PROPOSED ACTION:	Issuance of Regulations and Letters of Authorization to Apache Alaska Corporation for the Take of Marine Mammals Incidental to Seismic Surveys in Cook Inlet, Alaska.
TYPE OF STATEMENT:	Environmental Assessment
LEAD AGENCY:	U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service
RESPONSIBLE OFFICIAL:	Donna S. Wieting, Director Office of Protected Resources, National Marine Fisheries Service
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LOCATION:	Cook Inlet, Alaska.
ABSTRACT:	This Environmental Assessment analyzes the environmental impacts of the National Marine Fisheries Service, Office of Protected Resources' proposal to promulgate regulations and issue subsequent Letters of Authorization, pursuant to section 101(a)(5)(A) of the Marine Mammal Protection Act, to Apache Alaska Corporation for the take of small numbers of marine mammals incidental to conducting seismic surveys in Cook Inlet, Alaska.
DATE:	May 2016

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LIST OF ACRONYMS AND ABBREVIATIONS

3D	three dimensional
ADF&G	Alaska Department of Fish and Game
ADCCE	Alaska Department of Commerce, Community, and Economic
ADNR	Alaska Department of Natural Resources
AKRO	Alaska Regional Office
ANO	Alaska Native Organization
Apache	Apache Alaska Corporation
Authorization	Incidental Harassment Authorization
BOEM	Bureau of Ocean Energy Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIMMC	Cook Inlet Marine Mammal Council
cui	cubic inches
dB re 1 µPa	decibel referenced to one microPascal
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
EZ	Exclusion Zone
FONSI	Finding of No Significant Impact
ft	feet
FR	Federal Register
Hz	Hertz
JBER	Joint Base Elmendorf-Fort Richardson
KABATA	Knik Arm Bridge and Toll Authority
km	kilometer
km^2	square kilometer
LOA	Letters of Authorization
m	meter
mi	miles
mi^2	square miles
m^3/sec	cubic meters per second
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service

NMML	National Marine Mammal Laboratory
NOAA	National Oceanic and Atmospheric Administration
OMB	Office of Management and Budget
OPR	Office of Protected Resources
PAM	Passive Acoustic Monitoring
PR1	Permits, Conservation and Educational Division
PRD	Protected Resources Division
PSO	Protected Species Observer
rms	root-mean-squared

Chapter 1 Introduction and Purpose and Need

The National Oceanic Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) is proposing to issue a final rule and annual Letters of Authorization (LOAs) to Apache Alaska Corporation (Apache). The rule will be valid for five years beginning June 1, 2016 and authorizes takes, by Level B harassment, of marine mammals incidental to seismic surveys associated with oil and gas exploration within Cook Inlet, Alaska. NMFS promulgates regulations and issues LOAs pursuant to Section 101(a)(5)(A) of the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. §§ 1631 et seq.) and the regulations governing the taking and importing of marine mammals, 50 Code of Federal Regulations (CFR) Part 216.

The Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1631 et seq.) prohibits the incidental taking of marine mammals. The incidental take of a marine mammal falls under three categories: Mortality, Serious injury or Harassment (injury and behavioral effects). Relevant to this action, harassment as defined by the MMPA 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, there are exceptions to the prohibition on take under the MMPA that gives NMFS the authority to permit the incidental taking of small numbers of marine mammals upon request from a U.S. citizen, provided certain determinations are made and statutory and regulatory procedures are met. Refer to Chapter 2 for details about NMFS proposed action and authorization criteria under the MMPA.

1.1 Background of Applicants Authorization Request

Apache Alaska Corporation (Apache) submitted an application to NMFS requesting authorization for the unintentional taking of small numbers of beluga whale and other marine mammals incidental to seismic surveys for oil and gas exploration. This is the fourth request from Apache for takes of marine mammals incidental to conducting seismic surveys in Cook Inlet. Apache received three Incidental Harassment Authorizations (IHAs) to conduct seismic surveys in calendar years 2012, 2013 and 2014, (77 Federal Register [FR] 27720, 78 FR 12720, 78 FR 80386, 79 FR 13636). Apache's last IHA expired on December 31, 2014. After applying for several IHAs, Apache submitted a petition for issuance of regulations and subsequent Letters of Authorization (LOAs) to authorize five years of seismic surveying in Cook Inlet. Although the initial application request was for seismic surveys beginning in 2015, Apache did not conduct seismic surveys in 2015. Subsequently, NMFS authorization will cover a five-year period beginning in 2016.

