, subsistence, personal use, recreational and commercial fishing will continue to take place in Cook Inlet. However, NMFS and the ADF&G manages fish stocks and monitors and regulates fishing in Cook Inlet to maintain sustainable stocks, resulting in no significant decline of prey availability due to fishing.

4.3.4. Vessel Traffic

Major contributors to vessel traffic throughout Cook Inlet include port facilities, oil and gas development, and commercial and recreational fishing. The Port of Anchorage (POA) is a major Alaskan port located adjacent to Anchorage in upper Cook Inlet. The POA provides 90 percent of the consumer goods for 85 percent of the state of Alaska. The POA handles the majority of Alaska's refined petroleum products and the bulk of jet fuel for Joint Base Elmendorf-Richardson and the Ted Stevens Anchorage International Airport (100 and 60 percent respectively; POA, 2014). Major vessels calling to the POA include cargo ships, barges, tankers, dredgers, military ships and tug boats (POA, 2009). Based on data from 1998-

2011, an average of approximately 450 vessels call to the POA annually (POA, 2014). The POA is outside the area Harvest is proposing to conduct pipeline installation activities; however, the POA yields a high volume of vessels traffic that must pass through or near where pipeline installation activities will take place. In addition, the POA is currently under construction and expanding its facilities. As a result, vessel traffic will increase once the project is complete.

Port MacKenzie is located in upper Cook Inlet and contributes to vessel traffic that passes through or near the area where pipeline installation activities will take place. It receives about two large ships annually (i.e. a landing craft and/or a barge), which is substantially less than the POA. However, the number of ships calling to port at Port MacKenzie is expected to increase over the next five years; the Rail Extension and expanding the currently existing deep draft dock are planned for construction.

Other smaller port facilities that contribute to vessel traffic in the action area include Nikiski, the City of Kenai, Kasilof, Ninilchik, Anchor River, Tyonek and Drift River. Vessels ranging from tankers to fishing boats call to these ports (Kenai Peninsula Borough, 2003). Gas and oil development also contribute to vessel traffic in the action area, as well as commercial and recreational fishing vessels.

The proposed action is not within an active shipping lane and no ports or vessel launch areas are located nearby. The project would increase small vessel presence and operation in the project area; however, we have accounted for the impact of these vessels through the proposed IHA and in this document as vessels are the primary source of potential harassment. The project would not result in any long-term use of the area (e.g., it does not involve building a dock or port) and any vessel use in the future would be limited to pipeline maintenance and repair. However, given it is a new pipeline, we do not anticipate any immediate repair needs.

4.3.5. Gas and Oil Development

Currently, there are no other pipeline installation projects proposed in Cook Inlet that may receive an MMPA authorization for incidental take. However, Hilcorp, the parent company of Harvest, has anticipated they will be conducting seismic activity in Lower Cook Inlet in 2019 to 2020. That action would not be overlapping in time or space with the Harvest's proposed pipeline installation. At this time, NMFS has not received a MMPA application for this work; therefore, more details regarding the project (*e.g.*, airgun array size, duration, etc.) are unknown. In addition, Hilcorp would continue maintenance and repair work on existing pipelines and platforms; however, those activities are not believed to have the potential to harass marine mammals because .

4.3.6. Coastal Zone Development

Coastal zone development may result in the loss of habitat, increased vessel traffic, increased pollutants and increased noise associated with construction and noise associated with the activities of the projects after construction. In the action area, two main projects are being considered, the Chuitna Coal Mine and the Ocean Renewable Power Company (ORPC) Tidal Energy Project.

Chuitna Coal Project

PacRim Coal, LP is proposing to develop, construct and operate a coal mine and export facility 19 km (12 mi) northwest of the Village of Tyonek. Potential impacts to marine mammals in upper Cook Inlet from the Chuitna Coal Project would include the construction of the coal export facility and surface water discharge. The coal export facility that includes an overland coal conveyer and ship loading berth would extend from shore into Cook Inlet. The conveyer and ship berth would incorporate tower sites approximately 335 m (1,100 ft) apart to allow for uninhibited movement of marine life (PacRim Coal, LP, 2011). No chemical or water-based processing of the coal would take place; therefore, the expected sources of discharge from the project would include rainfall, snowmelt and groundwater (PacRim Coal,LP, 2011). Prior to discharging water into Cook Inlet, the water would be directed to sediment control structures and meet the water quality criteria described by the APDES permit (PacRim Coal, LP 2011).

ORPC Alaska Tidal Energy Projects

The ORPC is proposing two tidal energy projects in Cook Inlet. The first tidal energy project would be located on the Westside of Fire Island near Anchorage, and the second project would be located adjacent to the East Foreland in the vicinity of Nikiski on the Kenai Peninsula (ORPC, 2011). The tidal energy projects would require the installation of an array of turbine generator units and transmission cables on the seafloor to harness the tidal energy. The tidal energy will be converted to electrical energy at stations on land. These projects are still in preliminary testing and environmental monitoring phases (ORPC, 2011).

