Issuance of Incidental Harassment Authorizations for the Take of Marine Mammals Incidental to the Port of Alaska's Petroleum and Cement Terminal in Cook Inlet, Alaska.

LEAD AGENCY: U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

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ABSTRACT: This Environmental Assessment analyzes the environmental impacts of the National Marine Fisheries Service, Office of Protected Resources' proposal to issue an Incidental Harassment Authorization, pursuant to section 101(a)(5)(D) of the Marine Mammal Protection Act, to the Port of Alaska for the take of small numbers of marine mammals incidental to construction of the Petroleum and Cement Terminal for the Port of Alaska Modernization Program in Cook Inlet, Alaska.

DATE: March 2020

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Acronyms and Abbreviations

ADF&G	Alaska Department of Fish & Game
AWC	*Anadromous Waters Catalog*
BA	Biological Assessment
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
dB	decibels
dBA	A-weighted decibels
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	essential fish habitat
EO	Executive Order
ESA	Endangered Species Act
FR	*Federal Register*
HF	high-frequency
Hz	hertz
ICRC	Integrated Concepts & Research Corporation
IHA	Incidental Harassment Authorization
ITA	Incidental Take Authorization
JBER	Joint Base Elmendorf-Richardson
kHz	kilohertz
km^2	square kilometers
LF	low-frequency
LGL	LGL Limited
m	meters
MF	mid-frequency
µPa	MicroPascal
PSO	
MMPA	Marine Mammal Protection Act
MOA	Municipality of Anchorage
MTRP	Marine Terminal Redevelopment Project
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NES	North Extension Stabilization
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
OMB	Office of Management and Budget
OW	otariid in water

PAMP	Port of Alaska Modernization Program
PCT	Petroleum and Cement Terminal
POA	Port of Anchorage
POC	Point of Contact
POL 1	Petroleum Oil Lubricants Terminal
PSO	Protected Species Observer
PTS	permanent hearing threshold shift
PW	pinniped in water
RE	Resident Engineer
rms	root mean square
SFS	Scientific Fishery Systems, Inc.
SHPO	State Historic Preservation Officer
SPL	sound pressure level
TL	transmission loss
TPP	Test Pile Program
TSAIA	Ted Stevens Anchorage International Airport
USACE	U.S. Army Corps of Engineers
USC	U.S. Code

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1 Chapter 1 Introduction and Purpose and Need

1.1 Introduction and Background

The National Marine Fisheries Service (NMFS) received an application from the Port of Alaska (POA) requesting authorization to take[1] marine mammals incidental to the construction of a new Petroleum and Cement Terminal (PCT) in Knik Arm, Alaska. 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.). An authorization for incidental take of marine mammals shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). NMFS evalutated POA's request and made the required findings under the MMPA and determined issuing two successive Incidental Harassment Authorizations (IHAs) was appropriate. NMFS criteria for determining whether to grant or deny an applicant's request are explained later in this Chapter and detailed information is available at https://www.fisheries.noaa.gov/topic/laws-policies#marine-mammal-protection-act.

In addition, the National Environmental Policy Act (NEPA), the Council on Environmental Quality Regulations (40 Code of Federal Regulations (CFR) Parts 1500 -1508) and NOAA policy and procedures[2] require all proposals for major federal actions to be reviewed with respect to environmental consequences on the human environment. NMFS' consideration whether to issue IHAs to POA allowing take of marine mammals, consistent with provisions under the MMPA and incidental to the applicant's lawful activities, is a major federal action and NMFS determined preparing an Environmental Assessment (EA) was the appropriate level of NEPA analysis for this action.

This Chapter presents a summary of NMFS' authority to authorize incidental take of marine mammals, a summary of the POA's request, and identifies NMFS' proposed action and purpose and need. This Chapter also explains the background and environmental review process associated with the POA'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 POA'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' proposed action and alternatives.
- Chapter 5 lists document preparers and Chapter 6 lists references cited.

1.2 Marine Mammal Protection Act Overview

When the MMPA was enacted in 1972, Congress made several findings concerning the conservation of marine mammals, including, but not limited to, indicating that "certain species and population stocks of

[1] The term "take" means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." (16 U.S.C. §1362(3)(13))

[2] NOAA Administrative Order (NAO) 216-6A "*Compliance with the National Environmental Policy Act, Executive Orders 12114, Environmental Effects Abroad of Major Federal Actions; l1988 and 13690, Floodplain Management and 11990, Protection of Wetlands*" issued April 22, 2016 and the Companion Manual for NAO 216-6A "*Policy and Procedures for Implementing the National Environmental Policy Act and Related Authorities*" issued January 13,2017.

marine mammals are, or may be, in danger of extinction or depletion as a result of man's activities" (16 U.S.C. 1361(1)) [and] "such species and population stocks should not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part[…]" (16 U.S.C. 1361(2)) [and that] "marine mammals…[are] resources of great international significance…[that] should be protected and encouraged to develop to the greatest extent feasible commensurate with sound policies of resource management and that the primary objective of their management should be to maintain the health and stability of the marine ecosystem[….]" (16 U.S.C. 1361(6)). These and other findings in Section 2 of the MMPA speak to the need to maintain a broad scope in marine mammal protection that considers species- and ecosystem-level impacts.

To serve these broader goals, Section 101(a) of the MMPA prohibits the incidental taking of marine mammals. The incidental take of a marine mammal falls under three categories: mortality, serious injury, or harassment (i.e., injury and/or disruption of behavioral patterns). Harassment[3] is 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 potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns (Level B harassment). Disruption of behavioral patterns includes, but is not limited to, migration, breathing, nursing, breeding, feeding or sheltering. However, Sections 101(a)(5)(A) and (D) of the MMPA provide exceptions to the prohibition on take, which give NMFS the authority to authorize the incidental but not intentional take of small numbers of marine mammals, provided certain determinations are made and statutory and regulatory procedures are met. ITAs may be issued as either (1) regulations and associated Letter of Authorization (LOA) or (2) IHAs, when a proposed action does not have the potential for serious injury and/or mortality or where any such potential can be avoided through required mitigation measures. Regulations may be issued for a maximum period of five years and IHAs may be issued for a maximum period of one year.

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.

1.3 Summary of the Applicant's Incidental Take Authorization Request

On March 6, 2017, NMFS received a request from the POA for an IHA to take marine mammals incidental to pile driving associated with the construction of the PCT. Revised applications followed on May 22, 2017 and March 25, 2019 requesting one IHA. On June 19, 2019, the POA submitted a subsequent request for two successive IHAs, after realizing the project would take two construction seasons (April – November) to complete. A revised application followed on August 9, 2019 and was deemed adequate and complete by NMFS on August 28, 2019. The POA submitted a further revised application on October 15, 2019. On February 5, 2020, the POA presented NMFS information on modifications to select elements of the project to protect marine mammals.

The PCT Project is a new construction project intended to replace the existing Petroleum Oil Lubricants Terminal (POL 1) with a new structure. The existing POL 1 is the only bulk cement-handling facility in Alaska and is the primary terminal for receipt of refined petroleum products. A newly constructed and operational PCT will be designed to withstand a major seismic event and rapidly return to service, thereby consistently providing Anchorage and other areas of Alaska with refined fuels and bulk cement. The PCT Project will involve new construction of a loading platform, access trestle, and dolphins; and installation

[3] As defined in the MMPA for non-military readiness activities (Section 3(18)(A))

of utility (electricity, water, and communication), petroleum, and cement lines linking the terminal and shore. Ships mooring to the PCT will utilize both breasting dolphins and mooring dolphins.

Proposed activities included as part of the PCT Project with potential to affect marine mammals within the waterways adjacent to the POA include vibratory and impact pile-driving and removal operations. Take by Level B harassment of six marine mammal species and take by Level A harassment of four of those six species would be authorized in the IHAs.

1.4 Purpose and Need

1.4.1 Description of Proposed Action

NMFS proposed to issue two successive IHAs to POA pursuant to Section 101(a)(5)(D) of the MMPA and 50 CFR Part 216. The first IHA will be valid from April 1, 2020 through March 31, 2021 and the second IHA would be valid from April 1, 2021 through March 31, 2022. The IHAs, if issued, would authorize takes of small numbers of six species of marine mammals, by Level B harassment incidental to the pile driving associated with the construction of the PCT. There is potential for take by Level A harassment of four of the six marine mammal species. No serious injury or mortality is anticipated or will be authorized; therefore, an IHA is appropriate. NMFS' proposed action (i.e., issuance of the IHAs) is a direct outcome of POA requesting an authorization to take small numbers of marine mammals incidental to the PCT construction activities. Additional details about NMFS' proposed action are provided in the notice of the proposed IHAs published in the *Federal Register* on December 30, 2019 (84 FR 72154). The IHAs do not permit or authorize the POA's PCT project activities, only the take of marine mammals incidental to those activities.

1.4.2 Purpose

The purpose of NMFS' proposed action is to authorize take of marine mammals incidental to POA's proposed activity. The acoustic stimuli from pile driving has the potential to harass, as defined under the MMPA, marine mammals in and near the PCT construction area. Six species of marine mammals may taken by Level B (behavioral) harassment and four of those six species may also be taken by Level A (injury) harassment. No mortality or serious injury is anticipated or authorized in the IHAs. Therefore, the activity warrants IHAs from NMFS.

The IHAs, if issued, provide an exemption to POA from the take prohibitions contained in the MMPA. To authorize the incidental take of small numbers of marine mammals, NMFS must evaluate the best available scientific information to determine whether the take would have a negligible impact on marine mammals or stocks and whether the activity would have an unmitigable impact on the availability of affected marine mammal species for subsistence use. In addition, NMFS must prescribe in an IHA 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. If appropriate, NMFS must prescribe means of effecting the least practicable impact on the availability of the species or stocks of marine mammals for subsistence uses. NMFS also includes requirements or conditions pertaining to monitoring and reporting.

1.4.3 Need

U.S. citizens seeking to obtain authorization for the incidental take of marine mammals under NMFS' jurisdiction must submit such a request (in the form of an application). Once NMFS determines an application is adequate and complete, NMFS has a corresponding duty to determine whether and how to authorize take of marine mammals incidental to the activities described in the application. On August 28, 2019, NMFS determined POA submitted an adequate and complete application demonstrating the need and potential eligibility for IHAs under the MMPA. Thus, the purpose of NMFS' action—which is a direct outcome of POA's request for authorization to take marine mammals incidental to their proposed

PCT construction (specifically pile driving and removal)—is to evaluate the information in POA's application pursuant to the MMPA and 50 CFR 216 and issue the requested incidental take authorizations, if appropriate. The need for NMFS' action is to consider the impacts of authorizing the requested take on marine mammals and their habitat. NMFS' responsibilities under Section 101(a)(5)(D) of the MMPA and its implementing regulations establish and frame the need for NMFS' proposed action.

1.5 Environmental Review Process and Background

Under NEPA, federal agencies are required to examine the environmental impacts of their proposed actions within the United States and its territories. A NEPA analysis is a concise public document that provides an assessment of the potential effects a major federal action may have on the human environment. Major federal actions include activities that federal agencies fully or partially fund, regulate, conduct or approve. Because NMFS' issuance of two successive IHAs to the POA would allow for the taking of marine mammals, consistent with provisions under the MMPA and incidental to the applicant's lawful activities, NMFS considers this as a major federal action subject to NEPA; therefore, NMFS analyzes the environmental effects associated with authorizing incidental takes of marine mammals and prepares the appropriate NEPA documentation. In addition, 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 and Atmospheric and Administration (NOAA), (e.g., the Office of National Marine Sanctuaries) and with other regulatory agencies (e.g., 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 ITAs, NMFS relies substantially on the public process required by the MMPA for proposed ITAs to develop and evaluate relevant environmental information and provide a meaningful opportunity for public participation when NMFS prepares NEPA documents. NMFS considers public comments received in response to the publication of proposed IHAs during the NEPA review process.

1.5.1 Scoping and Public Involvement

The NEPA process enables NMFS to make decisions based on an understanding of the environmental consequences of a proposed action and take actions to protect, restore, and enhance the environment. 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 published the notice of proposed IHAs in the *Federal Register* for review and comment on December 30, 2019 (84 FR 72154). There, NMFS alerted the public it intended to use the MMPA public review process to solicit relevant environmental information and provided the public an opportunity to submit comments. NMFS alerted the public that a draft EA was available on the internet within the notice of proposed IHAs.

The *Federal Register* notice of proposed IHAs included a detailed description of the proposed action, the potential effects of the project on marine mammals, their habitat and subsistence uses, proposed mitigation and monitoring measures to avoid and minimize potential adverse impacts to marine mammals and their habitat, proposed reporting measures, and NMFS preliminary findings. The *Federal Register* notice of the proposed IHAs, the draft EA and the corresponding public comment period were instrumental in providing the public with information on relevant environmental issues and offering the public a meaningful opportunity to provide comments for our consideration in both the MMPA and NEPA processes.

During the 30-day public comment period for the proposed IHAs to POA, NMFS received a comment letter from the Marine Mammal Commission (Commission) and the Center for Biological Diversity (CBD). Specific to the proposed IHAs, the Commission questioned NMFS' method of calculating ensonifed areas to Level B harassment isopleths, take calculations, and negligible impact and small numbers determinations. They suggested we make the required findings considering the two IHAs cumulatively. The Commission and CBD expressed concerns about the overall status of CIBWs and suggested that NMFS refrain from issuing incidental take regulations until NMFS can say with certainty that issuance of these takes would not exacerbate the decline of the population and set limits on the total amount of CIBW taking authorized for all activities in Cook Inlet. CBD asserted we have not met our statutory responsibilities under the MMPA, including requiring means of the least practicable adverse impact on marine mammals, argued that an Environmental Impact Statement (EIS) is required for the proposed IHAs, and expressed concerns about the cumulative impact analysis in the draft Environmental Assessment (EA) that was made available for comment currently with the notice of proposed IHAs. Comments received in response to the publication of the proposed IHAs were considered and used to inform the analysis in this Final EA. A more detailed summary of the comments, and NMFS' responses to those comments, is included in the *Federal Register* notice for the issued IHAs.

1.5.2 Compliance with 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 IHAs to POA.

1.5.2.1 The Endangered Species Act

The Endangered Species Act (ESA) established protection over and conservation of threatened and endangered (T&E) species 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.

Marine mammals under NMFS' jurisdiction listed as threatened or endangered under the ESA with confirmed or possible occurrence in the proposed project area (i.e., upper Cook Inlet): the Cook Inlet Distinct Population Segment (DPS) of beluga whales; the western DPS of Steller sea lion; and the Mexico DPS and Western North Pacific DPS of the humpback whale (we note under the MMPA, humpback whales are classified as one stock: Western North Pacific). Although critical habitat for the Cook Inlet

beluga whale (CIBW) exists within Cook Inlet, the PCT would fall within the Beluga Critical Habitat Exclusion Area. NMFS issuance of an IHA is a federal action subject to the requirements of Section 7 of the ESA. As a result, we are required to consult and ensure the issuance of the IHAs to POA 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. On November 18, 2019, NMFS Office of Protected Resources (OPR) requested a Section 7 consultation with the Alaska Regional Office (AKRO) on the proposed issuance of two successive IHAs to POA.

The formal consultation concluded and a final Biological Opinion (BiOp) was issued on March 23, 2020. The BiOp found that NMFS' proposed action is not likely to jeopardize the continued existence or recovery of CIBWs, the Mexico distinct population segment (DPS) and western North Pacific DPS of humpback whales, and the western DPS of Steller sea lions. This determination was made based on review of the status of the ESA-listed species, the environmental baseline within the action area, and the effects of the proposed action as well as effects of interrelated and interdependent actions and cumulative effects. Furthermore, NMFS AKR, PRD found that the proposed action is not likely to destroy or adversely modify designated critical habitat for CIBWs or the western DPS of Steller sea lion. There is no critical habitat designated for humpback whales in the action area.

1.5.2.2 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) was enacted to address impacts to fisheries on the U.S. continental shelf. It established U.S. fishery management over fishes within the fishery conservation zone from the seaward boundary of the coastal states out to 200 nautical miles (i.e., boundary of the U.S. Exclusive Economic Zone). MSFCMA also established regulations for foreign fishing within the fishery conservation zone and issued national standards for fishery conservation and management to be applied by regional fishery management councils. Each council is responsible for developing Fishery Management Plans (FMPs) for domestic fisheries within its geographic jurisdiction. In 1996, Congress enacted amendments to the MSFCMA known as the Sustainable Fisheries Act (P.L. 104-297) to address substantially reduced fish stocks resulting from direct and indirect habitat loss. Under 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. EFH is defined as the waters and substrate necessary to fishes or invertebrates for spawning, breeding, feeding and growth to maturity. Areas designated as EFH contain habitat essential to the long-term survival and health of U.S. fisheries. This typically includes aquatic areas and their associated physical, chemical, and biological properties used by fish, and may include areas historically used by fish. Substrate types include sediment, hard bottom, structures underlying the waters, and associated biological communities. If an action is likely to adversely affect EFH, the Federal agency must consult with NMFS to identify conservation measures to minimize or avoid adverse impacts. If NMFS identifies conservation measures, the action agency must determine whether it will implement them and provide a formal response if it fails to do so.

The North Pacific Fishery Management Council (NPFMC) has identified estuarine and marine waters in the vicinity of the POA as EFH for chinook (Oncorhynchus tshawytscha), chum (O. keta), coho (O. kisutch), sockeye (O. nerka), and pink salmon (O. gorbuscha; NPFMC 2012). Marine EFH for salmon in Alaska includes all estuarine and marine areas utilized by Pacific salmon of Alaska origin, extending from the influence of tidewater and tidally submerged habitats to the limits of the U.S. Exclusive Economic Zone (NPFMC 2016).

Eulachon (Thaleichthys pacificus), longfin smelt (Spirinchus thaleichthys), and low numbers of Pacific cod (Gadus macrocephalus), walleye pollock (Theragra chalcogramma), Pacific herring (Clupea pallasii),

and Pacific staghorn sculpin (Leptocottus armatusspecies) have also been captured in upper Cook Inlet (NOAA 2016; Houghton et al. 2005). While these species are managed under the fishery management plan for groundfish in the Gulf of Alaska, waters in the vicinity of the POA are not identified as EFH for these species (NPFMC 2016; Eagleton 2016). In addition, streams, lakes, ponds, wetlands, and other water bodies that support Pacific salmon, as identified by the Alaska Department of Fish and Game Anadromous Waters Catalog (AWC), are considered freshwater EFH for Pacific salmon.

Under 2017 Office of Habitat Conservation guidance on EFH and Incidental Take Authorizations, we have determined that the issuance of the IHAs will not result in adverse impacts to EFH, and further, that it will not require separate consultation per Section 305(B)(2) of the MSFCMA as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267).

1.6 Document Scope

This EA was prepared in accordance with NEPA (42 USC 4321, et seq.), 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 pile driving and removal activities proposed by the POA. However, the scope of this analysis is limited to the decision for which we are responsible (*i.e.*, whether to issue the IHAs). This EA is intended to provide focused information on the primary issues and impacts of environmental concern, which is our issuance of the IHAs authorizing the take of marine mammals incidental to POA's pile driving and removal 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

Biological	Physical	Socioeconomic/Cultural
	National Wildlife Refuges	Public Health and Safety
	Park Land	
	Water Quality	
	Wetlands	
	Wild and Scenic Rivers	

2 Chapter 2 Alternatives

As described in Chapter 1, the National Marine Fisheries Service (NMFS) Proposed Action is to issue two Incidental Harassment Authorizations (IHAs) to the Port of Alaska (POA) to authorize the take of small numbers of marine mammals incidental to the POA proposal to construct a new PCT in Knik Arm, Alaska. NMFS' Proposed Action is triggered by POA's request for the IHAs per the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 *et seq.*). In accordance with NEPA and the Council on Environmental Quality (CEQ) Regulations, NMFS is required to consider a reasonable range of alternatives to a Proposed Action, as well as a 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 the 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 of Section 101(a)(5)(D) of the MMPA. Therefore, NMFS applied the screening criteria and considerations outlined in 2.1 below to the alternatives to identify which alternatives to carry forward for analysis. Accordingly, an alternative must meet these criteria to be considered "reasonable."