1.1.1 Applicant's Proposal

Apache proposes to conduct seismic surveys in the area depicted in Figure 1 (pg 16). The total proposed area encompasses approximately 4,825 square kilometers (km2) (1,863 square miles [mi]) of intertidal and offshore areas. All of Apache's planned oil and gas exploration activities encounter land, inter-tidal transition zones and marine environments but the MMPA authorization request is for seismic surveys in the transition zone and marine environments, as the land-based activities are not anticipated to result in underwater sound levels exceeding NMFS threshold criteria. Although Apache's authorization request

includes the total proposed area, they only intend to survey a portion of the total area in any given year. In addition, Apache is requesting authorization in this total area to account for factors that influence seismic surveys and allow for operational flexibility in specific areas within Cook Inlet. For example, to return to areas previously surveyed to collect 3-dimensional (3D) data where previously, only 2D data was collected. Factors that influence the areas Apache proposes to conduct seismic surveys include:

- Geology of the Cook Inlet
- Other permitting restrictions (commercial fishing, subsistence fishing, Alaska Department of Fish and Game refuges)
- Seismic imaging of leases held by other entities with whom Apache has agreements (data sharing)
- Overlap of sources and receivers to obtain the necessary seismic imaging data
- General operational restrictions (ice, weather, environmental conditions, marine life activity)

1.1.2 Marine Mammals in the Action Area

The proposed seismic survey program could adversely affect the following marine mammal species under our jurisdiction:

- Cook Inlet beluga whale (Delphinapterus leucas)
- Harbor seal (Phoca vitulina richardsi)
- Killer whale (Orcinus orca)
- Harbor porpoise (Phocoena phocoena)
- Gray whale (Eschrichtius robustus)
- Humpback whale (Megaptera novaeangliae)
- Minke whale (Balaenoptera acutorostrata)
- Dall's porpoise (Phocoenoides dalli)
- Steller sea lion (Eumetopias jubatus)

1.1.3 Summary of Findings and Initial Determinations

On February 23, 2015, NMFS published a proposed rule in the Federal Register (FR) (80 FR 9510), which included the following:

- a description of the proposed action and an assessment of the potential impacts on marine mammals and the availability of marine mammals for subsistence uses
- plans for Apache's mitigation and monitoring measures to avoid and minimize potential adverse impacts to marine mammals and their habitat and proposed reporting requirements
- our preliminary findings under the MMPA

NMFS considered Apache's proposed mitigation and monitoring measures that would effect the least practicable adverse impact on marine mammals and made a preliminary determination that the impact on marine mammals from seismic surveys would result, at worst, in a modification in behavior and/or low-level physiological effects (Level B harassment) of certain species of marine mammals, with a negligible

impact on the affected species or stocks. In addition, we preliminarily determined that the seismic surveys would not have an unmitigable adverse impact on the availability of marine mammals for subsistence uses.

In addition to findings under the MMPA, NMFS analysis in the Draft EA determined the issuance of LOAs would not result in individually insignificant but cumulatively significant impacts or in cumulative adverse effects that could have a substantial effect on the target species or non-target marine mammal species. The intermittent frequency and short duration of the harassment from the seismic surveys should allow adequate time for the marine mammals to recover from potentially adverse effects. Finally, the environmental analyses did not identify any significant environmental issues or impacts.

1.2 Purpose and Need

Purpose: To authorize the take of small numbers of marine mammals in accordance with section 101(a)(5)(A) of the MMPA. Specifically, this section directs the Secretary of Commerce to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock, by United States citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if we make certain findings and regulations are issued.

Need: On July 11, 2014, Apache submitted an adequate and complete application demonstrating both the need and potential eligibility for authorization under the MMPA. Therefore, NMFS has a duty to determine whether and how to authorize take incidental to the activities described in Apache's application. NMFS responsibilities under section 101(a)(5)(A) of the MMPA and its implementing regulations establish and frame the need for NMFS proposed action. Any alternatives considered under NEPA must meet the agency's statutory and regulatory requirements.

1.3 Environmental Review and Compliance

NMFS' promulgation of regulations and issuance of an LOA to Apache is considered a major federal action under the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 et seq.), and the Council on Environmental Quality (CEQ) regulations in 40 CFR §§ 1500-1508. Thus, we are required to analyze the effects on the human environment and determine whether they are significant. This Environmental Assessment (EA), titled "Issuance of Regulations and Letters of Authorization to Apache Alaska Corporation for the Take of Marine Mammals Incidental to Seismic Surveys in Cook Inlet, Alaska," (hereinafter, EA) addresses the potential environmental impacts of three alternatives available to us under section 101(a)(5)(A) of the MMPA, namely:

1) Issue annual LOAs under a five-year rule to Apache authorizing unintentional take of marine mammal's incidental to the conduct of seismic surveys. The authorization includes the prescribed means of take and requires mitigation measures, monitoring and reporting. (Alternative 1, Preferred Alternative)

2) Do not authorize Apache for unintentional takes of marine mammal's incidental to seismic surveys, in which case there are two possible outcomes. One is that the seismic surveys occur in the absence of an MMPA authorization. In this case, (1) Apache would be in violation of the MMPA if takes occur, (2) mitigation, monitoring and reporting would not be prescribed by

NMFS or (3) Apache could implement the mitigation and monitoring NMFS would have required under an authorization. Another outcome scenario is Apache could choose not to proceed with their proposed activities

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. NFMS consults and/or coordinates internally (e.g., Office of the National Marine Sanctuaries) and with other regulatory agencies (e.g., U.S. Fish and Wildlife Service (USFWS)), as appropriate, during NEPA reviews prior to implementation of a proposed action to ensure all requirements are met. NMFS also integrates the review and preparation of NEPA documents with the public process required by the MMPA for proposed authorizations. The following subsections discuss how NMFS integrated the public review and applicable consultation processes for our proposed action.