4.3.7. Marine Mammal Research

Because many important aspects of marine mammal biology remain unknown, or are incompletely studied, and because management of these species and stocks requires knowledge of their distribution, abundance, migration, population, ecology, physiology, genetics, behavior, and health, free-ranging marine mammal species are frequently targeted for scientific research and studies. Research activities normally include close approach by vessel and aircraft for line-transect surveys; behavioral observation; photo-identification and photo-video-grammetry; passive acoustic recording; attachment of scientific instruments (tagging), both by implantable and suction cup tags; biopsy sampling, including skin and blubber biopsy and swabbing; land-based surveys; live capture for health assessments, and blood and tissue sampling, pinniped tooth extraction, and related pinniped anesthesia procedures. All researchers are required to obtain a scientific research permit from NMFS Office of Protected Resources under the MMPA and/or ESA (if an ESA-listed species is involved). Currently, the permits authorizing research on beluga whales in Cook Inlet, as wells as permits authorizing research on harbor seals, harbor porpoises, Steller sea lions, and killer whales in Alaskan waters may have cumulative effects on these species and stocks but are likely not significant. NMFS anticipates that scientific research on marine mammals in Cook Inlet will continue, and possibly expand, due to the increasing need to better understand distribution and abundance relative to temporal (seasonal, diel, or tidal) and spatial (geographic or bathymetric) parameters.

4.3.8. Climate Change

The 2007 Intergovernmental Panel on Climate Change concluded that there is very strong evidence for global warming and associated weather changes and that humans have "very likely" contributed to the problem through burning fossil fuels and adding other "greenhouse gases" to the atmosphere (IPCC, 2007). This study involved numerous models to predict changes in temperature, sea level, ice pack dynamics, and other parameters under a variety of future conditions, including different scenarios for how human populations respond to the implications of the study.

Evidence of climate change in the past few decades, commonly referred to as global warming, has accumulated from a variety of geophysical, biological, oceanographic, and atmospheric sources. The scientific evidence indicates that average air, land, and sea temperatures are increasing at an accelerating rate. Although climate changes have been documented over large areas of the world, the changes are not uniform and affect different areas in different ways and intensities. Arctic regions have experienced some of the largest changes, with major implications for the marine environment as well as for coastal communities. Recent assessments of climate change, conducted by international teams of scientists (Gitay et al., 2002 for the Intergovernmental Panel on Climate Change; (IPCC) Arctic Climate Impact Assessment, 2004; IPCC, 2007), have reached several conclusions of consequence for this EA:

- Average arctic temperatures increased at almost twice the global average rate in the last 100 years.
- Satellite data since 1978 show that perennial arctic sea ice extent has shrunk by 2.7 percent per decade, with larger decreases in sea ice extent in summer of 7.4 percent per decade.
- Arctic sea ice thickness has declined by about 40 percent during the late summer and early autumn in the last three decades of the 20^{th} century.

Marine mammals are classified as sentinel species because they are good indicators of environmental change. Arctic marine mammals are ideal indicator species for climate change, due to their circumpolar distribution and close association with ice formation. NMFS recognizes that warming of the Arctic, which results in the diminishing of ice, could be a cause for concern to marine mammals. In Cook Inlet, marine mammal distribution is dependent upon ice formation and prey availability, among other factors. For example, belugas often travel just along the ice pack and feed on prey beneath it (Richardson et al., 1991). Any loss of ice could result in prey distribution changes or loss; however, beluga whales do not use ice for resting, reproduction, or rearing of young like pinnipeds.

It is not clear how governments and individuals will respond or how much of these future efforts will reduce greenhouse gas emissions. Although the intensity of climate changes will depend on how quickly and deeply humanity responds, the models predict that the climate changes observed in the past 30 years will continue at the same or increasing rates for at least 20 years. Although NMFS recognizes that climate change is a concern for the sustainability of the entire ecosystem in Cook Inlet, it is unclear at this time the full extent to which climate change will affect marine mammal species.

4.3.9. Conclusion

Based on the summation of activity in the area provided in this section, NMFS determined that the impact of issuing an IHA for one year for Harvest's proposed pipeline installation project in Cook Inlet would not be expected to result in a cumulative significant impact to the human environment when added to past, present, and future activities. The potential impacts to marine mammals, their habitats, and the human environment of issuing an IHA are expected to be minimal based on the limited and temporary noise footprint and the through the implementation of mitigation and monitoring requirements of the IHA.

Chapter 5 List of Preparers

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