2.1 Criteria and Considerations for Selecting Alternatives

Per 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 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"). NMFS does not have a regulatory definition for "least practicable adverse impact." NMFS must also find the authorized taking does not have an unmitgable adverse impact on the availability of marine mammal species or stocks for taking for subsistence uses (which is relevant here).

NMFS does not have a regulatory definition for "least practicable adverse impact." NMFS's implementing regulations require applicants 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 not carry out the project (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.

2.2 Description of the Applicant's Specified Activities

The purpose for the PCT project is for POA to replace the existing POL 1, the only bulk cement-handling facility in Alaska and the primary terminal for receipt of refined petroleum products. POL 1, built in 1965, is more than 50 years old and consists of 160 wharf pilings that are uncoated, hollow-steel pile. The need for the PCT is based on the heavily deteriorated physical condition of POL 1. It suffers from severe corrosion of its foundation pilings to levels of marginal safety, as evidenced by currently imposed load restrictions. A 2014 pile condition assessment found severe corrosion throughout the facility, with pile wall losses exceeding 67 percent of their original thickness. It also sustained structural damage from a magnitude 7.1 earthquake that struck the area on November 30, 2018. Recent inspections in 2019 have led engineers to confirm the stress imposed on the already-weakened structure by the November 30th quake caused some piling failure and predisposes the docks to additional failure during future earthquakes. POL 1 is functionally obsolete, has exceeded its useful life, and is unlikely to survive another such earthquake.

The Port of Alaska is an intermodal transport hub that efficiently links marine, road, rail, pipeline, and air cargo systems to connect communities, military bases, and other destinations across the state. It serves deep-draft vessels that operate year-round to transport cargo faster, cheaper, and more reliably than any other means. It is Alaska's only National Strategic Seaport, one of 23 nationwide. It is a critical piece of national defense infrastructure.

The Port is the primary entry point for fuel and cement in Alaska. The transportation and construction sectors of the Alaska economy rely upon the fuel and cement that comes through the Port to maintain their ongoing business operations. Joint Base Elmendorf-Richardson (JBER) relies on the jet fuel that is delivered across the dock to support all their U.S. Air Force flight activities. Bulk fuel and cement are

transported from the Port by rail and road to facilities in both urban and rural towns across Southcentral and Interior Alaska. Fuel and cement are also trans-loaded onto barges for shipment to the rural towns and villages in Southeast, Southwest, and Northern Alaska.

The Port is also the only facility in the state that can transfer cement from bulk carriers in un-sacked powder form. Approximately 87 percent of the cement used for construction in the state comes into the Port annually, with POL 1 being the only facility capable of supporting this operation. In 2018, 105,000 tons of Portland cement powder was transferred from vessels across POL1 to Alaska Basic Industries Port storage facilities. Post-disaster reconstruction for Alaskans will be highly dependent on capability to receive bulk shipments of cement. A new PCT will provide the necessary capability because it will be built to high standards for seismic resilience.

POL 1 is a key infrastructure asset that supports essential elements of Alaska's fuel supply. In 2018, 11.1 million barrels of petroleum products were unloaded from vessels through these bulk cargo terminals. Approximately forty-nine percent of the fuel for air carriers operating at Ted Stevens Anchorage International Airport (TSAIA) is brought into the state through the Port. Aviation fuels are stored at the Port and transported to TSAIA in fuel trucks (Aviation Gasoline or Avgas) and by a small-diameter pipeline (Jet Fuel). This fuel is critical to TSAIA's operations, which in turn is critical to Alaska and beyond. TSAIA's passenger traffic has hovered around the 5 million mark for the last 10 years. TSAIA is North America's second-busiest airport as ranked by landed cargo tonnage. One in 10 Anchorage jobs depends on TSAIA. Any significant disruption of fuel supplies would harm TSAIA cargo-handling operations, the local economy, and national and international commerce. Likewise, the Fairbanks International Airport depends on fuel delivered across the docks of the Port of Alaska.
If POL 1 fails before a replacement is available, the transportation challenges of moving these products become almost insurmountable, because there are no other facilities in Southcentral Alaska with similar facilities or capacity.

The PCT Project is located at the POA (Figure 1) and includes three major components: (1) a loading platform in Phase 1, (2) an access trestle (bridge-like structure allowing access to the loading platform) in Phase 1, and (3) breasting and mooring dolphins in Phase 2. Figure 2 provides the footprint of the PCT. A temporary work trestle and temporary templates are required for constructing the permanent access trestle in Phase 1, and temporary templates are required for constructing the dolphins in Phase 2. During both Phase 1 and Phase 2, temporary mooring dolphins will be required to accommodate construction barges and to moor construction vessels. Piles will be installed primarily with an impact hammer; however, some vibratory pile driving is also required. A bubble curtain will be deployed to reduce in-water sound levels during PCT construction for impact and vibratory hammer pile installation of 144-, 48-, 36-, and 24-inch plumb (vertical) piles and vibratory hammer removal of 36- and 24-inch plumb piles . A bubble curtain will not be deployed during installation and removal of 24-inch battered (installed at an angle, not vertical) piles for the temporary construction work trestle and temporary dolphins due to the difficult geometric application.

All Phase 1 work will occur under the first IHA, while Phase 2 work will occur under the second IHA. Pile sizes and quantities for permanent and temporary components for each phase are shown in Table 2.

Figure 1. Port of Alaska, Anchorage, Alaska

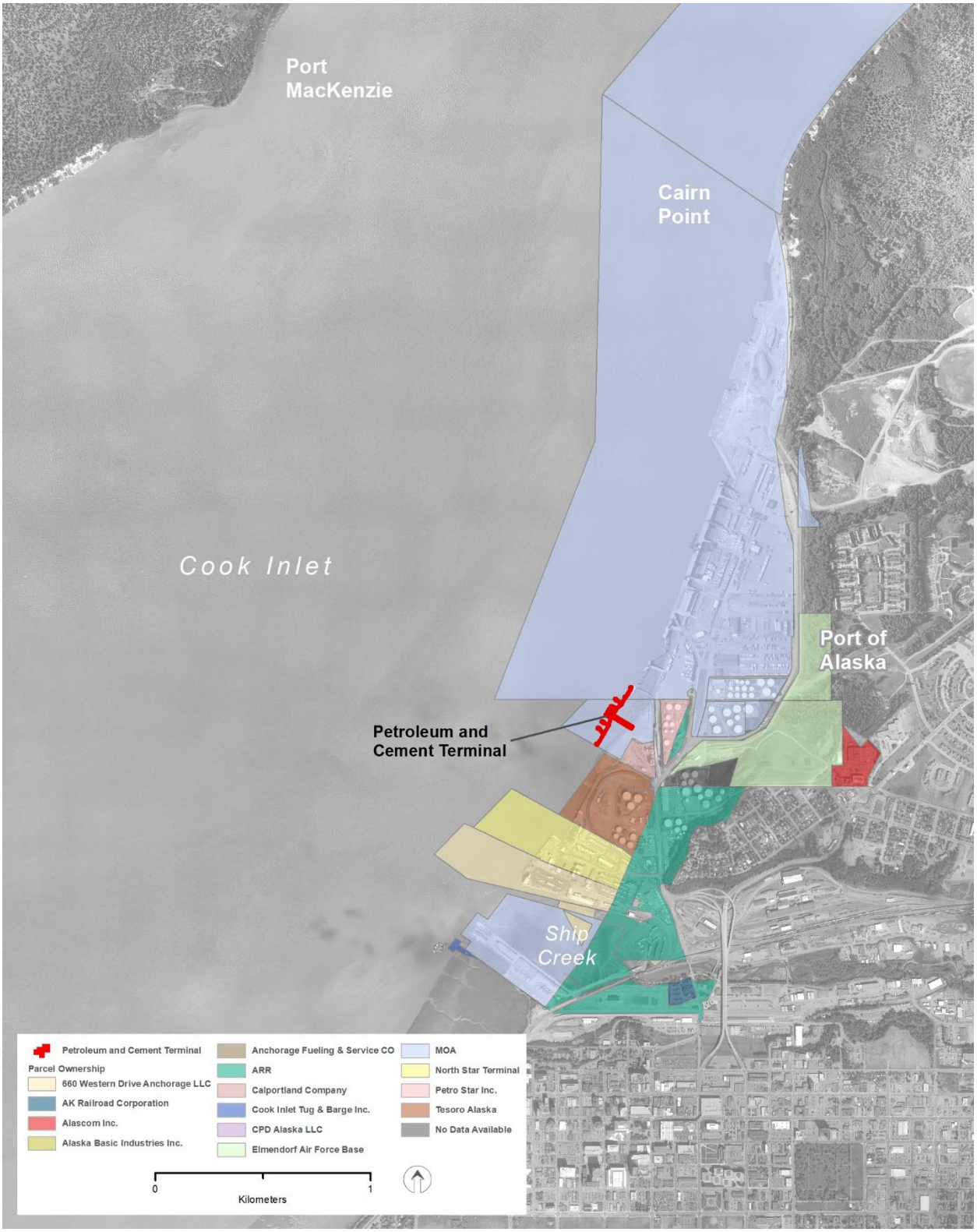


Figure 2. Project Footprint and Pile Locations of the Proposed PCT.

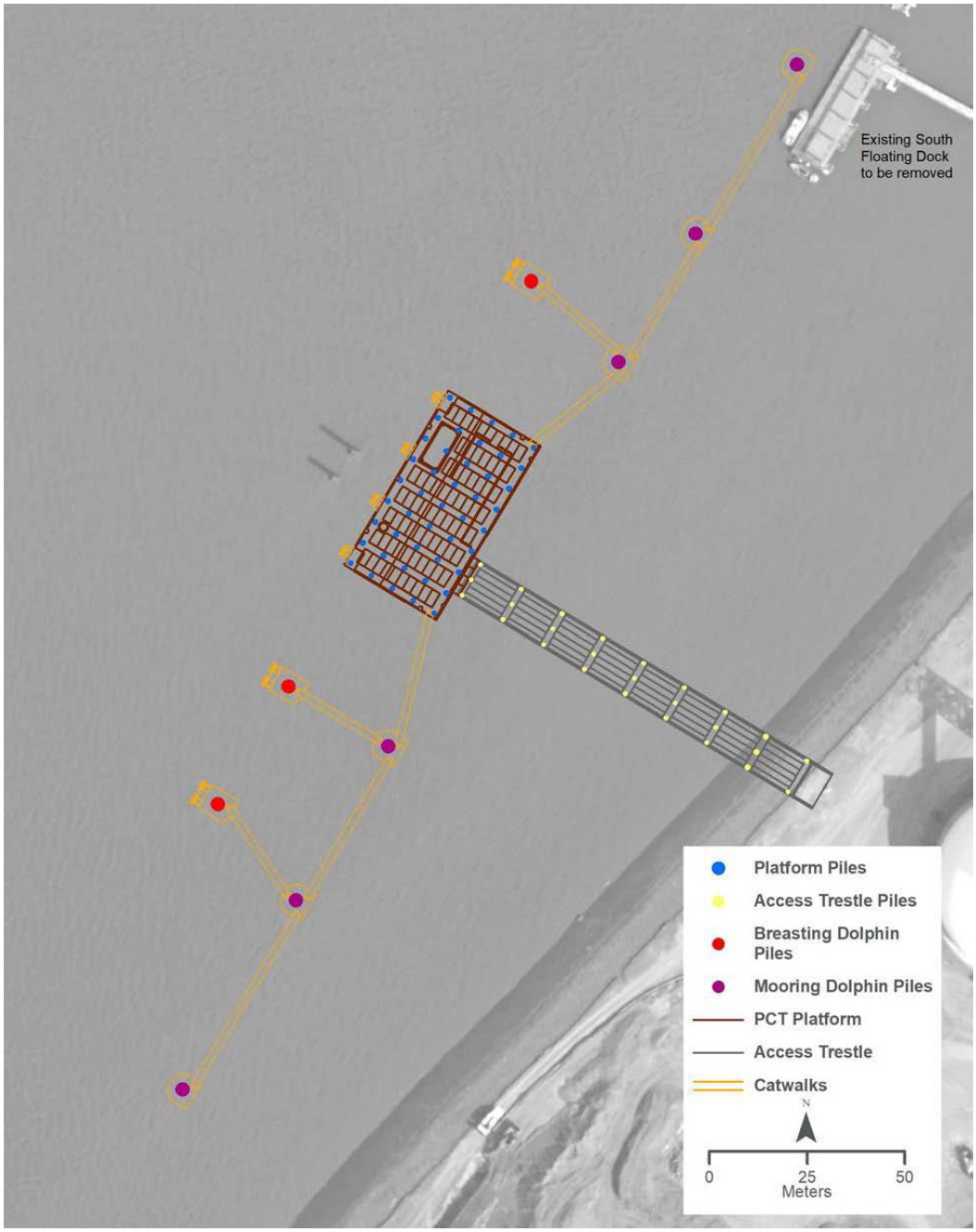


Table 2. Summary of PCT Project Components and Activities

Type of Activity	Location	Phase	Size and Type	Total Amount or Number
Permanent Components				
Permanent pile installation (loading platform)	In water	1	48-inch steel pipe (plumb)	45 piles
Permanent pile installation (access trestle)	In water	1	48-inch steel pipe (plumb)	26 piles
Permanent pile installation (breasting and mooring dolphins)	In water	2	144-inch steel pipe (plumb)	9 piles
Installation of concrete decking on loading platform and main trestle	Above water	1	Pre-cast panels	About 120 panels
Catwalks	Above water	2	Prefabricated steel or aluminum trusses with open steel grating	9 units, totaling 990 feet
Construction Support and Temporary Components				
Vessel support	In water	1 & 2	Barges and tugs	16 flat deck barges, 2 derrick barges, and 3-4 tugs
Temporary pile installation (construction work trestle)	In-water	1	24-inch steel pipe (plumb)	26 piles
		1	24-inch steel pipe (battered)	10 piles
Temporary pile installation (dolphin templates)	In-water	2	36-inch steel pipe (plumb)	72 piles
Temporary pile installation (construction work trestle)	In-water	1	36-inch steel pipe (plumb)	26 piles
Temporary pile installation (access trestle templates)	In-water	1	24-inch steel pipe (plumb)	36 piles
Temporary mooring anchor systems	In-water	1 & 2	20,000 pound Danforth anchors	2 mooring systems
Temporary derrick barge	In-water	1 & 2	36-inch steel pipe (plumb)	4 piles

Table 2. Summary of PCT Project Components and Activities

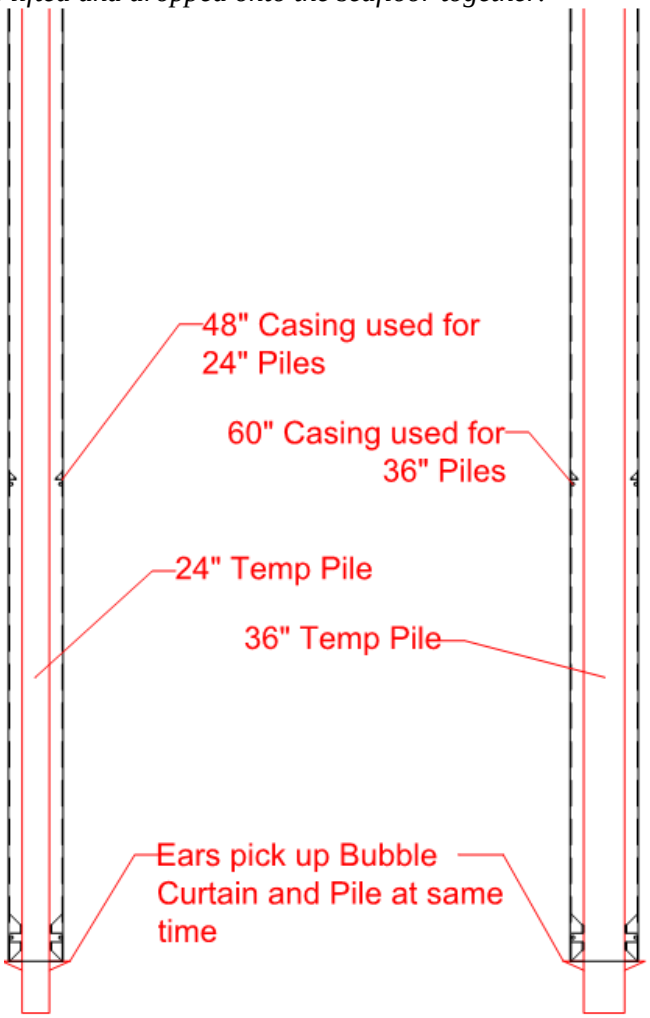
Type of Activity	Location	Phase	Size and Type	Total Amount or Number
Temporary dolphins for mooring construction vessels	In-water	1 & 2	24-inch steel pipe (plumb) 24-inch steel pipe (battered)	3 dolphins, each with 1 plumb and 2 battered piles (9 piles total)
Installation of Utility, Petroleum, and Cement Lines				
Installation on access trestle and loading platform	Above water, on-dock	1	Pipelines, various sizes and types	300–600 linear feet each

2.2.1 Phase 1 Loading Platform and Access Trestle

Phase 1 will take place during 2020 and will include construction of the loading platform and access trestle. Construction will be accomplished from two concurrent headings or directions; one marine-side derrick barge with a crane/hammer will be used to construct the loading platform, and a land-side crawler crane/hammer will be used to construct the temporary and permanent access trestle from the shoreline out. The crawler crane will initially advance the temporary work trestle out from the shoreline with a top-down or leap-frog type construction method, and then the crawler crane will work off of the temporary work trestle to construct the permanent trestle all the way out to the loading platform.

For the access trestle, the permanent access trestle construction requires construction of a parallel temporary trestle, installed adjacent to the permanent trestle, from which to advance the temporary piles used for templates and installation of the permanent access trestle piles. While the permanent trestle requires 48-inch piles, the temporary trestle will be constructed using 24- and 36-inch piles. Initial construction of the temporary work trestle will be advanced first; then, as the work trestle advances water-ward and room is made available to accommodate construction equipment, work will commence on construction of the permanent access trestle coincidentally as the temporary work trestle is advanced water-ward toward the loading platform. During Phase 1, all piles (temporary and permanent) will be installed and removed (temporary piles only) using a confined bubble curtain such that the bubble curtain is surrounded by a solid, steel casing pile (e.g., Figure 3).

Figure 3. Example Diagram of temporary pile and confinement system, demonstrating concentric arrangement that can be lifted and dropped onto the seafloor together.