1.3.1 Public Involvement Summary

The NEPA process is intended to enable NMFS to make decisions based on an understanding of the environmental consequences and take actions to protect, restore, and enhance the environment. An integral part of the NEPA process is public involvement. Early public involvement facilitates the development of an EA and informs the scope of issues to be addressed in the EA. Although agency procedures do not require public involvement prior to finalizing an EA, NMFS determined that providing the Draft EA for public review with the publication of the proposed IHA was the appropriate step to involve the public in order to understand the public concerns for the proposed action, identify significant issues related to the proposed action and obtain the necessary information to complete an analysis. We posted Apache's application and the Draft EA on our website with the release of the proposed rule on February 23, 2015, (80 FR 9510) for a 45-day public review period. The proposed rule, supporting analyses, and corresponding public comment period were instrumental in providing the public with information on relevant issues and offering the public a meaningful opportunity to provide comments to NMFS for consideration in both the MMPA and NEPA decision-making processes.

1.3.2 Relevant Public Comments

During the 45-day public comment period, NMFS received 14 comment letters from the following agencies, organizations or individuals:

- State of Alaska Department of Natural Resources (AK DNR)
- Alaska Chamber
- All American Oil Field
- Alaska Oil and Gas Association (AOGA)
- Chugach Alaska Corporation
- Cook Inlet Regional Inc. (CIRI)
- International Fund for Animal Welfare (IFAW)
- Resource Development Council (RDC)
- Natural Resource Defense Council (NRDC)
- Marine Mammal Commission (MMC)
- Public law class of the Vermont Law School

- Three private citizens

The substantive public comments related to the potential environmental impacts associated with NMFS' action of issuing regulations and subsequent LOAs for Apache's action include:

- Encouraging NMFS to deny the request for regulations and instead issue annual IHAs
- Updating take methodology to include new information as well as mitigation and monitoring reports
- Considering two additional species in the take estimation analysis
- Improving the analysis cumulative impacts to Cook Inlet beluga whales in light of additional oil and gas activities proposed for Cook Inlet
- Requiring the use of alternate technologies
- Requiring the use of additional mitigation technologies, including passive acoustic monitoring.

NMFS considered all comments received and incorporated comments as applicable. For comments regarding monitoring and mitigation measures, NMFS considered these within the context of the MMPA requirement to "effect the least practicable impact on marine mammals and their habitat and on subsistence uses of marine mammals" and included a requirement for passive acoustic monitoring and made some adjustments to its analysis by adding two additional species to the authorization that have the potential to enter the action area.

NMFS bases its decision on factors analyzed in this Final EA, including best available science and the findings made under the MMPA for promulgating regulations and subsequent LOAs.

1.3.3 Endangered Species Act Consultation

Section 7 of the Endangered Species Act (ESA) and implementing regulations at 50 CFR §402 require consultation with the appropriate federal agency (either NMFS or USFWS) for actions that "may affect" a listed species or critical habitat. NMFS' issuance of Authorizations affecting ESA-listed species or designated critical habitat, directly or indirectly, is a federal action subject to these Section 7 consultation requirements. There are three marine mammal species under NMFS' jurisdiction listed as endangered under the ESA with confirmed or possible occurrence in the proposed project area (i.e., Cook Inlet): the Cook Inlet beluga whale, Central North Pacific humpback whale, and the Steller sea lion. Additionally, the proposed action falls within designated critical habitat for the Cook Inlet beluga whale. Accordingly, NMFS is required to ensure that its action is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of critical habitat for such species.

1.3.3.1 Previous Section 7 Consultations

For the previous IHAs issued to Apache, NMFS Office of Protected Resources (OPR) Permits and Conservation Division (PR1) consulted with NMFS Alaska Regional Office (AKRO) Protected Resources Division (PRD). The consultation results were as follows:

On February 17, 2012, NMFS issued its Biological Opinion, which concluded that the issuance of the April 2012 Authorization is not likely to jeopardize the continued existence of Cook Inlet beluga whales or Steller sea lions, nor destroy or adversely modify Cook Inlet beluga whale critical habitat. On May 21,

2012, NMFS revised the February 17, 2012, Biological Opinion to clarify several sections, but the conclusions were unchanged. Due to a change in the size of the area for the second Authorization, NMFS PR1 reinitiated consultation with the AKRO PRD on the proposed issuance of an Authorization for Area 2.

On February 14, 2013, NMFS issued a Biological Opinion, which concluded that the issuance of an Authorization for Area 2 was not likely to jeopardize the continued existence of Cook Inlet beluga whales or Steller sea lions, nor destroy or adversely modify Cook Inlet beluga whale critical habitat. PR1 discussed the proposed action of issuing a third section 101(a)(5)(D) Authorization with AKRO PRD and determined that the action falls within the scope and analysis of the February 2013 Biological Opinion. Therefore, a new section 7 consultation was not conducted prior to the issuance of the March 2014 Authorization.

1.3.3.2 Current Section 7 Consultation

On October 8, 2014, PR1 initiated consultation under section 7 of the ESA regarding the proposed promulgation of regulations and issuance of annual LOA to Apache for the take of ESA-listed marine mammals for a five-year period beginning in June 2016. In addition to NMFS Section 7 consultation, Apache requested a permit from the U.S. Army Corps of Engineers (ACOE) to place and retrieve autonomous nodal recording systems (nodes) in an area 2,195 square miles in size below the mean high water mark (MHWM) of the Cook Inlet for conducting the proposed seismic surveys. The proposed deployment and retrieval of seismic nodes requires authorization under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403 et seq.). Therefore, the ACOE requested consultation under section 7 of the ESA jointly with PR1. The biological opinion for this consultation concluded that the issuance of regulations and subsequent LOAs as well as work authorized by the ACOE is not likely to jeopardize the continued existence of Cook Inlet beluga whales, western DPS Steller sea lions, or humpback whales; and that the actions are not likely to adversely affect the critical habitat for Steller sea lions or Cook Inlet beluga whales. Adverse effects are expected to be in the form of harassment.

1.3.4 Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Federal agencies are required to consult with the Secretary of Commerce with respect to any proposed action that may adversely affect essential fish habitat (EFH) identified under the MSFCMA. EFH identified in Cook Inlet includes the walleye Pollock, rock sole, Pacific cod, skate, weathervane scallop, Pacific salmon, and sculpin. The effects to EFH from NMFS authorization of seismic surveys would be temporary and minor. The main effect is short-term disturbance that might lead to temporary and localized relocation of the EFH species or their food. The actual physical and chemical properties of the EFH will not be impacted by either Apache's activity or NMFS' authorization because the activity will not have any lasting effects to EFH. The activity is temporary and does not alter the physical habitat in any way other than temporary laying and retrieval of nodes on the seafloor. Only a small area of EFH will be exposed to sound from airguns or node laying at any particular time, ensuring the majority of EFH is available at any given time for necessary biological functions. Therefore, NMFS determined authorizing take of marine mammals incidental to Apache's seismic surveys in Cook Inlet would not have an adverse impact on EFH and an EFH consultation is not required.

1.4 Scope of Environmental Analysis

The analysis in this Final EA addresses potential impacts to the human environment and natural resources, specifically marine mammals and ESA-listed species resulting from NMFS' proposed action to authorize takes incidental to Apache's seismic surveys. The range of alternatives includes the No Action alternative and other reasonable courses of action. NMFS analyzed direct, indirect and cumulative impacts and based the scope of its proposed action and alternatives on the relevant requirements in section 101(a)(5)(A) of the MMPA. Thus, NMFS authority under the MMPA bounds the scope of our alternatives and analysis. This EA does not further evaluate effects to the elements of the human environment listed in Table 1 because previous environmental assessments, (NMFS 2008a, b, c, 2013a, and b) have shown that our limited action of issuing authorizations to Apache for proposed seismic surveys would not significantly affect these elements the human environment.

Table 1. Components of the human environment not affected by our issuance of an Authorization.

Biological	Physical	Socioeconomic / Cultural
Amphibians	Air Quality	Commercial Fishing
Humans	Essential Fish Habitat	Military Activities
Non-Indigenous Species	Geography	Oil and Gas Activities
Seabirds	Land Use	Recreational Fishing
	Oceanography	Shipping and Boating
	State Marine Protected Areas	National Historic Preservation Sites
	Federal Marine Protected Areas	National Trails and Nationwide Inventory of Rivers
	National Estuarine Research Reserves	Low Income Populations
	National Marine Sanctuaries	Minority Populations
	Park Land	Indigenous Cultural Resources
	Prime Farmlands	Public Health and Safety
	Wetlands	Historic and Cultural Resources
	Wild and Scenic Rivers	
	Ecologically Critical Areas	

1.5 Other Sources that Influence the Scope of the EA

Previous analyses (included in the list below) that considered the impacts of authorizing take of marine mammals incidental to conducting seismic surveys concluded that the issuance of IHAs for these activities result in negligible impacts. Specifically, these analyses indicated that with the incorporation of monitoring and mitigation measures proposed by Apache, the authorized taking of marine mammals results in minor, short-term (recoverable) adverse effects on individual marine mammals. This EA relies and incorporates by reference Apache's application (Petition for Incidental Take Regulations, ASRC Energy Services, 2014a), the proposed rule (80 FR 9510), and other environmental compliance documentation listed below to avoid duplication of analysis and unnecessary length.

- Biological Assessment Cook Inlet, Alaska (ASRC Energy Services, 2014b);
- Final Supplemental Environmental Impact Statement—Cook Inlet Beluga Whale Harvest (NMFS, 2008a)
- Final Conservation Plan for the Cook Inlet beluga whale (Delphinapterus leucas) (NMFS, 2008b)
- Recovery Plan for the Steller sea lion (Eumatopias jubatus) (NMFS, 2008c)
- Environmental Assessment for the Issuance of an Incidental Harassment Authorization for the Apache Alaska Corporation 3D Seismic Survey in Cook Inlet, Alaska (NMFS, 2013a)
- Endangered Species Act: Section 7 Consultation Biological Opinion for 3D Seismic Surveys off Cook Inlet, Alaska by Apache Alaska Corporation (NMFS, 2013b).

Chapter 2 Alternatives Including the Proposed Action

2.1 Description of NMFS Proposed Action

NMFS' proposed action is to issue a final rule and annual Letters of Authorization (LOAs) to Apache Alaska Corporation (Apache). The rule will be valid for five years beginning June 1, 2016 and governs authorization of takes, by Level B harassment, of marine mammals incidental to seismic surveys for oil and gas exploration within Cook Inlet, Alaska.