2.2.2 Phase 2: Mooring and Breasting Dolphins

Phase 2 will occur in 2021 and will include construction of the mooring and breasting dolphins. Construction will be accomplished from one marine-based derrick barge with a crane/hammer work station. Similar to Phase 1, the contractor will initially install four temporary mooring piles to stabilize the derrick barge during the construction season. Also, three temporary mooring dolphins will be constructed in the vicinity of the PCT to serve as mooring for construction vessels and barges containing construction materials, and will be removed at the end of the construction season. The derrick barge will host the crane and hammer used to install the mooring and breasting dolphins. Temporary template piles will then be installed to anchor the template that will guide the installation of the permanent dolphin piles at each of the dolphin locations. Template piles will be installed approximately 115 feet into the substrate. Temporary template piles will be driven in a grid formation surrounding the location of each dolphin pile, with a steel framework bolted to the temporary piles to guide dolphin pile installation. The framework includes adjustable components and hydraulic guides that can be adjusted to maintain correct positioning of the dolphins once they are in place. All template piles will be aligned plumb (vertically) and installed and removed using a vibratory hammer due to accuracy requirements for setting the template. All plumb

piles will employ a bubble curtain during all pile-driving activity. Use of an open versus confined system will be determined for 24-in and 36-in piles upon results of using the confined system during Phase 1 to verify effectiveness both logistically and for minimizing noise propagation into the aquatic environment. However, the 144-in piles will be installed with an open bubble curtain system as there are no casing piles large enough to encapsulate the 144-in piles.

Ships mooring to the PCT will utilize both breasting dolphins and mooring dolphins. To meet required structural demands, monopile dolphins are planned for both the breasting and mooring dolphins. Breasting dolphins are designed to assist in the berthing of vessels by absorbing some of the lateral load during vessel impact. Breasting dolphins also protect the loading platform from impacts by vessels. Mooring dolphins, as their name implies, are used for mooring only and provide a place for a vessel to be secured by lines (ropes). Use of mooring dolphins helps control transverse and longitudinal movements of berthed vessels.

2.3 Alternative 1- 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 issuing the requested IHAs 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 IHAs to POA in which case NMFS assumes POA would not proceed with their proposed PCT construction as described in the application as harassment of marine mammals is likely (unless modifications to the project were taken that would negate the need for the IHAs). Although the No Action Alternative would not meet the purpose and need to allow incidental takes of small numbers 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.

2.4 Alternative 2- Issuance of Requested IHAs (Preferred Alternative)

Under this alternative, NMFS would issue the requested IHAs to POA allowing the take, by Level B harassment of six species of marine mammals and Level A harassment of four of those six species, incidental to pile driving associated with the construction of the PCT (see 2.2 above), subject to the mitigation measures, monitoring and reporting requirements set forth in the IHAs, if issued. This alternative also includes mandatory requirements for POA to achieve the MMPA standard of effecting the least practicable impact on each species or stock of marine mammal and their habitat, paying particular attention to rookeries, mating grounds, and other areas of similar significance and not having an unmitigable adverse impact on the availability of marine mammals for subsistence use.

2.4.1 Required Mitigation

In accordance with the MMPA, NMFS must prescribe, in the IHAs, the means of effecting the least practicable adverse impact on the species or stocks of marine mammals and their habitat. To do so, NMFS considers an applicant's proposed mitigation measures and assesses how such measures could benefit the affected species or stocks and their habitat. Our evaluation of potential measures includes consideration of the following factors in relation to one another: (1) the manner in which and the degree to which we expect the successful implementation of the measure to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation.

Though any 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:

- Avoidance or minimization of marine mammal injury, serious injury, or death whenever possible;
- Reduction in the number of marine mammals taken (total number or number at a biologically important time or location);
- Reduction in the number of times the activity takes individual marine mammals (total number or number at a biologically important time or location);
- Reduction in the intensity of the anticipated takes (either total number or number at a biologically important time or location);
- Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base, activities that block or limit passage to or from biologically important areas, permanent destruction of habitat, or temporary destruction/disturbance of habitat during a biologically important time; and
- For monitoring related directly to mitigation, an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Mitigating adverse effects to marine mammal 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 recruitment 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.

In their application, the POA proposed a limited amount of mitigation, including a single shutdown zone of 100 m that would apply to all marine mammals. Through the MMPA IHA process, NMFS determined the measures proposed by POA did not constitute effecting the least practicable adverse impact and were not sufficient. Therefore, in consultation with the POA, we have modified the POA's proposed 100 m shutdown zone for CIBWs and added several other measures. To reduce the potential for disturbance from acoustic stimuli associated with impact and vibratory pile installation and removal activities, NMFS evaluated and requiring several mitigation measures in the IHAs. These measures summarized below are explained in the Section 4 of the IHAs.

(1) **Notification of Commencement of PCT Construction Activities, Beluga Whale Sightings**: The POA will formally notify the NMFS Alaska Region office and the Office of Protected Resources at the beginning of each construction phase (Phase 1 and Phase 2) prior to the commencement of pile installation and removal.

(2) **Pile Installation and Removal**: The POA is committed to installing 48- and 144-inch piles using impact hammer pile installation methods to the extent feasible due to the smaller harassment zones. The temporary 24- and 36-inch piles will be installed and removed using vibratory and impact hammer methods. Impact hammer installation methods result in smaller Level B harassment zones than vibratory hammer installation methods for similar pile sizes and types. This, in turn, reduces the overall area of elevated underwater noise exceeding harassment thresholds, and therefore reduces acoustic impacts on marine mammals. If impact hammer installation methods for 48- and 144-inch piles encounter

obstructions (estimated at 10 percent of these piles), it is anticipated that a vibratory hammer may be required for pile extraction or adjustment.

(3) **Pre-activity Monitoring and Soft Starts**: PSOs will begin observing for marine mammals within the Level A and Level B harassment zones for 30 minutes before "soft start" or in-water pile installation or removal begins.

- A ''soft start'' technique will be used at the beginning of impact pile installation each day to allow any marine mammal in the immediate area to leave before pile driving reaches full energy. Soft starts will not be used for vibratory pile installation and removal. When the impact hammer is used, operators will provide an initial set of three strikes from the impact hammer at reduced energy, followed by a 30-second waiting period, then two subsequent three-strike sets.
- If a marine mammal for which take is not authorized is sighted within the Level A or Level B harassment zone, a "soft start" will not commence until the PSO has determined, through sighting or by waiting 30 minutes without resighting, that the animal(s) has moved outside of the Level A and Level B harassment zones.
- If a marine mammal for which only Level B take is authorized is sighted within the Level A harassment zone, the soft start will be delayed until the animal(s) leaves the Level A harassment zone. Activity will begin only after the PSO has determined, through sighting, that the animal(s) has moved outside the Level A harassment zone.
- If a marine mammal for which Level B take is authorized (other than a CIBW) is sighted within the Level B harassment zone after the 30-minute monitoring period but prior to soft start, the Contractor will either (1) begin soft start with documentation of take or (2) delay the soft start to avoid take of marine mammals.
- If a marine mammal for which Level A take is authorized is sighted within the Level A harassment zone, a soft start will not commence until the PSO has determined, through sighting or by waiting 30 minutes without resighting, that the animal(s) has moved outside of the Level A harassment zone.
- If the Level A and Level B zones have been monitored continuously during impact installation of the day's first pile, and the PSOs have confirmed that no marine mammals are observed within the Level A and Level B zones, impact installation of the successive pile will begin without a soft start.

(4) **CIBW Delay and Shutdown Zone**: POA would delay pile driving if a beluga whale is observed within or entering Knik Arm prior to pile driving. If pile driving has commenced, POA would continue driving the pile but must shut down if a beluga whale is likely to enter the Level B harassment zone (i.e., all take of beluga whales is to be avoided; however, the take authorized is for those circumstances where there is not enough time or there are safety issues with shutting down pile driving).

(5) **Shutdown Procedures**: If pile driving is occurring and a non-beluga whale marine mammal is traveling along a trajectory that could take it into the Level B harassment zone, the lead PSO will notify the Contractor Point of Contact (POC), who will decide to either (1) immediately shut down all in-water pile installation or removal before the marine mammal enters the Level B harassment zone, thereby avoiding a take, or (2) document the marine mammal as a take upon its entry into the Level B harassment zone. For safety or operational reasons, the immediate shutdown of in-water pile installation or removal may not be possible. The PSOs will document the reason behind each shutdown or non-shutdown decision. If the Contractor POC decides to continue pile installation or removal while a

marine mammal is within the Level B harassment zone, that pile segment will be completed without cessation, unless the animal approaches and is likely to enter the Level A harassment zone. At that point, the Contractor POC will immediately shut down all in-water pile installation and removal before the marine mammal enters the Level A harassment zone, thereby avoiding a Level A take. For all marine mammal species for which take is not authorized, pile installation or removal will be shut down to avoid take.

(6) **Shutdown for Weather:** Pile installation and removal will take place only when the Level Level B harassment zones can be adequately monitored. The only exception is during vibratory driving of the 144-in pile in Phase 2 (due to large 9 km harassment zone).

(7) **Other In-Water Activities:** To avoid the potential for collision with a marine mammal during in-water work involving use of vessels (e.g., barges, tugboats, work boats, and skiffs), if a marine mammal approaches within 50 meters, vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions.

(8) **Take Management:** If CIBW take levels approach 80 percent of the authorized take levels during construction, the POA will re-engage with NMFS to determine an appropriate strategy for managing take over the remaining construction period. Construction means and methods will likely be adjusted as the project moves into the construction phase, and construction events may require some modifications to the parameters identified in the IHA application; however, all monitoring and take accumulations will be monitored within the tolerances of the overall take Authorization, and the applicant (Port of Alaska) will consult with NMFS for any significant deviations from the construction means and methods identified in the IHA Application. The assumed use of a vibratory hammer on 10 percent of 48- and 144-inch permanent piles due to encountering obstructions or experiencing difficulty with plumbing a particular pile is only an estimate; additional vibratory hammer applications may be required for additional piles, but will be managed within the tolerances of the overall take authorization.

(9) **Bubble Curtain:** During Phase 1, the POA will utilized a confined bubble curtain during all pile driving and removal. The pile driven will be surrounded with both the bubble curtain and an outer hollow pile casing (the casing makes the curtain “confined”). The system will be operated such that it adhere to NMFS-UFWS performance standards. During Phase 2, the POA may operate a confined or unconfined bubble curtain on all but the six battered (i.e., angled) piles (the geometric configuration precludes using a bubble curtain on battered piles). An unconfined bubble curtain will be used during installation of 144-in piles as no outer casing pile is available on market to encompass such a large pile.

2.4.2 Required Monitoring and Reporting

In order to issue an IHA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

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

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density).
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas).
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors.
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks.
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat).
- Mitigation and monitoring effectiveness.

The IHAs contain monitoring and reporting requirements to meet the aforementioned goals. These include:

Marine Mammal Monitoring: Marine mammal monitoring will be conducted at all times when in-water pile installation or removal is taking place. Monitoring will be conducted by qualified PSOs from four monitoring stations ranging from the northern portion of the POA to Point Woronzof. All PSOs must be approved by NMFS prior to commencement of pile driving. General monitoring plan criteria are discussed in Section 13 of the IHA Application and additional information is found in the marine mammal monitoring and mitigation plan in Appendix A of the IHA Application and the notice of proposed IHAs (84 FR 72154).

Hydroacoustic Monitoring: In coordination with NMFS, a project-specific hydroacoustic monitoring study plan has been developed and will be implemented as part of PCT project construction. The goal of hydroacoustic monitoring will be primarily to confirm the effectiveness of the bubble curtain system for future PAMP construction projects and incidental take Authorization requests. Hydroacoustic data collection and analysis methods for the PCT Project will follow NMFS' guidance on hydroacoustic monitoring, including use of equipment, such as moorings, recording systems, hydrophones, and other hardware and software. General hydroacoustic monitoring plan criteria are discussed in Section 13 of the IHA Application and the POA's Hydroacoustic Monitoring Plan.

The POA is required to submit weekly, monthly and final marine mammal monitoring reports to NMFS under both IHAs. Interim hydroacoustic monitoring reports are also due to NMFS in a timely manner after completion of the acoustic monitoring. Any adjustments to harassment zones must be approved by NMFS and will be based on these data.

2.5 Alternatives Considered but Eliminated from Further Consideration

In coordination with POA, NMFS considered whether other alternatives could meet the purpose and need while supporting POA's proposal to construct a new PCT. As a result, NMFS considered a third alternative to issue the IHAs with an additional mitigation measure. The additional mitigation under this third alternative would involve including a restriction on all pile driving during August and September when CIBWs are in highest abundance in Knik Arm. However, POA indicated implementing this additional mitigation measure was not practicable in terms of time (e.g., completing the project before ice cover prevented work) and cost. In addition, the mitigation and monitoring measures identified under Alternative 2, that will be required in the IHAs, if issued, meet the issuance criteria of effecting the least practical adverse impact on marine mammals (as required by the MMPA and its implementing

regulations) as well as adequately meeting the purpose and need. Therefore, this third alternative was not carried forward for detailed analysis in this EA.

3 Chapter 3 Affected Environment

NMFS considered all relevant environmental, cultural, historical, social, and economic resources based on the geographic location associated with NMFS's proposed action, alternatives, and POA's request for the successive Incidental Harassment Authorizations (IHAs). 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 were not carried forward for further consideration or evaluation in this EA (See Table 1 in Chapter 1, Section 1.5.). Chapter 4 provides an analysis and description of environmental impacts associated with the affected environment.

3.1 Physical Environment

Cook Inlet is a large tidal estuary that exchanges waters at its mouth with the Gulf of Alaska. The inlet is roughly 20,000 square kilometers (km^2; 7,700 square miles [mi^2]) in area, with approximately 1,350 linear kilometers (840 miles) of coastline (Rugh et al. 2000) and an average depth of approximately 100 meters (330 feet). Cook Inlet is generally divided into upper and lower regions by the East and West Forelands. Northern Cook Inlet bifurcates into Knik Arm to the north and Turnagain Arm to the east. The POA is located in the southeastern shoreline of Knik Arm.

The POA's boundaries currently occupy an area of approximately 129 acres. Other commercial and industrial activities related to secure maritime operations are located near the POA on Alaska Railroad Corporation (ARRC) property immediately south of the POA, on approximately 111 acres.

3.1.1 Ambient Sound/Acoustical Environment

In Knik Arm, marine mammals are exposed to natural and anthropogenic sounds. Though much of upper Cook Inlet is a poor acoustic environment, characterized by shallow depth, sand/mud bottoms, and high background noise from currents and glacial silt (Blackwell and Greene 2002), vessel use and in-water construction have affected baseline acoustic conditions for marine mammals.

Ambient noise is background noise from many sources in multiple locations (Richardson et al. 1995a). The lower range of broadband (10 to 10,000 Hertz [Hz]) background sound levels obtained during underwater measurements at Port MacKenzie, located across Knik Arm from the POA, ranged from 115 to 133 decibels (dB) referenced to 1 microPascal (dB re 1 µPa; Blackwell 2005). All underwater sound levels in this Draft EA are referenced to 1 µPa. Background sound levels measured during the 2007 test pile study for the POA's Marine Terminal Redevelopment Project (MTRP) site ranged from 105 to 135 dB (URS 2007). The ambient background sound pressure levels (SPLs) obtained in that study were highly variable, with most SPL recordings exceeding 120 dB. Background sound levels measured in 2008 at the MTRP site ranged from 120 to 150 dB (SFS 2009). These measurements included industrial sounds from maritime operations, but ongoing USACE maintenance dredging and pile driving from construction were not underway at the time of the study.

The most recent measurements of ambient sound levels at the POA are from the 2016 TPP, when ambient sound recordings were measured at two locations during a 3-day break in pile installation activities. Median ambient noise levels, measured at a location just offshore of the existing POA South Floating Dock and at a second location about 1 kilometer offshore, were 117.0 and 122.2 dB re 1 µPa, respectively.

3.2 Biological Environment

The primary component of the biological environment that would be affected by the proposed action and alternatives is marine mammals, which would be directly affected by the authorization of incidental take.

3.2.1 Marine Mammal Habitat

The mouths of rivers such as those near the POA are important CIBW feeding habitat. Harbor seals use coastal haulouts in upper Cook Inlet, including mud flats near river mouths. Harbor porpoises are found in upper Cook Inlet in low numbers and are rarely seen near the project area; no harbor porpoises were observed in 2016 during TPP monitoring. Other species that may be encountered infrequently or rarely within the project area include killer whales and Steller sea lions. Killer whales have been documented preying on beluga whales in upper Cook Inlet; however, they have not been observed during POA construction or scientific monitoring. Steller sea lions were observed near the POA in 2009 and 2016.

Pursuant to the ESA, critical habitat has been designated for CIBWs (Figure 4). The CIBW is the only ESA-listed marine mammal entity in the vicinity of the project area that has critical habitat designated in Cook Inlet.[4] CIBW critical habitat includes portions of Knik Arm. Area 1 of the CIBW critical habitat encompasses all marine waters of Cook Inlet north of a line connecting Point Possession (61.04° N, 150.37° W) and the mouth of Three Mile Creek (61.08.55° N, 151.04.40° W), including waters of the Susitna, Little Susitna, and Chickaloon Rivers below mean higher high water (MHHW). This area provides important habitat during ice-free months and is used intensively by Cook Inlet beluga between April and November (NMFS 2016a). More information on CIBW habitat can be found at *https://www.fisheries.noaa.gov/action/critical-habitat-cook-inlet-beluga-whale* and in section 4.2.1.6 of NMFS' Biological Opinion on the Port of Alaska's PCT Project (NMFS, 2020).
The area in the vicinity of the proposed POA PCT Project was excluded from the critical habitat designation for national security reasons (Figure ; 76 FR 20180). Although the immediate area around the POA is excluded from designated critical habitat, underwater noise from pile installation would be perceptible to CIBWs in designated critical habitat beyond the exclusion zone for some installation methods and pile sizes.

[4] Critical habitat for Steller sea lions does not occur near the PCT Project area or in upper Cook Inlet.

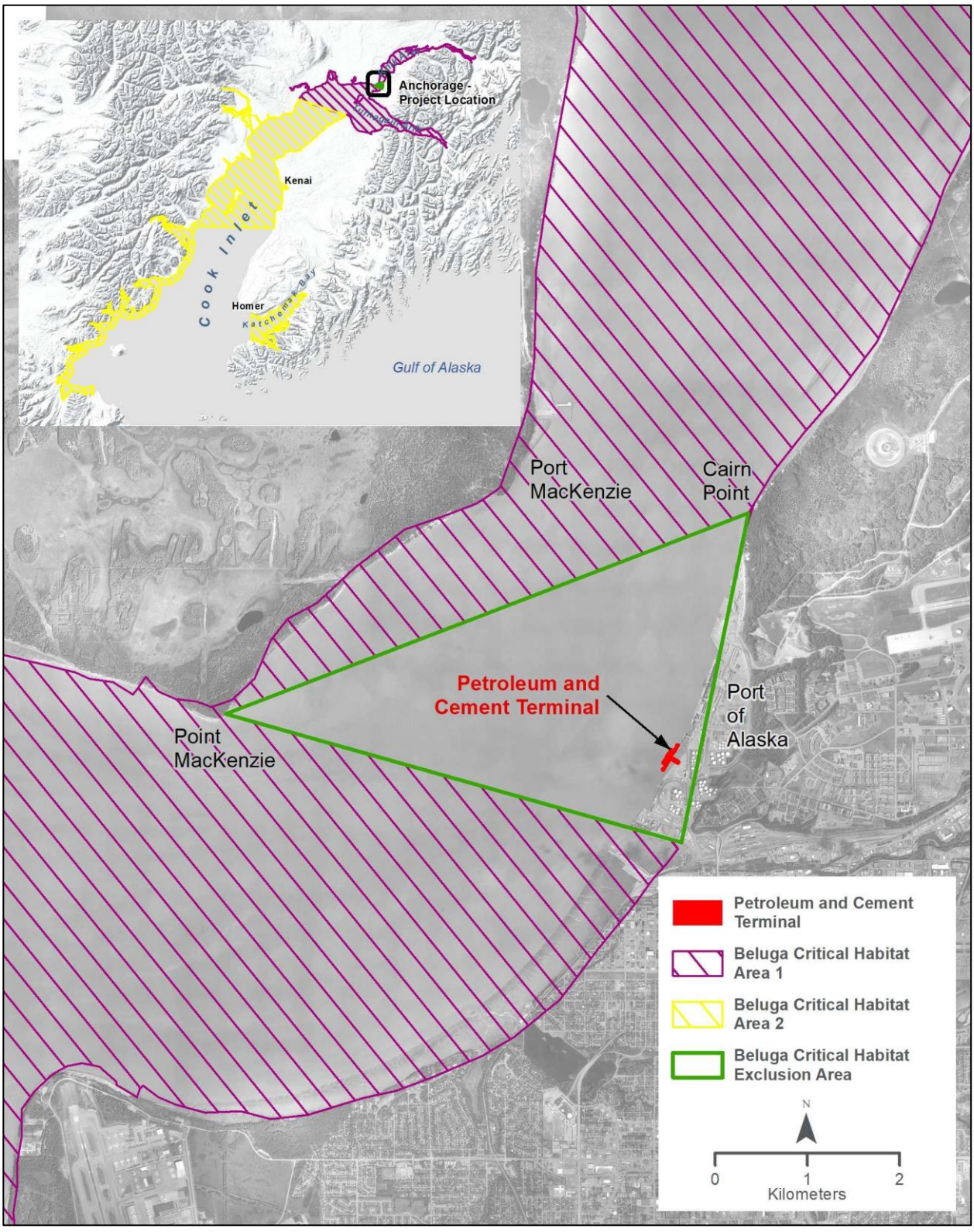


Figure 4. Beluga Whale Critical Habitat and Exclusion Zone

3.2.2 Marine Mammals

The marine mammals with potential to be harassed incidental to construction of the PCT are the CIBW, western DPS of the Steller sea lion, harbor seal, harbor porpoise, killer whale, and humpback whale. CIBWs, harbor seals, and harbor porpoises are the species most likely to be sighted during construction of the PCT.

Table 3 provides a summary of the abundance and status of the marine mammals likely to occur in the PCT Project area based on NMFS' Draft 2019 Stock Assessment Reports and, for CIBWs, the recently released update on the status of CIBWs (Sheldon and Wade, 2019). Information on the distribution, population size, and conservation status for each species appears in the proposed Authorization *Federal Register* notice, and we incorporate those descriptions by reference here. The POA's IHA application and NMFS' *Federal Register* notice of proposed IHAs contain detailed information on life history functions, hearing abilities, and distribution, which is also incorporated by reference and briefly summarized below. We note the status of CIBWs has been updated since the notice of proposed IHAs and draft EA were released (see below).

Table 3. Marine Mammals in or near the Project Area

Species or DPS	Abundance (Population/Stock)	MMPA Designation	ESA Listing	Occurrence in Project Area
Harbor seal *(Phoca vitulina)*	28,411 (Cook Inlet/Shelikof Strait)	None	None	Common
Steller sea lion *(Eumatopias jubatus)*	54,267 (Western DPS)	Depleted & Strategic	Endangered	Rare
Harbor porpoise *(Phocoena phocoena)*	31,046 (Gulf of Alaska)	Strategic	None	Occasional
Killer whale (Orca) *(Orcinus orca)*	2,347 (Eastern North Pacific Alaska Resident)	None	None	Rare
	587 (Gulf of Alaska, Aleutian Islands, & Bering Sea Transient)	None	None	
Cook Inlet beluga whale *(Delphinapterus leucas)*	297 (Cook Inlet)	Depleted & Strategic	Endangered	Common
Humpback whale *(Megaptera novaeangliae)*	11,398 (Hawaii DPS)	Depleted & Strategic	None	Rare
	3,264 (Mexico DPS)	Depleted & Strategic	Threatened	

Table 3. Marine Mammals in or near the Project Area

Species or DPS	Abundance (Population/Stock)	MMPA Designation	ESA Listing	Occurrence in Project Area
	1,059 (Western North Pacific DPS)	Depleted & Strategic	Endangered	

3.2.2.1 ESA Listed Marine Mammals

Cook Inlet Beluga Whale

Beluga whales appear seasonally throughout much of Alaska, 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 2014). The Cook Inlet stock is the most isolated of the five stocks, because 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 project area.

The ADF&G conducted a survey of beluga whales in August 1979 and estimated 1,293 individuals (Calkins 1989). Although this survey did not include all of upper Cook Inlet, the area where almost all beluga whales are currently found during summer, it is the most complete survey of Cook Inlet prior to 1994 and incorporated a correction factor for beluga whales missed during the survey. Therefore, the ADF&G summary (Calkins 1989) provides the best available estimate for historical beluga whale abundance in Cook Inlet. For management purposes, NMFS has adopted 1,300 beluga whales as the carrying capacity in Cook Inlet (65 FR 34590) based on Calkins (1989).

No systematic population estimates for CIBWs were conducted prior to 1994. 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).

In 1999, NMFS received petitions to list the CIBW stock as an endangered species under the ESA (64 FR 17347). However, NMFS determined that the population decline was due to overharvest by Alaska Native subsistence hunters and, because the Native harvest was regulated in 1999, listing this stock under the ESA was not warranted at the time (65 FR 38778). The CIBW stock was designated as depleted under the MMPA in 2000, indicating that the size of the stock was below its Optimum Sustainable Population level (65 FR 34590). The population has remained below its Optimum Sustainable Population level since the designation, but would be considered recovered once the population estimate rises above the Optimum Sustainable Population level.

NMFS announced initiation of another CIBW status review under the ESA in 2006 (71 FR 14836) and received another petition to list the CIBW under the ESA (71 FR 44614). NMFS issued a decision on the status review on 20 April 2007, concluding that the CIBW is a DPS that is in danger of extinction throughout its range. Subsequently, NMFS issued a proposed rule to list the CIBW as an endangered species (72 FR 19821). On 17 October 2008, NMFS announced the listing of the population as endangered under the ESA (73 FR 62919). In 2010, a Recovery Team, consisting of a Science Panel and Stakeholder Panel, began meeting to develop a Recovery Plan for the CIBW. The Draft Recovery Plan

was published in the *Federal Register* on 15 May 2015 and the Final Recovery Plan was published in the *Federal Register* on 05 January 2017.

Until 2020, the best estimate of the CIBW stock was 327 with a minimum estimate of 311 whales (Muto et al., 2019). In 2020, NMFS released an updated population estimate using a new method to estimate group size from the aerial surveys in the analysis of abundance and trends for CIBWs (Boyd et al., 2019). This new method replaced the method developed by Hobbs et al. (2000, 2015) and has several important differences, as these differences contribute to the disparity between the Hobbs method and the Boyd method. These differences are fully explained in Sheldon and Wade (2019). In summary, the new method leads to some smaller and some larger group size estimates compared to the older Hobbs et al. (2000, 2015) method, when applied to all groups recorded during the period 2004-2016. Using the older method, the rate of population decline is not as great primarily because the 2016 estimate is higher, and there is no 2018 estimate using this older method. Annual abundance was calculated as the median of all the daily abundance estimates, using all days with an acceptable survey. Using the old method, from 2006 to 2016, the rate of decline was estimated to be -0.5% per year, (with a 70% probability the population is declining) (Shelden et al. 2017). Using the new method, NMFS found from 2008-2018, the estimated trend in the CIBW population is a decline of -2.3 percent per year. The abundance estimates indicate there is a 99.7 percent probability of a decline, and a 93.0% probability of a decline that is more than 1 percent per year. The best estimate of 2018 abundance for the CIBW population from the aerial survey data is 279 (95% probability interval 250 to 317). This is based on the estimate of smoothed abundance for 2018. A comparison of the population estimates over time is presented in Figure 5. While Sheldon and Wade (2019) provides explanations for the differences between model results, including inadequacies and biases, the authors does not postulate on the reason for population decline in general (which was evident using both models); however, recent literature suggests prey reductions may be a critical contributing factor (Norman et al., 2020). This is not unexpected as prey availability has been directly linked to increased mortality and reduced health and survival of other marine mammals populations such as the Southern Resident killer whale (e.g., Ward et al., 2009, Trites and Rosen, 2017) and California sea lion (e.g., McClatchie et al., 2016).

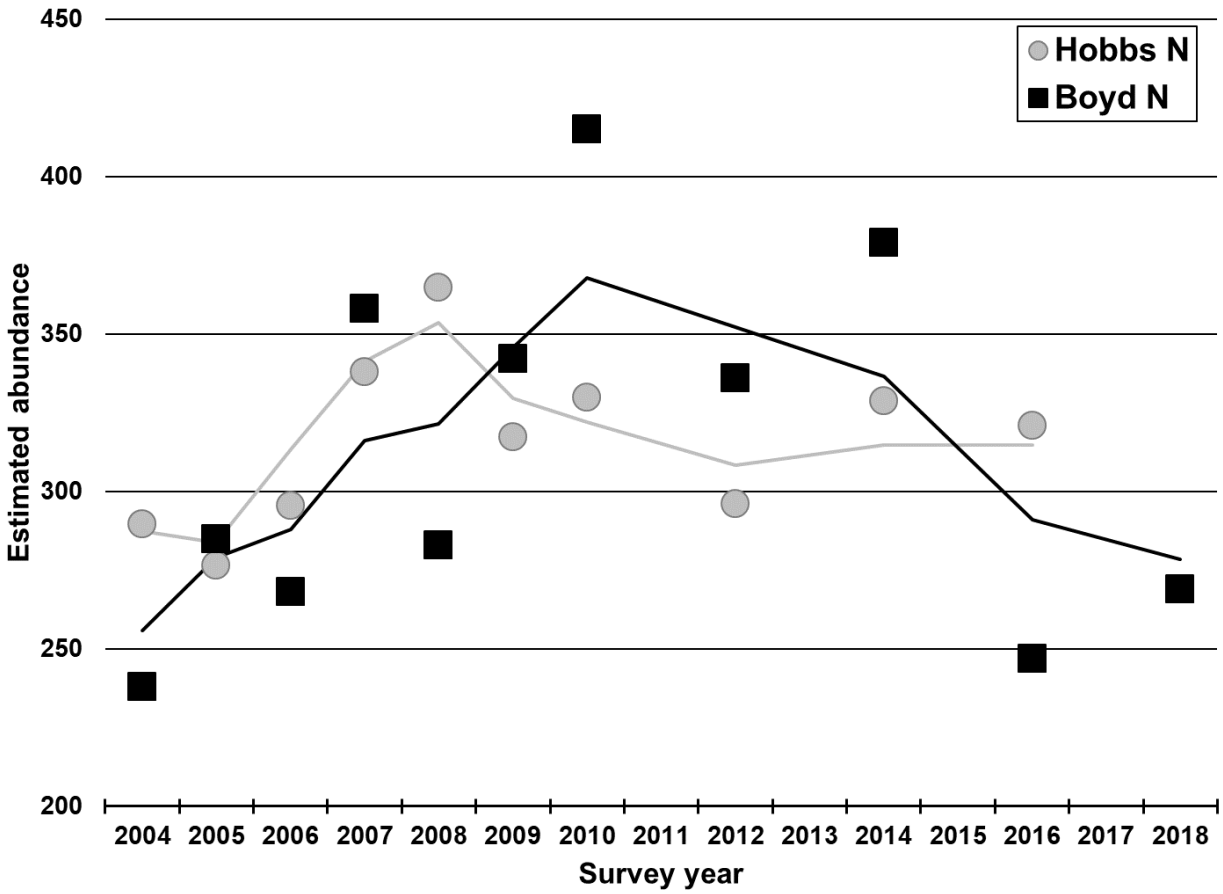


Figure 5. Annual estimates of abundance for both group size estimation methods. The moving average of each set of estimates is also plotted. Taken from Sheldon et al (2019).

During 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). Important calving grounds are located near the river mouths of upper Cook Inlet, and peak calving occurs between July and October (McGuire et al. 2016).

Beluga whales are the marine mammals most likely to be encountered in the project area. The POA conducted a NMFS-approved monitoring program for beluga whales and other marine mammals focused on the POA area from 2005 to 2011 as part of their permitting requirements for the MTRP and in 2016 for the TPP. Knik Arm is one of three areas in upper Cook Inlet where beluga whales concentrate during spring, summer, and early fall. Most beluga whales observed in or near the POA are transiting between upper Knik Arm and other portions of Cook Inlet, and the POA itself is not considered high-quality foraging habitat. Beluga whales tend to follow their anadromous prey and travel in and out of Knik Arm with the tides. Their use of Knik Arm is concentrated between August and October and is highest in September, is lowest in winter (December through February), and remains low in spring and early summer (March–July; Hobbs et al. 2011, 2012; Rugh et al. 2000, 2004, 2005, 2006, 2007; Funk et al. 2005; U.S. Army Garrison Fort Richardson 2009).

Goetz et al. (2012a) used distribution and group size data collected during annual aerial surveys between 1994 and 2008 to develop a predictive habitat model. This predictive model maps beluga whale density from zero to 1.12 whales per square kilometer in Cook Inlet. The highest predicted densities of beluga whales are in upper Knik Arm, near the mouth of the Susitna River, and in Chickaloon Bay. The model

suggests that the density of beluga whales at the mouth of Knik Arm, near the POA, ranges between approximately 0.013 and 0.062 whales per square kilometer. The distribution presented by Goetz et al. (2012a) is generally consistent with beluga whale distribution documented in Upper Cook Inlet throughout ice-free months (NMFS 2016).

Several marine mammal monitoring programs and studies have been conducted at or near the POA during the last 10 to 12 years. Data on beluga whale sighting rates, grouping, behavior, and movement indicate that the POA is a relatively low-use area, in that beluga whales do not linger in the area, but pass through en route to other locations. They are observed most often at low tide in fall, with numbers peaking in late August to early September. Although groups with calves have been observed to enter the POA area, data do not suggest that it is an important nursery area.

Although POA scientific monitoring studies indicate that beluga whales generally pass through the area, it is also used as foraging habitat by whales traveling between lower and upper Knik Arm. Individuals and groups of beluga whales have been observed passing through the area each year during monitoring efforts. In all years, diving and traveling were the most coPSOn behaviors observed, with many instances of confirmed feeding. Sighting rates at POA ranged from 0.05 to 0.4 whales per hour (Cornick and Saxon-Kendall 2008; Cornick et al. 2011; Markowitz and McGuire 2007; Prevel-Ramos et al. 2006), as compared to 3 to 5 whales per hour at Eklutna, 20 to 30 whales per hour at Birchwood, and 3 to 8 whales per hour at Cairn Point (Funk et al. 2005), indicating that these areas are of higher use than areas near the POA.

Data collected annually during monitoring efforts at the POA indicate that few beluga whales were observed in July and early August; numbers of sightings increased in mid-August, with the highest numbers observed late August to mid-September. In all years, beluga whales have been observed to enter the project area while construction activities were taking place, including pile driving and dredging. The most commonly observed behaviors were traveling and diving with some suspected feeding. No apparent behavioral changes or reactions to in-water construction activities were observed (Cornick et al. 2011; Cornick and Seagars 2016).

Steller Sea Lion

Two DPSs of Steller sea lion occur in Alaska: the western DPS and the eastern DPS. The western DPS includes animals that occur west of Cape Suckling, Alaska, and therefore includes individuals within the project area. The western DPS was listed under the ESA as threatened in 1990, and its continued population decline resulted in a change in listing status to endangered in 1997. Since 2000, studies indicate that the population east of Samalga Pass (i.e., east of the Aleutian Islands) has increased and is potentially stable (Muto et al. 2018). For the region that encompasses Cook Inlet (Central Gulf of Alaska), the annual trend in counts (annual rates of change) of western DPS Steller sea lions is 4.33 for non-pups (adults and juveniles) and 4.22 for pups for the period 2003–2016 (Sweeney et al. 2016 from Muto et al. 2018). The most recent abundance estimate for the western DPS is 53,303 individuals (Muto et al. 2018).

Steller sea lions have been observed near the POA in June 2009 (ICRC 2009) and in May 2016 (Cornick and Seagars 2016). In 2009, there were three Steller sea lion sightings that were believed to have been the same individual (ICRC 2009a). In 2016, Steller sea lions were observed on 2 separate days. On 02 May 2016, one individual was sighted. On 25 May 2016, there were five Steller Sea lion sightings within a 50-minute period, and these sightings occurred in areas relatively close to one another (Cornick and Seagars 2016). Given the proximity in time and space, we believe these five sightings were of the same individual sea lion. All sightings occurred during summer, when the sea lions were likely attracted to ongoing salmon runs. However, considering the many hours of observations that have taken place in the area, the documented occurrence of Steller sea lions in the project area is rare.

Humpback Whale

Humpback whales worldwide were designated as endangered under the Endangered Species Conservation Act in 1970, and were listed under the ESA at its inception in 1973. However, on 08 September 2016, NMFS published a final decision that changed the status of humpback whales under the ESA (81 FR 62259), effective 11 October 2016. The decision recognized the existence of 14 DPSs based on distinct breeding areas in tropical and temperate waters. Five of the 14 DPSs were classified under the ESA (4 endangered and 1 threatened), while the other 9 DPSs were delisted. No critical habitat was designated for any of the 5 listed DPSs. Three DPSs considered in the proposed action: Mexico, western North Atlantic, and Hawaii; the latter stock (Hawaii) is not listed under the ESA.

The DPSs of humpback whales that were identified through the ESA listing process are not equivalent to existing MMPA stocks, and the stock delineations of humpback whales under the MMPA are currently under review. Until this review is complete, NMFS considers humpback whales in the Gulf of Alaska to be comprised primarily of whales belonging to the Central North Pacific stock, with a small proportion of animals belonging to the Western North Pacific Stock (Muto et al. 2018). Both stocks are designated strategic and depleted under the MMPA (Muto et al. 2018). The current estimates of humpback whale population sizes are 10,103 for the Central North Pacific stock and 1,107 for the Western North Pacific stock (Muto et al. 2018).

There have been few sightings of humpback whales in the vicinity of the project area. Humpback whales were not documented during POA construction or scientific monitoring from 2005 to 2011 or during 2016 (Cornick and Pinney 2011; Cornick and Saxon-Kendall 2008, 2009; Cornick and Seagars 2016; Cornick et al. 2010, 2011; ICRC 2009a, 2010a, 2011a, 2012; Markowitz and McGuire 2007; Prevel-Ramos et al. 2006). Observers monitoring the Ship Creek Small Boat Launch from 23 August to 11 September 2017 recorded two sightings, each of a single humpback whale, which was presumed to be the same individual (POA 2018b). One other humpback whale sighting has been recorded for the immediate vicinity of the project area. This event involved a stranded whale that was sighted near a number of locations in upper Cook Inlet before washing ashore at Kincaid Park in 2017; it is unclear as to whether the humpback whale was alive or deceased upon entering Cook Inlet waters.

3.2.2.2 Non-ESA Listed Marine Mammals

Harbor Seal

Harbor seals inhabit waters all along the western coast of the United States, British Columbia, and north through Alaskan waters to the Pribilof Islands and Cape Newenham. There are 12 recognized stocks of harbor seals in Alaska. Harbor seals in the project area are members of the Cook Inlet/Shelikof stock; no other stock is present within the project area. Distribution of the Cook Inlet/Shelikof stock extends from Unimak Island, in the Aleutian Islands archipelago, north through all of upper and lower Cook Inlet (Muto et al. 2018).

The current abundance estimate for the Cook Inlet/Shelikof stock is based on aerial survey data from 1998 through 2011 and is estimated at 27,386 individuals, with a positive population growth trend of 313 seals per year (Muto et al. 2018). The estimated average annual subsistence harvest of the Cook Inlet/Shelikof stock between 2004 and 2008 was 233 individuals (Muto et al. 2018). Harbor seals are not listed under the ESA or designated as depleted or strategic under the MMPA, but like all marine mammals, they are protected under the MMPA.