NMFS proposed action is a direct outcome of Apache's application requesting authorization for the unintentional taking marine mammals incidental to oil and gas exploration activities that involve the conduct of seismic surveys. Seismic surveys have the potential to cause marine mammals near or within the survey area to be behaviorally disturbed, requiring a permit from NMFS. NMFS' criteria for issuing regulations and LOAs require that the taking of marine mammals have a negligible impact on the species or stock(s) and, where relevant, will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses. In addition, the rule and LOA must set forth, where applicable, the permissible methods of taking, other means of effecting the least practicable adverse impact on the species or stock and its habitat, and requirements pertaining to the monitoring and reporting of such takings.

2.2 Description of Applicants Proposed Activities

We presented a general overview of Apache's proposed oil and gas exploration seismic survey program operations in our proposed rule Federal Register notice (80 FR 9510, Feb 23, 2015). We incorporate those descriptions by reference in this EA and briefly summarize them here.

2.2.1 Specified Time and Specified Area

Apache proposes to conduct seismic surveys over the course of five years for approximately eight to nine months annually in offshore areas in open water periods from March 1 through December 31, beginning in June 2016. During each 24-hour period, seismic support activities may be conducted throughout the entire period; however, in-water airguns would only be active for approximately 2-3 hours during each of the slack tide periods. There are approximately four slack tide periods in a 24-hour period; therefore, airgun operations would be active during approximately 8-12 hours per day, if weather conditions allow.

Apache's proposed seismic surveys would occur in intertidal transition zone and marine environment areas of Cook Inlet, Alaska. The land-based activities were not considered in this EA since these are not anticipated to result in underwater sound levels exceeding NMFS criteria for take thresholds. The proposed location of Apache's acquisition plan encompasses approximately 5,684 km^2 (2,195 mi^2) of intertidal and offshore areas. This area is approximately 18% larger than the area contained in Apache's MMPA application (ASRC, 2014a) and is depicted in Figure 1 (pg 16). The additional area proposed for seismic surveys (and not originally noted in Apache's MMPA application) is located in northern Cook Inlet near the Susitna Delta region. Apache would only operate in a portion of this entire area between March 1 and December 31, each year. There are numerous factors that influence the seismic survey areas, including the geology of the Cook Inlet area, other permitting restrictions (i.e., commercial fishing, Alaska Department of Fish and Game refuges), seismic surveys conducted by other entities with whom Apache has agreements (e.g., data sharing), overlap of nodal sources and receivers to obtain the necessary

seismic survey data, and general operational restrictions (ice, weather, environmental conditions, marine life activity, etc.). Water depths for the program range from 0-128 m (0-420 ft).

2.2.2 Seismic Survey Operations

During seismic survey operations, vessels would lay and retrieve nodal sensors on the sea floor in periods of low current, or, in the case of the intertidal area, during high tide over a 24-hour period. Apache proposes to use two synchronized vessels. Each source vessel would be equipped with compressors and 2,400 cubic inch (in^3) airgun arrays. Additionally, one of the source vessels would be equipped with a 440 in^3 shallow water source array, which can be deployed at high tide in the intertidal area in less than 1.8 m (6 ft) of water. The two source vessels do not fire the airguns simultaneously; rather, each vessel fires a shot every 24 seconds, leaving 12 seconds between shots. Vessel speeds range from two to four knots. The operation would utilize two source vessels, three cable/nodal deployment and retrieval operations vessels, a mitigation/monitoring vessel, a node re-charging and housing vessel, and two small vessels for personnel transport and node support in the extremely shallow waters in the intertidal area.

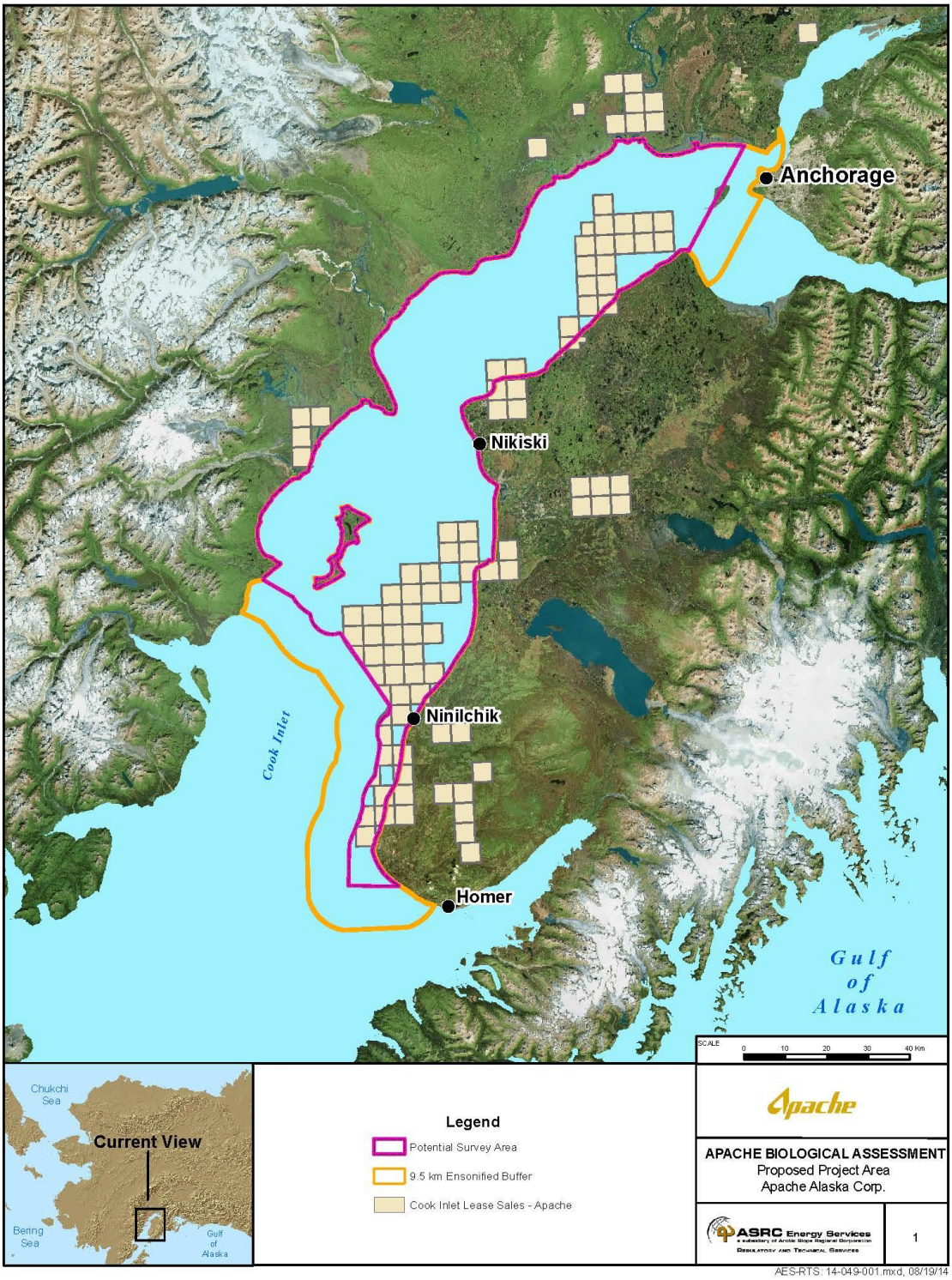

Figure 1. Project Area for Apache's 2016-2021 3D Seismic Survey Program

2.3 Description of Alternatives

2.3.1 Alternative 1 – Issuance of Authorizations with Mitigation Measures

Alternative 1 is the Preferred Alternative. Under this alternative, we would promulgate regulations that would be valid for five years beginning around June 2016 and issue annual Letters of Authorization (LOAs) to Apache allowing the incidental take, by Level B harassment, of nine species of marine mammals subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the final rule, if issued, along with any additions based on consideration of public comments.

2.3.1.1 Mitigation and Monitoring Measures

As described in Section 1.2.1, we must prescribe the means of effecting the least practicable adverse impact on the species or stocks of marine mammals and their habitat. In order to do so, we must consider Apache's proposed mitigation measures, as well as other potential measures, and assess 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 measures to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the measures to minimize adverse impacts as planned; and (3) the practicability of the measures for applicant implementation.

Any additional mitigation measure proposed by us beyond what the applicant proposes should be able to or have a reasonable likelihood of accomplishing or contributing to the accomplishment of one or more of the following goals:

- Avoidance or minimization of marine mammal injury, serious injury, or death wherever possible;
- A reduction in the numbers of marine mammals taken (total number or number at biologically important time or location);
- A reduction in the number of times the activity takes individual marine mammals (total number or number at biologically important time or location);
- A reduction in the intensity of the anticipated takes (either total number or number at 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 directly related to mitigation, an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

To reduce the potential for disturbance from acoustic stimuli associated with the activities, Apache proposed to implement several monitoring and mitigation measures for marine mammals. NMFS proposed some additional measures. The proposed monitoring and mitigation measures include the following vessel-based measures:

- Utilize NMFS-qualified, vessel-based Protected Species Observers (PSOs) to visually watch for and monitor marine mammals near the seismic source vessels during daytime operations (from nautical twilight-dawn to nautical twilight-dusk) and before and during start-ups of sound sources day or night. Two PSOs would be on each source vessel, and two PSOs would be on the support

vessel to observe the exclusion and disturbance zones. When practicable, as an additional means of visual observation, Apache's vessel crew may also assist in detecting marine mammals.

- Establish a 180 dB re 1 µPa (rms) and 190 dB re 1 µPa (rms) "exclusion zone" (EZ) for marine mammals before the full array (2400 in^3) is in operation; and a 180 dB re 1 µPa (rms) and 190 dB re 1 µPa (rms) EZ before a single airgun (10 in^3) is in operation, respectively. Apache must also establish a 160 dB re 1 µPa (rms) zone for belugas and groups of five or more harbor porpoises and killer whales before the full array (2400 in^3) and before a single airgun (10 in^3) is in operation.