Harbor seals inhabit the coastal and estuarine waters of Cook Inlet and are observed in both upper and lower Cook Inlet throughout most of the year (Boveng et al. 2012; Shelden et al. 2013). Recent research on satellite-tagged harbor seals observed several movement patterns within Cook Inlet (Boveng et al. 2012). In fall, a portion of the harbor seals appeared to move out of Cook Inlet and into Shelikof Strait,

northern Kodiak Island, and coastal habitats of the Alaska Peninsula. The western coast of Cook Inlet had higher usage by harbor seals than eastern coast habitats, and seals captured in lower Cook Inlet generally exhibited site fidelity by remaining south of the Forelands after release (south of Nikiski; Boveng et al. 2012).

The presence of harbor seals in upper Cook Inlet is seasonal. Harbor seals are commonly observed along the Susitna River and other tributaries within upper Cook Inlet during eulachon and salmon migrations (NMFS 2003). The major haulout sites for harbor seals are in lower Cook Inlet; however, there are a few in upper Cook Inlet (Montgomery et al. 2007). During beluga whale aerial surveys of upper Cook Inlet from 1993 to 2012, harbor seals were observed 24 to 96 kilometers (15 to 60 miles) south-southwest of Anchorage at the Chickaloon, Little Susitna, Susitna, Ivan, McArthur, and Beluga rivers (Shelden et al. 2013).

Harbor seals are commonly observed within the project area, particularly near the mouth of Ship Creek (Cornick et al. 2011; Shelden et al. 2013). During annual marine mammal surveys conducted by NMFS since 1994, harbor seals have been observed in Knik Arm and in the vicinity of the POA (Shelden et al. 2013).

Harbor seals have been observed during construction monitoring at the POA from 2005 through 2011 and in 2016; data were unpublished for 2005 through 2007 (**Error! Reference source not found.**; Cornick and Saxon-Kendall 2008, 2009; Cornick et al. 2010, 2011; Markowitz and McGuire 2007; Prevel-Ramos et al. 2006). Harbor seals were observed in groups of one to seven individuals (Cornick et al. 2011; Cornick and Seagars 2016).

Harbor Porpoise

In Alaska, harbor porpoises are divided into three stocks: the Bering Sea stock, the Southeast Alaska stock, and the Gulf of Alaska stock. The Gulf of Alaska stock, which includes individuals in Cook Inlet, is currently estimated at 31,046 individuals (Muto et al. 2018). Dahlheim et al. (2000) estimated abundance and density of harbor porpoises in Cook Inlet from surveys conducted in the early 1990s. The estimated density of animals in Cook Inlet was 7.2 per 1,000 square kilometers (km^2), with an abundance estimate of 136 (Dahlheim et al. 2000), indicating that only a small number use Cook Inlet. Hobbs and Waite (2010) estimated a harbor porpoise density in Cook Inlet of 13 per 1,000 km^2 from aerial beluga whale surveys in the late 1990s. Neither of these surveys included coastlines, which have been documented to be used heavily by harbor porpoises (Shelden et al. 2014).

Harbor porpoises have been observed within Knik Arm during monitoring efforts since 2005. During POA construction from 2005 through 2011 and in 2016, harbor porpoises were reported in 2009, 2010, and 2011 (Cornick and Saxon-Kendall 2008, 2009, 2010; Cornick et al. 2011; Markowitz and McGuire 2007; Prevel-Ramos et al. 2006; Cornick and Seagars 2016). In 2009, a total of 20 harbor porpoises were observed during construction monitoring, with sightings in June, July, August, October, and November. Harbor porpoises were observed twice in 2010: once in July and again in August. In 2011, POA monitoring efforts documented harbor porpoises five times, with a total of six individuals in August, October, and November at the POA (Cornick et al. 2011). During other monitoring efforts conducted in Knik Arm, there were four sightings of harbor porpoises in 2005 (Shelden et al. 2014), and a single harbor porpoise was observed within the vicinity of the POA in October 2007 (URS 2008). No harbor porpoises were observed in 2016.

Killer Whale

There are two stocks that have the potential to be in the project area: the Eastern North Pacific Alaska Residents and the Gulf of Alaska, Aleutian Islands, and Bering Sea Transients. Both ecotypes overlap in the same geographic area; however, they maintain social and reproductive isolation and feed on different prey species. The population of the Eastern North Pacific Alaska Resident stock of killer whales contains an estimated 2,347 animals, and the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock of

killer whales is estimated to contain 587 animals (Muto et al. 2018). Killer whales are rare in Cook Inlet, and most individuals are observed in lower Cook Inlet (Shelden et al. 2013).

No killer whales were spotted in the vicinity of the POA during surveys by Funk et al. (2005), Ireland et al. (2005), and Brueggeman et al. (2007, 2008a, 2008b). Killer whales have also not been documented during any POA construction or scientific monitoring from 2005 to 2011 or during 2016 (Cornick and Pinney 2011; Cornick and Saxon-Kendall 2008; Cornick and Seagars 2016; Cornick et al. 2010, 2011; ICRC 2009a, 2010a, 2011a, 2012; Markowitz and McGuire 2007; Prevel-Ramos et al. 2006). Very few killer whales, if any, are expected to approach or be in the vicinity of the project area during construction of the PCT.

3.2.2.3 Marine Mammal Acoustics and Hearing

Since the potential effects of sound on marine mammal species present in the action area involves analysis of the manner in which sound interacts with the physiology of marine mammals and the potential responses of those animals to sound,[5] general information about sound and marine mammal hearing is provided in this section and potential effects of sound on marine mammal species is provided in Chapter 4. Understanding the frequency ranges marine mammals are able to hear described in this section is essential to the consideration of the effects of pile driving to marine mammals specified in POA's application and explained in the notice of proposed IHAs to be issued under the MMPA. The exposure estimates associated with the activities specified in the application and the notice of proposed IHAs were considered in addition to other factors that may affect the impacts of those exposures on marine mammals.

Overview of Sound and Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals because they rely on sound to obtain detailed information about their surroundings, communicate, navigate, reproduce, socialize and avoid predators. Thus, the surrounding soundscape is a key component of marine mammal habitat and can be considered their acoustic habitat (Clark et al. 2009). Underwater sound comes from numerous natural sources (biological and physical processes) and anthropogenic sources. Biological sounds include marine life (marine mammals, fish, snapping shrimp). Physical sounds include wind and wave activity, rain, cracking sea ice, undersea earthquakes and volcano eruptions. Anthropogenic sound includes shipping and other vessel traffic, military activity, marine construction, oil and gas exploration and more. Some of these natural and anthropogenic sounds are present more or less everywhere in the ocean all of the time, therefore, background sound in the ocean is commonly referred to as "ambient noise" (DOSITS 2019).

Sound travels in waves, the basic components of which make up frequency, wavelength, velocity, and amplitude. Frequency is the number of pressure waves that pass by a reference point per unit of time and is measured in hertz (Hz) or cycles per second. Wavelength is the distance between two peaks or corresponding points of a sound wave (length of one cycle). Higher frequency sounds have shorter wavelengths than lower frequency sounds, and typically attenuate (decrease) more rapidly, except in certain cases in shallower water. Amplitude is the height of the sound pressure wave or the "loudness" of a sound and is typically described using the relative unit of the dB. When underwater objects vibrate or activity occurs, sound-pressure waves are created. These waves alternately compress and decompress the water as the sound wave travels. Underwater sound waves radiate in a manner similar to ripples on the surface of a pond and may be either directed in a beam or beams or may radiate in all directions (omnidirectional sources). The compressions and decompressions associated with sound waves are detected as changes in pressure by aquatic life and man-made sound receptors such as hydrophones. The

[5] For example, predicting how many marine mammals could be harassed required potential effects to be evaluated within the context of applicable laws and regulations. Both the MMPA and ESA require all anticipated responses to sound resulting from the proposed research activities be considered relative to their potential impact on animal growth, survivability and reproduction. Although a variety of effects may result from an acoustic exposure, not all effects will impact survivability or reproduction (e.g., short-term changes in respiration rate would have no effect on survivability or reproduction).

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

The sound level of a region is defined by the total acoustical energy being generated by known and unknown sources. In general, ambient sound levels tend to increase with increasing wind speed and wave height. Precipitation can be an important component of total sound at frequencies above 500 Hz and possibly down to 100 Hz during quiet times. Marine mammals can contribute significantly to ambient sound levels, as can some fish and snapping shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz. In deep water, low-frequency ambient sound from 1-10 Hz mainly comprises turbulent pressure fluctuations from surface waves and the motion of water at the air-water interface. At these frequencies, sound levels depend only slightly on wind speed. Between 20-300 Hz, distant ships transiting dominates wind-related sounds. Above 300 Hz, the ambient sound level depends on weather conditions, with wind- and wave-related effects mostly dominating the soundscape. Vessel noise typically dominates the total ambient sound for frequencies between 20 and 300 Hz. In general, the frequencies of anthropogenic sounds are below 1 kHz and, if higher frequency sound levels are created, they attenuate rapidly.

In Cook Inlet existing anthropogenic sources includes shipping and other vessel traffic (e.g., dredging, commercial and recreational fishing), pile driving for non-PCT project activities, geophysical surveys for research and other purposes and commercial and recreational fisheries.].

For frequency ranges marine mammals are able to hear, current data indicates not all marine mammal species have equal hearing capabilities (e.g., Richardson et al. 1995; Wartzok and Ketten 1999; Au and Hastings 2008). To reflect this, Southall et al. (2007, 2019) recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.*, low-frequency cetaceans). Subsequently, NMFS described generalized hearing ranges for these marine mammal hearing groups in their revision to the technical guidance for assessing effects of anthropogenic sound published in April 2018 (NMFS 2018). Generalized hearing ranges were chosen based on the approximately 65 decibel (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. Marine mammal hearing groups and their associated hearing ranges are depicted in Table 4 below.

Table 4. Marine Mammal Functional Hearing Groups

Hearing Group	Generalized Hearing Range*
Low Frequency Cetaceans *(Mysticetes–Baleen whales)*	7 Hz to 35 kHz

Hearing Group	Generalized Hearing Range*
Mid- Frequency Cetaceans *(Odontocetes—Toothed whales)*	150 Hz to 160 kHz
High-frequency Cetaceans *(Odontocetes)*	275 Hz to 160 kHz
Phocid pinnipeds *(true seals)*	50 Hz to 86 kHz
Otariid pinnipeds *(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)	

3.3 Socioeconomic Environment

3.3.1 Subsistence

While Alaska Natives have traditionally harvested subsistence resources in this region for millennia, only limited hunting of harbor seals occurs in the upper Cook Inlet area. Take is authorized only for limited boat-based subsistence hunting.

Due to dramatic declines in the CIBW population, on 21 May 1999, legislation was passed to temporarily prohibit (until 01 October 2000) the taking of CIBWs under the subsistence harvest exemption in Section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected Alaska Native Organizations (Public Law No. 106-31, Section 3022, 113 Stat. 57, 100). That prohibition was extended indefinitely on 21 December 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 Alaska Native organization representing CIBW hunters, which allowed for the annual harvest of 1 to 2 beluga whales. On 15 October 2008, NMFS published a final rule that established long-term harvest limits on CIBWs that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibited harvest for a 5-year period (e.g., 2008–2012, 2013–2017) if the average abundance for the CIBWs from the prior 5 years (e.g., 2003–2007) was below 350 whales. There has been no subsistence harvest of beluga whales since 2005 (NMFS 2016a). These figures demonstrate that subsistence harvests of marine mammal species are minimal.

While Steller sea lions are used for subsistence purposes in Alaska, in general, they are not regularly hunted in Cook Inlet and no known hunting occurs in upper Cook Inlet given their uncommon occurrence in this action. The only marine mammal species with subsistence value in upper Cook Inlet is the harbor seal. The Alaska Native subsistence harvest of harbor seals has been estimated by the Alaska Native Harbor Seal Commission (ANHSC) and the ADF&G. The minimum, maximum and average annual harvest from 2004-2008 was 177, 288, and 233 seals, respectively. No subsistence takes of harbor seals are known to occur in the immediate vicinity of the POA. Killer whales, harbor porpoise, and humpback whales in Cook Inlet are not used for subsistence purposes.

4 Chapter 4 Environmental Consequences

The National Marine Fisheries Service (NMFS) reviewed all possible direct, indirect, cumulative impacts to protected species and their environment, associated with NMFS' proposed action and alternatives. Based on this review, this section describes the potential environmental consequences for the affected resources described in Chapter 3.

4.1 Effects of Alternative 1 – No Action

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's view is that it is likely an applicant would choose to undertake its action in compliance with the law rather than proceed without an incidental take authorization. Under the No Action Alternative, NMFS would not issue the IHAs to POA authorizing take of small numbers of marine mammals. As a result, the exceptions to the prohibition on take of marine mammals per the MMPA would not apply and POA would not construct the new PCT 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.

4.2 Effects of Alternative 2- Issuance of the Authorizations

4.2.1 Impacts to Marine Mammal Habitat

The proposed PCT terminal project would result in permanent impacts to habitats used by marine mammals due to the physical structures constructed (i.e., within the footprint of the project); however, the footprint of the terminal would be located in an area that has been highly modified by industrial activity, including the presence of the existing POL1 terminal and annual dredging. Therefore, the baseline condition is poor quality marine mammal habitat. The project area experiences high levels of vessel traffic and relatively high underwater and in-air noise levels. The project area is not considered high-quality habitat for marine mammals or marine mammal prey, such as fish. In addition, it would not result in permanent impacts to designated critical habitat for beluga whales, as the piles will be driven in the critical habitat exclusion zone surrounding the POA (Figure 4). Although the waters around the POA are excluded from designated critical habitat, underwater noise from pile installation would be perceptible in designated critical habitat beyond the exclusion zone. Section 7 consultation under the ESA requires an analysis of potential effects on critical habitat; therefore, additional information on potential effects to designated critical habitat for the CIBW can be found in the Biological Opinion for the PCT Project (NMFS, 2020).

The proposed PCT Project would result in temporary changes in the acoustic environment within the Knik Arm during both phases of construction. Noise levels in water would increase during pile driving. Depending on the pile size and method of installation, noise levels about which could harass marine mammals is generally limited to several hundred meters to approximately 2 kms. For very large piles, this harassment zone could be larger (up to approximately 9 kms during 144-in vibratory pile driving); however, those circumstances are very limited in time (e.g., only 1 144-in pile would likely be driven using a vibratory hammer). If the bubble curtain casing pile for the 48-in piles must be vibrated in, this would occur for only 1-3 minutes per pile, a very short amount of time which is offset by the reduction of noise during impact hammering the 48-in pile.

The most likely impact to marine mammal habitat would be the temporary displacement of marine mammal prey at and near the POA during both phases of construction, due to turbid conditions from temporary disturbance to the immediate substrate area during pile installation. However, the area around the POA is not a primary foraging area for marine mammals. Long-term effects of any prey

displacements are not expected to affect the overall fitness of marine mammal populations; effects would be minor and would terminate after completion of PCT construction. In general, the nearer the prey is to the source, the higher the likelihood of high energy and a resultant effect (such as mild, moderate, or mortal injury). While some fish within the distance to fish injury criteria may be harmed, impacts on primary prey species would otherwise be short-term and local. The PCT Project is not anticipated to substantially impede migration of adult or juvenile salmon or adversely affect the health and survival of the affected species at the population level. Affected fish would represent only a portion of food available to marine mammals in the area. Once impact hammering has ceased and construction of the PCT is complete, habitat quality would be expected to return to pre-PCT Project conditions. The only exception would be habitat lost due to the presence of piles; however, this amount of habitat is minimal compared to the available habitat in adjacent Knik Arm waters and the PCT is replacing an existing terminal. Fish would be expected to move into and use adjacent available areas. Potential effects on fish are discussed in more detail in the *Port of Alaska Modernization Program Essential Fish Habitat Technical Memorandum – PAMP Petroleum and Cement Terminal Project* (POA 2018c).

Pile installation may temporarily increase turbidity that results from suspended sediments during both phases of construction. Any increases would be temporary, localized, and minimal and Knik Arm is a highly turbid environment with high load of suspended sediments. Regardless, the POA must comply with State water quality standards during these operations by limiting the extent of turbidity to the immediate project area. In general, turbidity associated with pile installation is localized to about a 25-foot radius around the pile (Everitt et al. 1980). Cetaceans are not expected to be close enough to the project site installation areas to experience the effects of turbidity above baseline, and any pinnipeds transiting the area could avoid localized areas of turbidity. Therefore, the impact from increased turbidity levels is expected to be minimal to marine mammals.

In summary, the long-term effects of any prey displacements are not expected to affect the overall fitness of the CIBW population or other affected marine mammal species. Effects would be minor and would terminate after completion of the proposed PCT Project. Due to the relatively small area of the habitat affected, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences for individual marine mammals or their populations, including CIBWs.

More information on potential impacts to marine mammal habitat is contained in the POA's IHA Application (POA 2019), the BA (POA 2019), and the notice of the proposed IHAs (84 FR 72154). .

4.2.2 Impacts to Marine Mammals

Acoustic stimuli associated with pile driving during both phases of construction of the proposed PCT Project has the greatest potential to impact marine mammals. The effects of sounds from pile installation and removal on marine mammals might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, temporary or permanent hearing impairment, and non-auditory physical effects (Richardson et al. 1995a). The potential for and magnitude of these effects are dependent on several factors, including marine mammal context (e.g., age, size, depth of the animal during exposure); the energy needed to drive the pile, which is related to pile size, depth driven, and substrate, the standoff distance between the pile and receiver; received levels and frequencies, and the sound propagation properties of the environment.

Impacts to marine mammals from pile driving activities are expected to result primarily from acoustic pathways. As such, the degree of effect is intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. The further away from the source, the less intense the exposure to noise should be. The substrate and depth of habitat also affect the sound propagation properties of the environment. Shallow environments are typically more structurally complex, which leads to rapid sound attenuation. In addition, substrates that are soft (e.g., sand) absorb or attenuate the sound more readily than hard substrates (e.g., rock) which may

reflect the acoustic wave. Soft porous substrates also likely require less time to drive the pile, and possibly less forceful equipment, which ultimately decrease the intensity of the acoustic source.

Threshold Shift: Permanent (PTS) and Temporary (TTS)

In general, noise has the potential to induce hearing threshold shifts if the energy accumulated by the received exceeds the thresholds necessary to do so. The accumulation of energy is a function of the source level, received level and duration of exposure. NMFS defines a noise-induced threshold shift (TS) as "a change, usually an increase, in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level" (NMFS, 2016). NMFS defines PTS as a permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS 2018). Available data from humans and other terrestrial mammals indicate that a 40 dB threshold shift approximates PTS onset (see NMFS 2018 for review). NMFS defines TTS as a temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS 2018). Based on data from cetacean TTS measurements (see Finneran 2014 for a review), a TTS of 6 dB is considered the minimum threshold shift clearly larger than any day-to-day or session-to-session variation in a subject's normal hearing ability (Schlundt *et al.,* 2000; Finneran *et al.,* 2000; Finneran *et al.,* 2002).

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

Behavioral Harassment

Behavioral disturbance may include a variety of effects, including subtle changes in behavior (*e.g.*, minor or brief avoidance of an area or changes in vocalizations), more conspicuous changes in similar behavioral activities, and more sustained and/or potentially severe reactions, such as displacement from or abandonment of high-quality habitat. Disturbance may result in changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where sound sources are located. Pinnipeds may increase their haul out time, possibly to avoid in-water disturbance (Thorson and Reyff 2006). Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g.*, species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day), as well as the interplay between factors (*e.g.*, Richardson *et al.* 1995; Wartzok *et al.* 2003; Southall *et al.* 2007; Weilgart 2007; Archer *et al.* 2010). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison *et al.* 2012), and can vary depending on characteristics associated with the sound source (*e.g.*, whether it is moving or stationary, number of sources, distance from the source). In general, pinnipeds seem more tolerant of, or at least habituate more quickly to, potentially disturbing underwater sound than

do cetaceans, and generally seem to be less responsive to exposure to industrial sound than most cetaceans.