- Visually observe the entire extent of the EZ (180 dB re 1 µPa [rms] for cetaceans and 190 dB re 1 µPa [rms] for pinnipeds and the 160 dB re 1 µPa [rms] for belugas and groups of five or more harbor porpoises and killer whales) using NMFS-qualified PSOs, for at least 30 minutes (min) prior to starting the airgun array (day or night). If the PSO finds a marine mammal within the EZ, Apache must delay the seismic survey until the marine mammal(s) has left the area. If the PSO sees a marine mammal that surfaces, then dives below the surface, the PSO shall wait 30 min. If the PSO sees no marine mammals during that time, they should assume that the animal has moved beyond the EZ. If for any reason the entire radius cannot be seen for the entire 30 min (i.e., rough seas, fog, darkness), or if marine mammals are near, approaching, or in the EZ, the airguns may not be ramped-up.

- Implement a "ramp-up" procedure when starting up at the beginning of seismic operations or any time after the entire array has been shut down for more than 10 min, which means start the smallest sound source first and add sound sources in a sequence such that the source level of the array shall increase in steps not exceeding approximately 6 dB per 5-min period. During ramp-up, the PSOs shall monitor the EZ, and if marine mammals are sighted, a power-down, or shutdown shall be implemented as though the full array were operational. Therefore, initiation of ramp-up procedures from shutdown requires that the PSOs be able to visually observe the full EZ as described above.

- Alter speed or course during seismic operations if a marine mammal, based on its position and relative motion, appears likely to enter the relevant EZ. If speed or course alteration is not safe or practicable, or if after alteration the marine mammal still appears likely to enter the EZ, further mitigation measures, such as a power-down or shutdown, shall be taken.

- Power-down or shutdown the sound source(s) if a marine mammal is detected within, approaches, or enters the relevant EZ. A shutdown means all operating sound sources are shut down (i.e., turned off). A power-down means reducing the number of operating sound sources to a single operating 10 in^3 airgun, which reduces the EZ to the degree that the animal(s) is no longer in or about to enter it.

- Following a power-down, if the marine mammal approaches the smaller designated EZ, the sound sources must then be completely shut down. Seismic survey activity shall not resume until the PSO has visually observed the marine mammal(s) exiting the EZ and is not likely to return, or has

not been seen within the EZ for 15 min for species with shorter dive durations (small odontocetes and pinnipeds) or 30 min for species with longer dive durations (large odontocetes, including killer whales and beluga whales).

- Following a power-down or shutdown and subsequent animal departure, survey operations may resume following ramp-up procedures described above.

- Marine geophysical surveys may continue into night and low-light hours if such segment(s) of the survey is initiated when the entire relevant EZs can be effectively monitored visually (i.e., PSO(s) must be able to see the extent of the entire relevant EZ).

- If a beluga whale or groups of five or more killer whales and/or harbor porpoises are visually sighted approaching or within the 160-dB disturbance zone, survey activity would not commence until the animals are no longer present within the 160-dB disturbance zone.

- Whenever beluga whales or groups of five or more killer whales and/or harbor porpoises are detected approaching or within the 160-dB disturbance zone, the airguns may be powered down before the animal is within the 160-dB disturbance zone, as an alternative to a complete shutdown. If a power down is not sufficient, the sound source(s) shall be shut-down until the animals are no longer present within the 160-dB zone.

The proposed monitoring and mitigation measures include the following shore-based measures:

- Utilize a shore-based station to visually monitor for marine mammals. The shore-based PSOs would scan the area prior to, during, and after the survey operations involving the use of sound sources, and would be in contact with the vessel-based PSOs via radio to communicate sightings of marine mammals approaching or within the project area.

The proposed monitoring and mitigation measures include the following aerial measures:

- When practicable, Apache proposes to utilize helicopter or fixed-wing aircraft to conduct aerial surveys of the project area prior to the commencement of operations in order to identify locations of congregations of beluga whales. Apache proposes to conduct daily aerial surveys as required in regulatory permits. As logistically feasible, each daily survey will be scheduled to occur at least 30 minutes and no more than 120 minutes prior to any seismic-related activities (including but not limited to node laying/retrieval or airgun operations). Daily aerial surveys will also occur on days that there may be no seismic activities. Aerial surveys are proposed to occur along and parallel to the shoreline throughout the project area as well as the eastern and western shores of central and northern Cook Inlet.

- Weather and safety permitting, aerial surveys would fly at an altitude of 305 m (1,000 ft). In the event of a marine mammal sighting, aircraft would attempt to maintain a radial distance of 457 m (1,500 ft) from the marine mammal(s). Aircraft would avoid approaching marine mammals from head-on, flying over or passing the shadow of the aircraft over the marine mammal(s).