Numerous studies have shown that underwater sounds from industry activities are often readily detectable by marine mammals in water at distances of many kilometers. Numerous studies have also shown that marine mammals at distances of more than a few kilometers often show no apparent response to industry activities of various types (Miller et al. 2005; Bain and Williams 2006). This is often observed, even in cases when sounds must be readily audible to the animals based on measured received levels and hearing sensitivity of that mammal group.

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 behaviors that function to reduce the impacts of masking. Structured signals, such as the echolocation click sequences of small toothed whales, may be readily detected even in the presence of strong background noise because their frequency content and temporal features usually differ strongly from those of the background noise (Au and Moore 1988, 1990). The components of background noise that are similar in frequency to the sound signal in question primarily determine the degree of signal masking. Masking effects of underwater sounds from the POA's proposed activities on marine mammal calls and other natural sounds are anticipated to be limited. For example, beluga whales use primarily high-frequency sounds to communicate and locate prey; therefore, masking by low-frequency sounds associated with project activities is not anticipated (Gales 1982).

There is evidence of other marine mammal species continuing to call in the presence of industrial activity. Annual acoustical monitoring near BP Exploration (Alaska) Inc.'s Northstar production facility during the fall bowhead migration westward through the Beaufort Sea has recorded thousands of calls each year (Richardson et al. 1995b; Aerts and Richardson 2008). Construction, maintenance, and operational activities have been occurring at this facility for decades. To compensate for and reduce masking, some baleen whales may alter the frequencies of their communication sounds (Richardson et al. 1995a; Parks et al. 2007). The echolocation clicks produced by the aforementioned marine mammals are usually far above the frequency range of the sounds produced by pile driving and other construction sounds (e.g., dredging and gravel fill). Blackwell (2005) and URS (2007) reported that background noise at the POA (physical environment and maritime operations) contributed more to received levels than pile driving did at distances greater than 1,300 meters from the source, which is slightly smaller than the Level B harassment zone for impact driving of unattenuated piles.

Pile installation operations could result in masking through overlapping frequencies of the marine mammal signals or by increasing sound levels such that animals are unable to detect important signals over the increased noise. A passive acoustic study in the vicinity of MTRP construction in 2009 measured the frequencies of noise produced as less than 10 kilohertz (kHz), with one exception of impact pile driving, which extended to 20 kHz (Širović and Kendall 2009).

Concentrating on CIBWs, Kendell and Cornick (2016) provide a comprehensive overview of four years of scientific marine mammal monitoring conducted during the POA's Expansion Project. These were observations made independent of pile driving activities (i.e., not construction based PSOs). The authors investigated beluga whale behavior before and during pile driving activity at the POA. Sighting rates, mean sighting duration, behavior, mean group size, group composition, and group formation were compared between the two periods. A total of about 2,329 h of sampling effort was completed across 349 d from 2005 to 2009. Overall, 687 whales in 177 groups were documented during the 69 days that whales were sighted. A total of 353 and 1,663 h of pile driving activity took place in 2008 and 2009, respectively. There was no relationship between monthly beluga whale sighting rates and monthly pile driving rates (r

= 0.19, p = 0.37). Sighting rates before (n = 12; 0.06 ± 0.01) and during (n = 13; 0.01 ± 0.03) pile driving activity were not significantly different. However, sighting duration of beluga whales decreased significantly during pile driving (39 ± 6 min before and 18 ± 3 min during). There were also significant differences in behavior before versus during pile driving. Beluga whales primarily traveled through the study area both before and during pile driving; however, traveling increased relative to other behaviors during pile driving activity. Suspected feeding decreased during pile driving although the sample size was low as feeding was observed on only two occasions before pile driving and on zero occasions during pile driving. Documentation of milling began in 2008 and was observed on 21 occasions. No acute behavioral responses were documented. Mean group size decreased during pile driving; however, this difference was not statistically significant. Beluga whales in densely packed groups increased by 67 percent during pile driving increases in dispersed groups (~81%) and lone white whales (~60%). Given that mixed groups were smaller, it may be that these groups contained calves, and the densely packed formation provided decreased distances for communication in a noisier environment and better protection for calves. Acoustically, Kendall et al. (2013) only recorded echolocation clicks and no whistles or noisy vocalizations near construction activity at the POA. We anticipate disturbance to CIBWs would manifest in the same manner when exposed to noise during the PCT project: whales move quickly and silently through the area in more cohesive groups. We do not anticipate whales to abandon entering or existing Knik Arm as this is not evident based on previous years of monitoring data (e.g., Kendell and Cornick, 2016) and the pre-pile driving clearance mitigation measure is designed to further avoid any potential abandonment. We do; however, suspect CIBWs may not chose to forage in Ship Creek and instead, move past the POA to richer foraging areas (Kendell and Cornick, 2016).

4.2.2.1 Applicable Noise Criteria and Take Estimates

The POA relied on the NMFS Technical Guidance for assessing Level A harassment and NMFS interim criteria to assess Level B harassment levels when preparing their application. A summary of PTS onset acoustic thresholds for assessing Level A harassment, and acoustic criteria for assessing Level B harassment from exposure to noise from impulsive and non-impulsive underwater sound sources is provided in Table 5.

Table 5. Summary of PTS Onset Acoustic Thresholds for Assessing Level A Harassment, and Acoustic Criteria for Assessing Level B Harassment, of Marine Mammals from Exposure to Noise from Impulsive (Pulsed) and Non-impulsive (Continuous) Underwater Sound Sources

Species Group	PTS Onset Acoustic Thresholds (Received Level)			
	Hearing Group	Impulsive (Pulsed or Intermittent)		Non-impulsive (Continuous)
Level A Harassment				
Cetaceans	LF	$L_{pk,flat}$	219 dB	$L_{E, LF, 24h}$: 199 dB
		$L_{E, LF, 24h}$	183 dB	
	MF	$L_{pk,flat}$	230 dB	$L_{E, MF, 24h}$: 198 dB
		$L_{E, MF, 24h}$	185 dB	
	HF	$L_{pk,flat}$	202 dB	$L_{E, HF, 24h}$: 173 dB
		$L_{E, HF, 24h}$	155 dB	
Pinnipeds	PW pinnipeds	$L_{pk,flat}$	218 dB	$L_{E, PW, 24h}$: 201 dB
		$L_{E, PW, 24h}$	185 dB	
	OW pinnipeds	$L_{pk,flat}$	232 dB	$L_{E, OW, 24h}$: 219 dB
		$L_{E, OW, 24h}$	203 dB	
Level B Harassment				
Cetaceans	LF	**160 dB rms**		**120 dB rms**
	MF			
	HF			
Pinnipeds	PW pinnipeds			
	OW pinnipeds			

Source: NMFS 2018a

Note: PTS = permanent threshold shift; $L_{pk,flat}$ = peak sound pressure level (unweighted); $L_{E,24h}$ = sound exposure level, cumulative 24 hours; LF = low frequency; MF = mid-frequency; HF = high frequency; PW = phocid in water; OW = otariid in water; dB = decibels; rms = root mean square.

Sound propagation and the distances to the sound isopleths defined by NMFS for Level A harassment of marine mammals under the new Technical Guidance were estimated using NMFS User Spreadsheet, available at https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance which provides simple calculations to estimate cumulative noise exposure and the potential for PTS. As part of our analysis under the MMPA, NMFS computes the distances to isopleths for the different functional hearing groups based on an unweighted sound level with corresponding distance. The model applies simple Weighting Factor Adjustments for the five functional hearing groups and incorporates a duty cycle to account for the number of pile strikes per unit time (NMFS 2018). The simple spreading loss to account for sound propagation and the distances to the sound isopleths defined by NMFS for onset of PTS and Level B harassment of marine mammals were estimated based on the following:

$$TL = TL_c \log10 (R/D)$$

Where

- TL_c is the TL coefficient,
- R is the estimated distance to where the sound level is equal to the Level B harassment threshold (160 dB), and
- D is the distance at which the sound source level was measured.

The estimated distance to the onset of PTS and Level B harassment isopleths can be calculated by rearranging the terms in the above equation:

$$R = D\ 10^{(TL/TLc)}$$

Where

- TL is the difference between the reference sound source level dB rms and the Level B threshold dB (160 dB).

Estimated Take of Marine Mammals

Potential estimates of take, pursuant to the analysis required under the MMPA, were derived based on the data available and the expected frequency of observing the species during the PCT Project. To estimate take, numbers of marine mammals are rounded up to the nearest integer, because a fraction of a marine mammal cannot be exposed to noise or taken.

Estimated take incidental to pile driving and removal for humpback whales, harbor seals, Steller sea lions, killer whales, and harbor porpoises is calculated by the following equation:

Take = N * number of days of pile installation, where:

N = highest daily abundance estimate for each species in project area

We note the estimate take does not necessarily equate to individual animals (e.g., the same harbor seal may be exposed on different days).

For CIBWs, the take calculation is explained in further detail below.

Humpback Whales

Sightings of humpback whales in the project area are rare, and the potential risk of exposure of a humpback whale to sounds exceeding the Level B harassment threshold is low. Few, if any, humpback whales are expected to approach the project area. However, based on two sightings in 2017 of what was likely a single individual at the Ship Creek Boat Launch (ABR 2017) south of the project area, we anticipate an observation rate of 1 individual per 16 days of pile driving. Based on this, we are authorizing 8 takes of humpback whales during Phase 1 (127 days for Phase 1 / [1 humpback whale every 16 days]) and 5 takes during Phase 2 (75 days for Phase 2 / [1 humpback whale every 16 days]). Up to two of those humpback whales may be taken by Level A harassment during each Phase.

Harbor Seals

Pile installation and removal is anticipated to take approximately 202 days to complete—127 days for Phase 1 and 75 days for Phase 2—depending on the number of piles installed each day. The number of sightings of harbor seals during 2016 TPP construction monitoring was 28 sightings recorded over 83.5 hours of monitoring from 3 May through 21 June 2016. Based on these observations, the sighting rate during the 2016 TPP construction monitoring period was 1 harbor seal every 3 hours, or approximately 4

harbor seals per 12-hour work day. Given projected positive population growth, as described in the IHA application, it is anticipated that 8 harbor seals may be observed, and potentially exposed to harassment level noise, per 12-hour work day. We anticipate a majority of these seals will be repeatedly exposed (i.e., the number of seals taken is much less than the number of takes estimated). We estimate no more than 1,016 takes would occur during Phase 1 (8 harbor seals per day * 127 days) and no more than 600 takes would occur during Phase 2 (8 harbor seals per day * 75 days). It is likely the majority of these takes would be repeated expsosures to the same cohort of seals that linger around the port.

Harbor seals often act curious about onshore activities, and previous monitoring has suggested that this species may congregate at the mouth of Ship Creek. It is important to note that the mouth of Ship Creek is about 700 meters from the southern end of the PCT, and is therefore outside the Level A zones for all species and pile sizes during both unattenuated and attenuated (with a bubble curtain) impact and vibratory pile installation. We estimate 30 percent of the Level B exposures could result in Level A harassment which is similar to the proportion of work where the Level A harassment isopleth extend to Ship Creek. Therefore, the POA has requested, and NMFS proposes to authorize 305 Level A harassment and 711 Level B harassment takes in Phase 1 and 180 Level A harassment and 420 Level B harassment takes in Phase 2.

Steller Sea Lions

Steller sea lions are anticipated to be encountered in low numbers, if at all, within the project area (Section 3.2.2). Three sightings of what was likely a single individual occurred in the project area in 2009 and two sightings occurred in 2016. Based on observations in 2016, we anticipate an exposure rate of 2 individuals every 19 days during PCT pile installation and removal. Based on this rate, we anticipate up to 13 takes of sea lions could occur during Phase 1 (127 days / [2 sea lions every 19 days] and 8 takes of Steller sea lions could occur during Phase 2 (75 days for Phase 2 / [2 sea lions every 19 days].

During Phase 1, the Level A harassment isopleth is less than the 100 m shutdown zone for all scenarios; therefore, the potential for Level A take is negligible. During installation of the 144-in piles in Phase 2, there is a low potential for Level A harassment; however, it is not completely discountable. Therefore, we allocate two of the Level B harassment takes in Phase 2 to Level A harassment.

Harbor Porpoises

As a conservative measure, the highest individual sighting rate for any recorded year during previous monitoring efforts was used to quantify exposure of harbor porpoises for pile installation/removal associated with the PCT Project. During 2009 construction monitoring, harbor porpoise sighting rates averaged 0.09 per day. It is assumed that 1 harbor porpoise could be observed every 2 days. Based on this, the Phase 1 IHA authorizes 64 exposures takes of harbor porpoise (127 days / [1 harbor porpoise every 2 days] and the Phase 2 IHA authorizes 38 takes (75 days for Phase 2 / [1 harbor porpoise every 2 days]. This precautionary approach also covers the possibility that larger groups of porpoises could occur less frequently.

All efforts will be taken to shut down prior to a harbor porpoise entering the Level A harassment zone and definitely within the 100-meter shutdown zone. Harbor porpoises are relatively small cetaceans that move at high velocities, which can make their detection and identification at great distances difficult. Therefore, the potential exists that a small number of harbor porpoises could enter the Level A harassment zone undetected. Therefore, we propose to allocate approximately one-third of the expected Level B harassment take to Level A harassment. For Phase 1, we are proposing to authorize 21 takes by Level A harassment and 43 takes by Level B harassment. For Phase 2, we propose to authorize 13 Level A harassment and 25 Level B harassment takes.

Killer Whales

The potential for exposure of killer whales within the Level B harassment isopleths is anticipated to be extremely low. Previous sightings of transient killer whales have documented pod sizes in upper Cook Inlet between one and six individuals (Shelden et al. 2003). The potential for exposure of killer whales within the Level B harassment isopleths is anticipated to be extremely low. Level B take is conservatively estimated at no more than 12 individuals during Phase 1 and Phase 2 to account for two large (n=12) groups or several smaller groups. No Level A harassment take for killer whales is anticipated or proposed to be authorized due to the small Level A harassment zones and implementation of a 100 m shutdown which is larger than Level A harassment isopleths.

Beluga Whales

Potential exposure of beluga whales to pile installation and removal was calculated differently than for other marine mammals. To better capture changes in beluga whale distribution and abundance, we undertook a multi-step analysis consisting of an evaluation of long-term, seasonal sighting data, proposed mitigation and monitoring measures, the amount of documented take from previous POA projects to authorized take, and considered group size. First, in lieu of density data, NMFS applied sighting rate data presented in Kendell and Cornick (2015) to estimate hourly sighting rates per month (April through November, Table 6). We then identified hours of pile driving per month. The POA indicated there will be extended durations when no pile driving is happening (e.g., later in the season when decking and other out-of-water work is occurring); however, the schedule could not be more refined than assuming an equal work distribution across the construction season. The POA did indicate the first two weeks of April and the last two weeks in November would be most likely utilized for equipment mobilization and demobilization; therefore, pile driving effort hours during those months was limited to two weeks. The data and calculated exposure estimates are presented below. These calculations assume no mitigation (*i.e.*, uncorrected take estimates) and that all animals observed would enter a given Level B harassment zone during pile driving. The uncorrected take estimates 94 exposures in Phase 1 and 60 exposures in Phase 2.

Table 6. Uncorrected Beluga Whale Exposure Estimates for Phase 1 and Phase 2.

	Monitoring Data[1]			**Estimated Take**			
Month	**Effort Hours**	**# of whales observed**	**Average whale/hr**	**Pile driving hours Phase 1[2]**	**CIBW Exposures Phase 1**	**Pile driving hours Phase 2[2]**	**CIBW Exposures Phase 2**
April	12	2	0.17	25.64	4.27	16.37	2.73
May	156	40	0.26	51.29	13.15	32.71	8.39
June	280	8	0.03	51.29	1.47	32.71u	0.94
July	360	2	0.01	51.29	0.28	32.71	0.18
August	426	269	0.63	51.29	32.38	32.71	20.65
Sept	447	169	0.38	51.29	19.37	32.71	12.35
October	433	22	0.05	51.29	2.61	32.71	1.66
Nov	215	175	0.82	25.64	20.91	16.37	13.35
Total	2317	685	0.30	359.02	**94.44**	229.00	**60.25**

[1] From Kendell and Cornick 2015.
[2] Assumes equal work distribution/month except in April and November when the POA has indicated they would be conducting only 2 weeks of pile driving due to time needed for mobilization and demobilization.

Second, NMFS then considered the proposed mitigation and distribution of beluga whales in Knik Arm. In the POA's application, they proposed a 100 m shutdown zone. However, as described in more detail below, NMFS has imposed additional mitigation designed to reduce Level B harassment take as well as Level A harassment take. We recognize that is certain situations, pile driving may not be able to be shutdown prior to whales entering the Level B harassment zone due to safety concerns. Sometimes beluga whales were initially observed when they surfaced within the harassment zone. For example, on 4 November 2009, 15 whales were initially sighted approximately 950 meters north of the project site near the shore when they surfaced in the Level B harassment zone during vibratory pile driving (ICRC 2009b). Construction activities were immediately shut down, but the 15 whales were documented as takes. On other occasions, beluga whales were initially sighted outside of the harassment zone and shut down was called, but the beluga whales swam into the harassment zone before activities could be halted, and take occurred. For example, on 14 September 2009, a construction observer sighted a white beluga whale just outside the harassment zone, moving quickly towards the 1,300 meter Level B harassment zone during vibratory pile driving. The animal entered the harassment zone before construction activity could be shut down, and was documented as a take (ICRC 2009c). With this in mind, we considered documented takes in conjunction with group size. Incorporation of previous take and a "pod factor" into the beluga whale exposure estimate is intended to better represent risk of exposure to beluga whales from the PCT project in consideration of the mitigation and monitoring measures.

Between 2008 and 2012, NMFS authorized 34 beluga whale takes per year to POA with mitigation measures similar to (but not identical to) the measures proposed here. The percent of authorized takes documented during this time period ranged from 12 to 59 percent with an average of 36 percent (Table 7). While we recognize the method of calculating takes in the previous ITAs was different than our proposed method here, we believe this first step is our analysis is reasonable and we assume the POA may use approximately 36 percent of the takes calculated for Phase 1 (n=94) and Phase 2 (n=64).

Table 7. Authorized and Reported Beluga Whale Takes during POA activities from 2009-2012.

ITA Effective Dates	Reported Takes	Authorized Take	Percent of authorized takes "used"
15 July 2008-14 July 2009	12	34	35
15 July 2009-14 July 2010	20	34	59
15 July 2010 - 14 July 2011	13	34	38
15 July 2011 - 14 July 2012	4	34	12
Average	36 percent		

Finally, we then considered group size from the long-term scientific monitoring effort and POA opportunistic data to determine if these numbers represented realistic scenarios. Group size exhibits a mode of 1 and a median of 2, indicating that over half of the beluga groups observed over the 5-year span of the monitoring program were of individual beluga whales or groups of 2. The 95th percentile of group size from the APU scientific monitoring data set is 11.1 beluga whales. This means that, of the 390 documented beluga whale groups in this data set, 95 percent consisted of fewer than 11.1 whales; 5 percent of the groups consisted of more than 11.1 whales. Another data set available to identify a pod factor is the POA opportunistic data. POA employees work in a building that is located on the piling-supported dock, and they are encouraged to document opportunistic sightings of beluga whales in a logbook. This has resulted in a data set of beluga sightings that spans all months over many years, and includes estimates of group size. Observations were not conducted systematically and this data set is likely to be biased in that smaller groups or individual whales are less likely to be sighted than larger groups. However, the data set contains good information on relative frequency of sightings and

maximum group sizes. Of the 131 sightings documented in the POA opportunistic data set, 48 groups were of 15 or more beluga whales. Therefore, the amount of take estimated accounts for several groups.

Considering sighting rates, amount of pile driving, the extensive mitigation and monitoring measures, and previous take history at the POA, we have determined that up to 55 CIBWs could be exposed to noise levels resulting in Level B harassment incidental to pile driving in Phase 1 (2020) and up to 35 CIBWs could be exposed to noise levels resulting in Level B harassment in Phase 2 (2021) (Table 8).

Table 8. Beluga Whale Level B Harassment Exposures.

PCT Construction Phase	Calculated Exposure	Proposed Take[1]
Phase 1 - 2020	94	55
Phase 2 - 2021	60	35
[1] Proposed take is identified as 59 percent of the calculated exposures using sighting rates.		

In summary, the total amount of Level A harassment and Level B harassment proposed to be authorized for each marine mammal stock is presented in Table 9.

Table 9. Amount of Take Authorized in the IHAs, by stock and harassment type.

Species	Stock	Phase 1 (2020)		Phase 2 (2021)	
		Level A	Level B	Level A	Level B
Humpback whale	Western N. Pacific	2	6	2	3
Beluga whale	Cook Inlet	0	55	0	35
Killer whale	Transient/Alaska Resident	0	12	0	12
Harbor porpoise	Gulf of Alaska	21	43	13	25
Steller sea lion	Western	0	13	2	6
Harbor seal	Cook Inlet/Shelikof	305	711	180	420

4.2.2.2 Vessel Strike Impacts to Marine Mammals

Project-related construction would require the use of tugs and barges, which would likely temporarily increase the occurrence of such vessels in the project area compared to baseline conditions. The contractor would mobilize cranes, tugs, and floating barges, including two 300-ton derrick barges, each with a mounted crane. Approximately three to four tugboats and approximately 6 barges may be on-site at one time. Cranes would be used to conduct overwater work from barges, which are anticipated to remain on-site for the duration of the PCT construction period. A 300-ton crawler crane installed on the temporary construction work trestle is anticipated to be used to construct the access trestle and provide support to platform construction.

The potential for striking marine mammals with vessels is a concern. Studies of whale strikes have established that vessel speed is correlated with risk of striking a whale and with the resulting level of injury (Laist et al. 2001; Neilson et al. 2012; Vanderlaan and Taggart 2007). In Alaska, an analysis of the characteristics of whale strike incidents found that 44 percent of the vessels were traveling at speeds of 12 knots or greater, and 14 percent were traveling at speeds less than 12 knots prior to collision (for 17 percent, the vessel's activities prior to the collision were unknown; Neilson et al. 2012). In addition to vessel speed, factors that increase a vessel's risk of striking a whale include drifting with the engine off, sailing with the motor off, and following or watching whales (Neilson et al. 2012). The influence of vessel speed in contributing to either a lethal or a non-lethal injury was examined for records of ship

strikes worldwide (Laist et al. 2001; Vanderlaan and Taggart 2007). Among collisions between motorized vessels and whales that caused lethal or severe injuries, 89 percent involved vessels moving at 14 knots or faster, and 11 percent involved vessels moving at 10 to 14 knots; no lethal or severe injuries were documented at speeds below 10 knots (Laist et al. 2001). Tugs, regardless of whether they are pulling barges, do not generally approach vessel speeds that have been reported to result in vessel strikes. Analysis of the influence of vessel type on whale strikes has not documented any instances of a tug striking a free-swimming whale in the wild (see Laist et al. 2001; Neilson et al. 2012).

Project-related vessels would not be engaging in activities that heighten the risk of striking whales (e.g., drifting with the engine off, sailing with the motor off, and following or watching whales). Project-related vessels would move at slow speeds or remain anchored or moored as they engage in support for pile-driving activities. Tugs, barges, and other project-related vessels would therefore be at low risk of striking a whale or other marine mammal, and the potential for this impact is discountable.

4.3 Impacts on Subsistence

Residents of the Native Village of Tyonek are the primary subsistence users in the upper Cook Inlet area. Project activities and they limit hunts to harbor seals. No harassment of marine mammals would occur in or near Tyonek's identified traditional subsistence hunting areas as it would generally by limited to within approximately 2-3 kms of the POA within Knik Arm and only very temporarily beyond that (e.g., during vibratory driving of likely only 1 144-in pile). Further, as the harvest of marine mammals in upper Cook Inlet is historically a small portion of the total subsistence harvest, and the number of marine mammals using upper Cook Inlet is proportionately small, the number of marine mammals harvested in upper Cook Inlet is expected to remain low. Although the proposed project would likely result in temporary disturbances to small numbers of harbor seals and Steller sea lions (a species not traditionally hunted in upper Cook Inlet but are hunted in other areas of Alaska) during pile driving, any impacts are expected to be minor modifications to behavior (e.g., avoidance of the immediate vicinity of the POA) or slight PTS for a limited number of individuals. We do not anticipate the project would impact the availability of marine mammal species for subsistence uses.

The proposed PCT construction activities will not occur near a traditional subsistence hunting area and are not anticipated to affect the availability of marine mammals for subsistence uses. Even so, the POA will communicate with representative Native subsistence users. The POA has sent letters to 14 tribal entities, including the communities of Kenaitze, Tyonek, Knik, Eklutna, Ninilchik, Seldovia, Salamatoff, and Chickaloon, informing them of the PCT Project, NMFS' notice of proposed IHAs, and identifying potential impacts to marine mammals as well as planned mitigation efforts. NMFS received no comments on the proposed IHAs from Native subsistence users during the public comment period or otherwise. Tribal members have not requested a Plan of Cooperation be developed and one is not required for issuance of the IHAs.

NMFS does not anticipate that the authorized taking of affected species or stocks will 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.

4.4 Cumulative Effects

In reviewing the definition of cumulative effects, per 40 CFR 1508.7[6] and the information provided in the application about the action area, NMFS determined activities that have the potential to permanently

[6]"Cumulative effects is 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

remove a resource would be expected to have additive or synergistic impacts if they affect the same population, even if the effects were separated geographically or temporally. Therefore, this cumulative effects analysis considers these potential impacts, however, focuses on activities that may temporally or geographically overlap with POA's proposal to construct a new PCT such that the effects of harassment warrant consideration for potential cumulative impacts to the following potentially affected marine mammals species: CIBW, humpback whale, harbor porpoise, killer whale, Steller sea lion, and harbor seal.

Incidental take of six species of marine mammals is the primary environmental effect associated with the consideration whether to issuance the IHAs to POA. Individuals found in the action area may be affected by activities anywhere within their habitat range as a number of natural and human activities occur in Cook Inlet. These generally include subsistence hunting; pollution; fisheries interaction; vessel traffic; coastal zone development, both at the POA and elsewhere; oil and gas development; mining; marine mammal research; and climate change.

The following sections briefly summarize the natural and human-related activities affecting the marine mammal species in the action area.

4.4.1 Subsistence Hunting

The practice of hunting marine mammals for food, clothing, shelter, heating and other uses is an integral part of the cultural identity of Alaska Native communities. In Cook Inlet, Alaskan Natives historically hunted beluga whales and continue to hunt harbor seals. However, we determined subsistence harvest activities by Alaskan Natives would not contribute to significant cumulative impacts when considered with other past, current or future actions. As explained in Section 3.3.1, not all of the potentially affected marine mammal species in Cook Inlet are used for subsistence purposes and of these, the only marine mammal species with subsistence value in Cook Inlet is the harbor seal. Alaskan Natives have not hunted CIBWs since 2005 and issuance of the IHAs would not adversely affect annual rates of recruitment or survival of the CIBW stock (i.e., the proposed action would not contribute to the population decline). Furthermore, based on harvest limitations established for harbor seals, known annual harvest rates (as monitored by ANHSC and ADF&G) combined with the fact that no subsistence takes of harbor seals are known to occur in the vicinity of the proposed PCT project, we can reasonably conclude take associated with subsistence harvest will have no significant cumulative impacts on the harbor seal population.

4.4.2 Pollution

The amount of pollutants that enter this portion of Knik Arm is likely to increase as populations in urban areas continue to grow. Sources of pollutants in urban areas include runoff from streets and discharge from wastewater treatment facilities. Gas, oil, and coastal zone development projects (see Sections 4.4.5 and 4.4.6) also contribute to pollutants that enter Knik Arm through discharge. These sources of pollutants are expected to continue in Knik Arm; therefore, it would be anticipated that pollutants could increase in this portion of Knik Arm. However, the U.S. Environmental Protection Agency and the Alaska Department of Environmental Conservation will continue to regulate the amount of pollutants that enter Knik Arm from point and non-point sources through Alaska Pollutant Discharge Elimination System permits. As a result, permit holders will be required to renew their permits, verify that they meet permit standards, and upgrade facilities if necessary. Additionally, the extreme tides and strong currents in Knik Arm and Cook Inlet may contribute to a reduction in the amount of pollutants found there.

undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time".

4.4.3 Fisheries Interaction

Fishing is a major industry in Alaska. As long as fish stocks are sustainable, subsistence, personal use, recreational, and commercial fishing would continue in Cook Inlet. As a result, there would be continued prey competition, risk of ship strikes, potential harassment, potential for entanglement in fishing gear, and potential displacement from important foraging habitat for CIBWs and other marine mammals. NMFS and the ADF&G will continue to manage fish stocks as well as to monitor and regulate fishing in Cook Inlet to maintain sustainable stocks.

4.4.4 Vessel Traffic

Major contributors to vessel traffic throughout Cook Inlet include port facilities, oil and gas development, and commercial and recreational fishing.

The POA yields a high volume of vessel traffic that passes through or near the action area. The POA provides 90 percent of the consumer goods for 85 percent of the state of Alaska. The POA also 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). According to data from 1998 to 2011, an average of approximately 450 vessels call to the POA annually (POA 2014). The POA is proposing to modernize its facilities (see Section 4.4.5); however, these facility updates are not expected to increase vessel traffic once the PCT Project is complete. An increase in vessel traffic could occur, however, from continuing city and state development and growth.

Port MacKenzie is also located in Knik Arm, and contributes to vessel traffic that passes through or near the action area. It receives approximately two large ships (a landing craft and/or a barge) annually, which is substantially fewer than the POA. The Port MacKenzie Rail Extension Project, which connects Port MacKenzie to the Alaska Railroad Corporation's existing mainline between Wasilla and Willow, will provide freight service between Port MacKenzie and Interior Alaska. Additionally, Port MacKenzie is planning to construct a deep-draft dock. If it is constructed, the number of ships calling to port at Port MacKenzie is anticipated to increase. Increased vessel traffic could result in increased in-water noise and potential ship strikes to marine mammals.

Beyond Knik Arm and to a lesser extent, other, smaller port facilities may contribute to vessel traffic in Cook Inlet. These include Nikiski, the City of Kenai, Kasilof, Ninilchik, Williamsport, Tyonek, and Drift River. Vessels ranging from tankers to fishing boats call to these ports (Kenai Peninsula Borough 2003). Gas and oil development, as well as commercial and recreational fishing vessels, also contribute to vessel traffic in the area.

4.4.5 Coastal Zone Development

Coastal zone development in this area of Knik Arm may result in the loss of habitat, increased vessel traffic, increased pollutants, and increased noise associated with construction and activities of the projects after construction. Projects within the area include mining projects, renewable energy projects (Fire Island Wind Project and Turnagain Arm Tidal Energy Project), and coastal construction (e.g., port expansions and maintenance, roadway construction, etc.) (Figure 6).

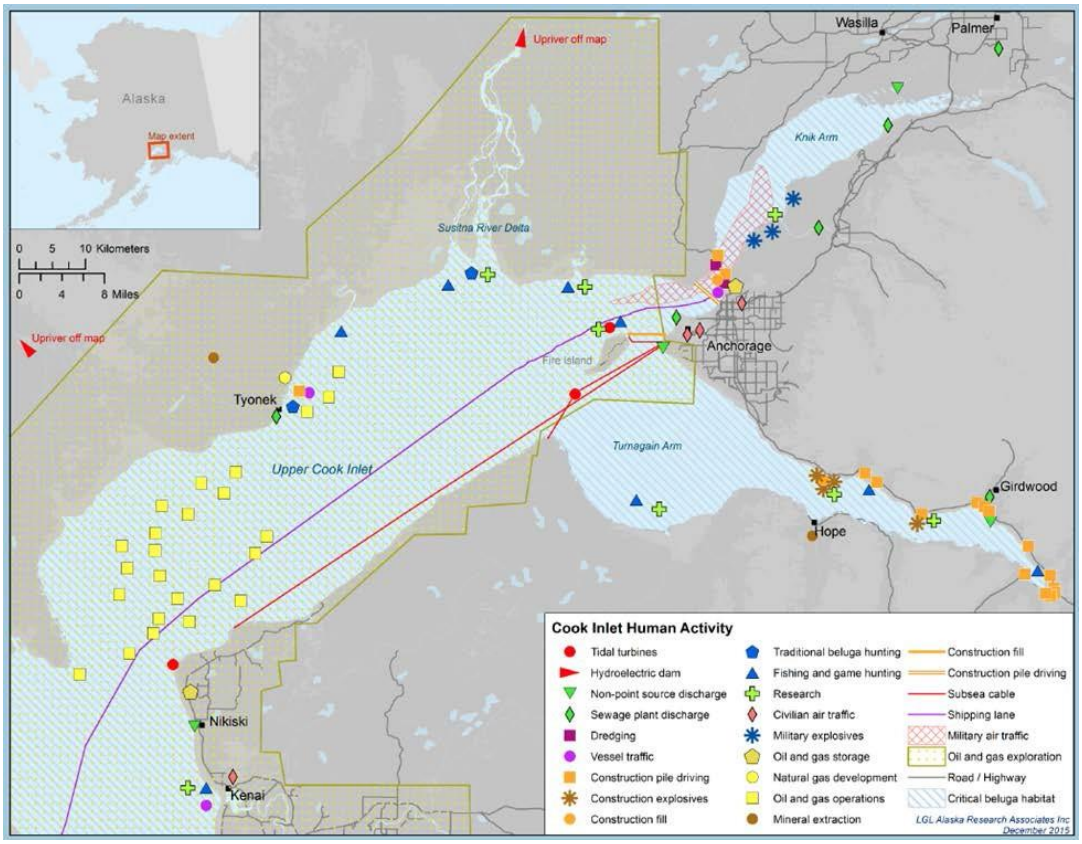


Figure 6. Example Activities in Cook Inlet (LGL, 2015, unpublished data).

4.5.5.1. Road Construction

The Alaska Department of Transportation undertook Seward Highway improvements from Mile 75 to 107 (along Turnagain Arm) beginning in 2015. These activities included geophysical and geotechnical testing, on-shore blasting, pile removal and installation at stream crossings, fill placed into Turnagain Arm to facilitate roadway straightening, and construction of a boat ramp at Windy Point which will also serve as an easy access point for non-motorized water sports such as wind surfing and kite surfing. This also includes resurfacing 15 miles of roadway, straightening curves, installing new passing lanes and parking areas, and replacing 8 existing bridges along the Seward Highway between mileposts 75 and 90. During geotechnical activities marine mammal monitoring efforts, beluga whales were observed on 15 of the 16 days of monitoring at Twentymile Bridge from April 6 to April 23, 2015. Even though no in-water activities occurred at night (at Twentymile Bridge), roadway flaggers present throughout the night indicated they could hear beluga whales at the bridge site during nighttime hours. During the 2015 season, there were 18 observations of beluga whale groups, ranging in size from 3-30. Shutdowns typically occurred when beluga whales were at the mouth of Twentymile River to ensure the animals did not enter the harassment zone during in-water activities (HDR 2015). Frequent sightings of belugas at the mouth of the Twentymile River are consistent with 2018 observations reported by the Beluga Whale Alliance where, from August 10-Oct. 9, belugas were observed at the Twentymile River mouth on 12 of 22 occasions (Beluga Whale Alliance, unpublished data).

As of the end of 2019, three bridges have already been replaced during Phase 1, with the final five planned for Phase 2 beginning in mid-2020. Replacing these bridges will include vibratory and impact pile installation and removal of both 24- and 48-inch piles. In-water work on this project will be avoided

from May 15 to June 15 to avoid harassment of CIBWs during the eulachon run, and any work conducted in water below mean high water (MHW) will require marine mammal monitoring by PSOs. In 2015, NMFS issued a Letter of Concurrence (LOC) for this Seward Highway Milepost 75 to 90 Bridge Replacement project.

In 2015, NMFS issued a LOC for the Seward Highway Milepost 105-107 Windy Corner project. The project will realign the highway and the railroad along 3.2 km (2 mile) segment of the Seward Highway in the vicinity of Windy Corner. In-water work includes land-based blasting and continuous noise form fill placement. The start of this project has been delayed since the consultation was completed. According to the Alaska Department of Transportation website, this project is expected to start construction in the summer of 2021.

4.5.5.2. Port Projects

The POA plans to continue to modernize the POA facilities as part of the PAMP. In 2019, the POA completed construction of the South Backlands Stabilization Project and transitional dredging as preparatory work for the PCT. The PCT is planned to be constructed during the 2020 and 2021 construction seasons. In 2020, the POA is anticipating relocation of the South Floating Dock to the southern extent of the South Backlands Stabilization Project. After completion of the PCT, the POA plans to replace Terminals 1 and 2 and complete the North Extension Stabilization (NES) Step 1 as part of Phase 2 of the PAMP. Other phases of the PAMP include replacing POL 2, the NES Step 2, and demolition of Terminal 3. It should be noted that the NES Step 1 and 2 Projects will remove existing filled areas and convert them to open marine waters, resulting in beneficial impacts on the marine environment.

Port of Alaska

The POA is Alaska's largest seaport and provides 90 percent of the consumer goods for about 85 percent of all of Alaska. It includes three cargo terminals, two petroleum terminals, one dry barge berth, two railway spurs, and a small craft floating dock, plus 220 acres of land facility, located in Anchorage. About 450 ships or tug/barges call at the POA each year.

Operations began at the POA in 1961 with a single berth. Since then, the POA has expanded to a terminal with five berths that moves more than four million tons of material across its docks each year (USACE 2009). The POA's Port of Alaska Modernization Program (PAMP) includes multiple construction projects, including the PCT construction activities that POA submitted an application for an incidental take authorization for, in the coming years to enable continued operations at the POA, update facilities for operational efficiency, accommodate modern shipping operations, and improve seismic resiliency[7]. This opinion considers the first Phase of the PAMP (**Error! Reference source not found.**). The future Phases will depend upon funding that is not yet secured. The PAMP website[8] describes the funding requests to the State of Alaska, and alternative sources of funding such as taxes or cargo tariffs. Additional information is provided below.

[7] http://www.portofalaska.com/modernization-project/

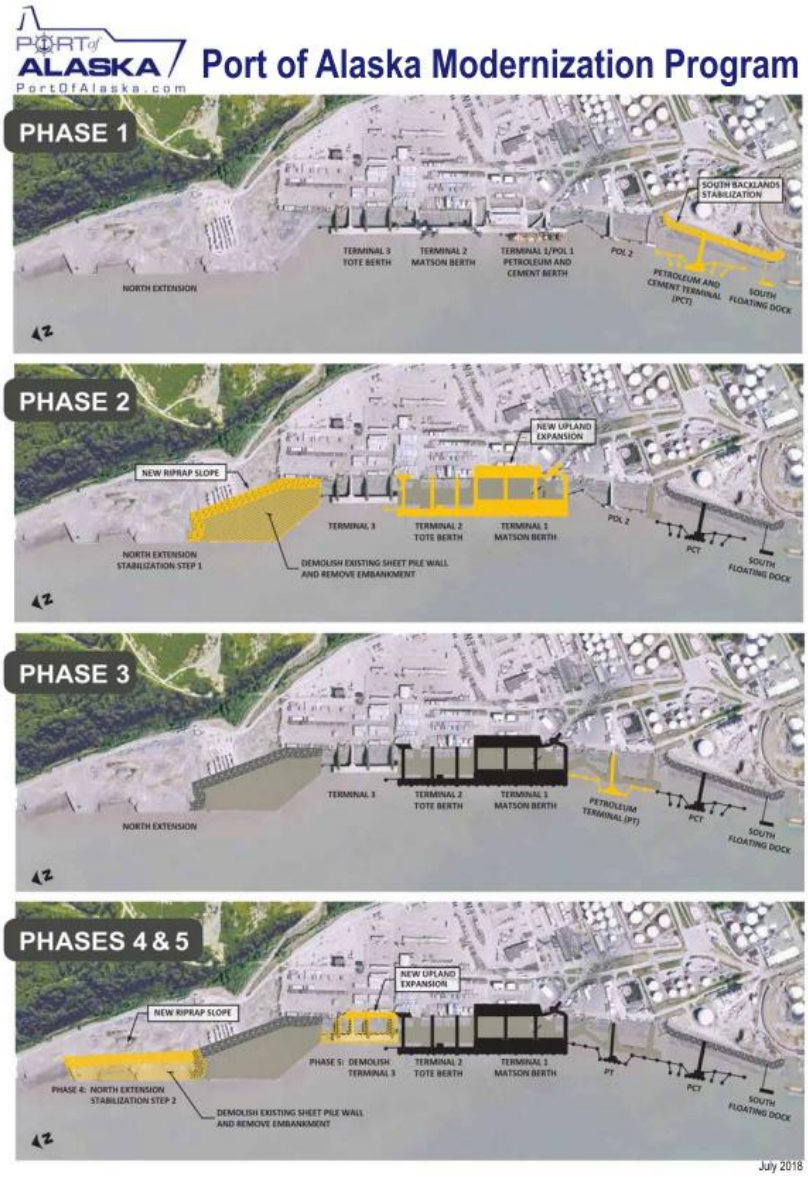


Figure 7.Phases 1-5 of the Port of Alaska's Modernization Program (PAMP)

The POA (i.e., Port of Anchorage at that time) Expansion Project (USACE 2009) included pile driving (including sheet and 36-in round piles) and dredging between 2008 and 2011. CIBWs were listed under the ESA in October of 2008; therefore, ESA section 7 consultation covered work from 2009 through 2011. As provided in Table 7, the number of CIBWs harassed, as defined under the MMPA, was less than the amount of take authorized. NMFS Permits Division authorized 34 takes of belugas per year of the project (there was no take issued for humpback whales or Steller sea lions). Takes of other marine mammal species was also limited. Scientific monitoring during this time period showed CIBWs continued to transit past the POA and passage to critical foraging grounds in upper Knik Arm was not blocked or impeded.

In 2016, NMFS issued a section 7 biological opinion for the POA's Test Pile Program (NMFS 2016a) to evaluate sound attenuation devices for potential use during port expansion projects, including the proposed action in this opinion. The NMFS Permits Division authorized 26 Level B harassment takes for

Cook Inlet belugas, and 6 Western DPS Steller sea lions. During the course of this project, belugas entered the Level B exclusion zone on 9 occasions. Only one 4-minute delay of start of operations was necessitated to avoid prohibited takes of belugas, and one authorized instance of Level B harassment occurred, affecting a single whale (Cornick and Seagars 2016).

In 2018, NMFS issued a LOC for ESA section 7 consultation for the POA Fender Pile and Replacement Repair project (NMFS 2018d). This project included pile driving of 44 22-in round piles. Mitigation measures were implemented to avoid take of marine mammals, therefore no take was authorized. No sightings of protected species occurred during pile driving activities. However, on May 30, 2019, a small group of belugas were observed by the construction crew before in water work began. When the PSO arrived they observed three adults traveling north and milling.

In 2019, NMFS issued a LOC for section 7 consultation for the South Floating Dock. The South Floating Dock at the POA will need to be relocated to accommodate construction of the PCT. It will be relocated from its existing location immediately south of the existing Petroleum Oil and Lubricants Terminal 2, to the southern extent of the South Backlands Stabilization Project, south of the new PCT. Depending on their condition and compliance with current design standards, the existing trusses, gangways, and pile caps will be relocated to the new site. The support and float guide piles will not be reused, and will be cut off at the mudline. A total of twelve 36" pipe piles will be installed to accommodate placement of the dock at its new location.

In-water construction of the south floating dock was originally scheduled to occur in 2019, however, this work was not able to be completed. The south floating dock is currently scheduled for 2020 and pile installation for the south floating dock will be scheduled so that impact/vibratory hammers will not be operating at the same time as PCT impact/vibratory hammers. In addition and in order to minimize cumulative effects, if south floating dock pile installation occurs on the same day as PCT pile installation/removal, the POA will limit the combined number of piles for both projects at up to three piles/day in accordance with the specifications identified for the PCT project in its IHA application. The POA received a LOC, under the ESA, on July 25, 2019, for the south floating dock project. NMFS anticipates the USACE will request re-initiation on this project pursuant to section 7 of the ESA. The POA would implement shutdown measures and employ PSOs during this project. The POA has determined there is no potential for take of marine mammals due to these measures and therefore an IHA under the MMPA is not necessary.

In 2020, the POA applied for concurrence from the USACE that the POA Fender Pile Replacement and Repair Project qualifies under Nationwide Permit 3, Maintenance (NWP3). The purpose of the project is to replace 180 corroding and failing 22-inch pin piles within the POA's existing fendering system. Pre- and post-earthquake (2018) inspections have shown that these piles are in a state of imminent failure and require emergency repair. It has been determined through engineering evaluation that these piles are currently providing only 10 percent of the required resistance for safely berthing ships at the POA, presenting a substantial safety hazard and potential threat to commerce in Alaska. The tendering system is comprised of 107 fender assemblies each supported by two pin piles. A total of 23 fender assemblies were replaced in 2015 and 2019. The POA plans to repair the remaining 84 fender assemblies via installation of 168. Shipping schedules - including cruise, cargo, fuel, cement, and military vessels - allow for only one or two fenders to be repaired each week, resulting in a maximum installation rate of 22 fenders (44 piles) per construction season (April – November). It is estimated that future repairs will take up to five years to complete, including one contingency year. Work may begin as early as May 2020.

In order to reinforce each fender assembly, a 22-inch pile would be installed inside of each existing 24-inch pile up to a 45-foot embedment depth using an impact and/or vibratory hammer. Installing the new pile within the existing pile would reduce noise impacts and the potential for incidental dock damage

during maintenance. For piles that are determined to be in extremely poor condition or that have already failed, a diving Contractor would be mobilized to the site to cut the pile off at the mudline and remove the non-embedded portion of the pile. This scenario may occur with 25 to 50 percent of the new piles. In-water work would include pile installation and fender repair within previously disturbed areas; no excavation or fill is associated with this project. The POA has independently prepared to implement mitigation and monitoring measures (shutdown zones and PSO monitoring) and has determined that this project would not result in the harassment of marine mammals; therefore, no MMPA authorization is necessary.

After completion of the PCT, the POA plans to replace Terminals 1 and 2 and stabilize the North Extension Stabilization Step 1 project as part of Phase 2 of the PAMP. Terminals 1 and 2 are the existing container and general cargo terminals, and are the only deep water marine cargo terminals in Anchorage. POA cargo services supply 87 percent of Alaska's population. Preliminary plans for these terminal replacements are currently in a state of reevaluation due to early estimates of high costs and current lack of funding. The schedule for replacement of Terminals 1 and 2 is currently uncertain.
The initial replacement plan that is currently under reevaluation for Phase 2 of the PAMP included demolition of the two existing marine terminals, a new upland expansion, and construction of two new marine terminals in the approximate center of the POA. Each terminal would include a pile-supported platform, pile-supported access trestles, a mooring system, and a fender system. Terminal 1 would support a lift-on/lift-off ship-to-shore rail mounted gantry crane system for the transfer of cargo. Vessels at Terminal 2 would utilize a roll-on/roll-off cargo transfer system. Terminal 2 would also include a single mooring dolphin. Excavation and placement of fill and armor rock would take place adjacent to Terminals 1 and 2 to extend the shoreline seaward. Reevaluation of this concept is currently underway and a final design solution is expected to be identified in late 2020.

Other future phases of the PAMP include replacing Petroleum Oil and Lubricants Terminal 2 as Part of Phase 3, and further stabilization of NES Step 2 and demolition of Terminal 3 as Part of Phases 4 and 5. It should be noted that the NES Step 1 and 2 Projects will remove existing filled areas and convert them to open marine waters, resulting in beneficial impacts on the marine environment. Similar to Phase 2 of the PAMP, Phases 3 through 5 are currently being reevaluated and the schedules for construction are uncertain.

The U.S. Army Corps of Engineers has been conducting maintenance dredging annually at the Port of Alaska since 1965, and continues to do so throughout each year. The POA is dredged to the depth of minus 35 feet mean lower low water (MLLW). Dredged materials are dumped 3,000 feet abeam of the POA dock face at the Anchorage in-water disposal site. NMFS issued a LOC Concurrence under the ESA for their current USACE permit in 2017. In 2018, NMFS issued a LOC for the POA to conduct transitional dredging at the Terminal facility and dredged material disposal offshore. These activities will provide the needed depths for berthing vessels at the new Terminal facility (mentioned above). Once the POA's dredging is complete the USACE will maintain dredging at this location.

Dredging operations also occur annually at the Ship Creek Boat Ramp, located approximately 1.4 km (0.8 mi) southwest of the POA PCT project location. The POA Dredging at this site is accomplished in early May during minus 3 foot tides, and is usually accomplished in three to four days using heavy machinery. Dredging at the POA does not seem to be a source of re-suspended contaminants (USACE 2009), and belugas often pass near the dredge (USACE 2008, ICRC 2012, POA 2019, USACE 2019). The POA's current permit and associated consultation are expiring and the POA has submitted a permit application to the USACE.

Port MacKenzie

Port MacKenzie also has the potential to expand its facilities, depending on future needs associated with large resource development projects. An increase in vessel traffic may have an effect on marine mammals. Construction activities, as well as the placement of piers and abutments, may have an effect on marine mammals, their habitat, and their prey species. However, NMFS is not currently aware of any specific projects planned at Port MacKenzie.

4.4.6 Oil and Gas Development

The Alaska Department of Natural Resources' Division of Oil and Gas has issued a preliminary best interest finding for proposed Cook Inlet area-wide oil and gas lease sales, 2019–2028. The lease sales could lead to increased oil and gas development in Cook Inlet; however, it is uncertain if oil and gas companies will be interested in acquiring these leases given the commodity prices, the State's tax structure, and the sustainable investment required to explore and develop offshore leases. Currently, there are 17 existing oil and gas drilling platforms within Cook Inlet.

Impacts from gas and oil development include temporary increased noise from seismic activity, vessel and air traffic, and well drilling; discharge of wastewater; small areas of habitat loss from the construction of oil and gas facilities; and contaminated food sources and/or injury from a natural gas blowout or oil spill. For projects where an IHA is requested, marine mammal exposure to seismic activities is mitigated to effect the least practicable adverse impact. It is a common requirements for seismic operations to maintain extensive marine mammal monitoring (e.g., flights) and shutdown if CIBWs are observed. The risk of these impacts may increase as oil and gas development increases; however, new development will undergo consultation and permitting requirements prior to exploration and development. If Authorizations are issued to these applicants, they will be required to implement mitigation and monitoring measures to reduce impacts to marine mammals and their habitat in the area, and will be subject to the same MMPA and, when applicable, ESA standards.

NMFS has received applications requesting takes of marine mammals incidental to seismic surveys and drilling operations. Seismic surveys in Cook Inlet (such as Hilcorp's geophysical and geotechnical surveys for which NMFS issued an LOA (84 FR 37442, July 31, 2019) that contained required mitigation, monitoring and reporting measures), may continue as the industry seeks a better understanding of available oil and gas deposits. In addition, NMFS has received an application from the Alaska Gasline Development Corporation (AGDC) for take of marine mammals, by harassment, incidental to construction of a marine terminal near Nikiski and installation of a pipeline in Cook Inlet. NMFS is currently processing that application. Mitigation and monitoring measures such as ramp-ups, shutdown zones, and PSO monitoring for the Alaska LNG project have been proposed (84 FR 30991, June 28, 2019) but have yet to be finalized. Below, we outline key mitigation and monitoring measures contained within Hilcorp's rule and LOA for seismic activity (84 FR 37442, July 31, 2019) which are designed to reduce the intensity of any harassment that may occur incidental to the surveys.

- Establishment of an exclusion zone within 10 nautical miles of the Susitna River Delta during periods of biological significance for CIBWs.
- Establishment of an exclusion zone for the mouth of the Kasilof River
- Implementation of shutdown whenever CIBWs are observed during use of airguns regardless of distance.
- Implementation of airgun shutdown procedures during the activity when marine mammals are detected within or about to enter the exclusion zone, to reduce the noise exposure level to below that which could cause injury to marine mammals
- Implementation of airgun ramp-up procedures when the array is started, to provide marine mammals with a warning and to allow marine mammals to vacate the area.

- Use of aerial surveys before starting seismic airgun surveys each day to look for groups of CIBWs that could be within the Level B isopleth of the day's planned survey area
- Use of NMFS-approved PSOs on source vessel and mitigation vessel.

Any harassment from these oil and gas projects would not occur within Knik Arm and would be concentrated toward the middle and lower Cook Inlet. In addition, the LOAs proposed for these projects limits take to no more than 20 CIBWs per year; therefore, the separation of time and space and limited take authorized is not likely to result in significantly cumulative effects on CIBWs. Harassment of other species of marine mammals is also separated in time and space from the species impacted during the PCT.

4.4.7 Mining

The Pebble Limited Partnership proposes to develop the Pebble copper-gold-molybdenum porphyry deposit (Pebble deposit) as a surface mine in Southwest Alaska near Iliamna Lake, approximately 200 miles southwest of Anchorage and 60 miles west of Cook Inlet. The project would include development of the open pit mine, with associated infrastructure to include a 270-megawatt power generating plant. A 188-mile natural gas pipeline from the Kenai Peninsula across Cook Inlet to the mine site is proposed as the energy source for the mine. The transportation corridor includes mine and port access roads, an 18-mile crossing of liamna Lake, and an Amakdedori port facility on the western shore of Cook Inlet. The construction and operation of the port facility could also impact marine mammals within Cook Inlet; however, the construction method and plans are currently unknown. It is possible pile driving may not occur. If impacts such as behavioral harassment would occur from construction of the PLP port, any impacts would not occur during the PCT project and would be farther removed in space (i.e., lower in the inlet).

4.4.8 Marine Mammal Research

Many important aspects of marine mammal biology remain unknown, or are incompletely studied. In addition, management of these species and stocks requires knowledge of their distribution, abundance, migration, population, ecology, physiology, genetics, behavior, and health. Therefore, free-ranging marine mammal species are frequently targeted for scientific research and studies.

Research activities typically 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) by both implantable and suction cup tags; biopsy sampling, including skin and blubber biopsy and swabbing; land-based surveys; and live capture for health assessments, blood and tissue sampling, pinniped tooth extraction, and related pinniped anesthesia procedures. All researchers are required to obtain scientific research permits from NMFS Office of Protected Resources under the MMPA and/or ESA (if an ESA-listed species is involved). Permits authorizing research in Cook Inlet on beluga whales, harbor seals, harbor porpoises, Steller sea lions, humpback whales, and killer whales may have cumulative effects on these species and stocks, but they are expected to be negligible to minor based on the specific research methodology. We anticipate 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 (e.g., seasonal, diel, or tidal) and spatial (i.e., geographic or bathymetric) parameters. However, the acoustic research currently conducted on CIBWs is passive in nature (hydrophone-based) and has no impact on marine mammals.

4.4.9 Climate Change

Climate change is a reasonably foreseeable condition that may result in cumulative effects to marine mammals in Cook Inlet (BOEM 2016). The 2014 Intergovernmental Panel on Climate Change concluded that they are "95 percent certain that humans are the main cause of current global warming" and that

increased anthropogenic greenhouse gas emissions, together with other anthropogenic drivers, are "extremely likely" to have been the dominant cause of the observed global warming since the mid-20th century (IPCC 2014). A recent special report indicates human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate (IPCC, 2018).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 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 they affect different areas in different ways and at differing intensities. Arctic regions have experienced some of the greatest changes, with major implications for the marine environment as well as for coastal communities.

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. We recognize that warming of the Arctic, which results in diminishing ice thickness and spatial extent, could be a cause for concern for marine mammals. In Cook Inlet, marine mammal distribution is dependent upon ice formation and prey availability, among other factors. For example, beluga whales often travel just along the ice pack and feed on prey beneath it (Richardson et al. 1990, 1991). Any loss of ice and environmental conditions such as rising water temperature could result in prey distribution changes or loss for beluga whales or other marine mammals. Ice; however, is not directly used in Cook Inlet for resting, reproduction, or rearing of young, as is the case for ice-dependent pinnipeds.

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 we recognize that concern for climate change in the project area is warranted, the full extent to which climate change would affect marine mammals in Knik Arm is unclear. The PCT project is occurring over a 2-year period during which time the impacts of climate change on marine mammals are likely to remain at baseline levels.

4.4.10 Conclusion

Based on the summation of past, present, and reasonably foreseeable future actions provided in this section, we believe that the incremental impacts to marine mammals and their habitat from issuance of the IHAs to the POA for the PCT Project would not result in cumulatively significant impacts to the human environment when added to other past, present, or future activities. Other relevant actions to be considered in evaluating potentially cumulatively significant impacts include subsistence hunting, pollution, commercial and recreational fishing, vessel traffic, coastal construction at the POA and elsewhere, oil and gas development activities, mining, marine mammal scientific research, and climate change. While consideration of these activities in sum suggests an increase in industrialization of Cook Inlet, many of these activities are spatially and temporally limited and do not permanently reduce or degrade the habitat available to marine mammals or their prey species. Cook Inlet is also a geographically vast area, and many activities, including the activities proposed by POA, are geographically distinct to various portions of the Inlet, which prevents the continued or permanent disruption of one particular portion of the Inlet for extended durations.

The proposed project would add an incremental contribution to the combined environmental impacts of other past, present, and reasonably foreseeable future actions; however, those impacts are expected to be mainly minimal and temporary (as described in this EA). None of the harassment authorized by NMFS in other incidental take authorizations would overlap in time or space with impacts from the PCT project. Where impacts from the PCT are permanent (i.e., PTS), any PTS would likely be a slight threshold shift

(e.g., a sound might have to be minimally louder in order to be perceived) and would be limited to low frequency ranges (as described in this EA). Therefore, overall, the potential for PTS is small and, if it occurs, it would be only slight PTS. Further, the amount of Level A harassment authorized in the form of PTS is for a very few number of animals with respect to large population sizes. Therefore, any cumulative impacts would affect so few individuals, the impact on the population would not likely be realized. In summary, incremental impacts of NMFS' proposed action, in combination with other actions, would not be significant.

5 List of Preparers and Agencies Consulted

Agencies Consulted

Office of Protected Resources

NOAA/National Marine Fisheries Service, Alaska Region

Prepared By

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