In addition to the mitigation measures proposed by Apache, we proposed additional mitigation measures:

- Suspending seismic operations if a live marine mammal stranding is reported in Cook Inlet coincident to, or within 72 hours of seismic survey activities involving the use of airguns. The shutdown must occur if the animal is within a distance two times that of the 160 dB isopleth of the largest airgun array configuration. Shutdown procedures will remain in effect until NMFS determines that, and advises Apache that, all live animals involved in the stranding have left the area (either of their own volition or following herding by responders).
- The mitigation airgun will be operated at approximately one shot per minute and will not be operated for longer than three hours in duration during daylight hours and good visibility. In cases when the next start-up after the turn is expected to be during lowlight or low visibility, use of the mitigation airgun may be initiated 30 minutes before darkness or low visibility conditions occur and may be operated until the start of the next seismic acquisition line. The mitigation gun must still be operated at approximately one shot per minute.
- Apache must not operate airguns within 10 miles (16 km) of the mean lower low water (MLLW) line of the Susitna Delta (Beluga River to the Little Susitna River) between April 15 and October 15 (to avoid any effects to belugas in an important feeding and breeding area).
- If any marine mammal species are encountered during seismic activities for which take is not authorized are likely to be exposed to sound pressure levels (SPLs) greater than or equal to 160 dB re 1 µPa (rms), then Apache must alter speed or course, power down or shut-down the sound source to avoid take.
- Apache must implement passive acoustic monitoring (PAM) during non-daylight hours. Detections from PAM will also serve to clear the exclusion zone of marine mammals at night by way of acoustic detections to allow for ramp-up in non-daylight hours. The exact specifications of the monitoring scheme will be detailed in LOAs to allow for adjustments of technology for optimal detection rates.

Apache proposed to sponsor marine mammal monitoring during the present project, in order to implement the mitigation measures that require real-time monitoring and to satisfy the monitoring requirements of the Authorization. Apache would monitor the area for marine mammals during all activities. Monitoring would be conducted from vessels, shore-based stations, and aerial platforms. Monitoring data would include the following:

(1) Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from seismic vessel, sighting cue, apparent reaction to the airguns or vessel (e.g., none, avoidance, approach, paralleling, etc., and including responses to ramp-up), and behavioral pace; and
(2) Time, location, heading, speed, activity of the vessel (including number of airguns operating and whether in state of ramp-up or power-down), Beaufort sea state and wind force, visibility, and sun glare. These data shall also be recorded at the start and end of each observation watch and during a watch whenever there is a change in one or more of the variables.

2.3.1.2 Reporting Measures

Apache would submit a weekly field report, no later than close of business each Thursday during the weeks when in-water seismic survey activities take place. The weekly field reports would summarize species detected (number, location, distance from seismic vessel, behavior), in-water activity occurring at the time of the sighting (discharge volume of array at time of sighting, seismic activity at time of sighting, visual plots of sightings, and number of power downs and shutdowns), behavioral reactions to in-water activities, and the number of marine mammals exposed. Additionally, Apache would submit a monthly report, no later than the 15th of each month, to NMFS' Permits and Conservation Division for all months during which in-water seismic survey activities occur. These reports must contain and summarize the following information:

(1) Dates, times, locations, heading, speed, weather, sea conditions (including Beaufort sea state and wind force), and associated activities during all seismic operations and marine mammal sightings;
(2) Species, number, location, distance from the vessel, and behavior of any marine mammals, as well as associated seismic activity (number of power-downs and shutdowns), observed throughout all monitoring activities;
(3) An estimate of the number (by species) of: (A) pinnipeds that have been exposed to the seismic activity (based on visual observation) at received levels greater than or equal to 160 dB re 1 µPa (rms) and/or 190 dB re 1 µPa (rms) with a discussion of any specific behaviors those individuals exhibited; and (B) cetaceans that have been exposed to the seismic activity (based on visual observation) at received levels greater than or equal to 160 dB re 1 µPa (rms) and/or 180 dB re 1 µPa (rms) with a discussion of any specific behaviors those individuals exhibited; and
(4) A description of the implementation and effectiveness of the: (A) terms and conditions of the Biological Opinion's Incidental Take Statement (ITS); and (B) mitigation measures of the Authorization. For the Biological Opinion, the report shall confirm the implementation of each Term and Condition, as well as any conservation recommendations, and describe their effectiveness, for minimizing the adverse effects of the action on ESA-listed marine mammals.

Apache would submit an annual report to NMFS' Permits and Conservation Division within 90 days after the end of every operating season during the five-year period. The annual report would include:

(1) Summaries of monitoring effort, both visual and passive acoustic (e.g., total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals);
(2) Analyses of the effects of various factors influencing detectability of marine mammals (e.g., sea state, number of observers, and fog/glare);
(3) Species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover;
(4) Analyses of the effects of survey operations; and
(5) Sighting and acoustic detection rates of marine mammals during periods with and without seismic survey activities (and other variables that could affect detectability), such as: (A) initial sighting distances versus survey activity state; (B) closest point of approach versus survey activity state; (C) observed behaviors and types of movements versus survey activity state; (D) numbers of sightings/individuals seen versus survey activity state; (E) distribution around the source vessels

versus survey activity state; and (F) estimates of take by Level B harassment based on presence in the 160 dB harassment zone.

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

In addition to these formal reports, Apache must immediately report to NMFS if 25 belugas are detected within the 160 dB re 1 µPa (rms) disturbance zone during seismic survey operations to allow NMFS to consider making necessary adjustments to monitoring and mitigation.

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by this Authorization, such as an injury (Level A harassment), serious injury or mortality (e.g., ship-strike, gear interaction, and/or entanglement), Apache shall immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, and the Alaska Regional Stranding Coordinators. The report must include the following information:

(1) Time, date, and location (latitude/longitude) of the incident;
(2) The name and type of vessel involved;
(3) The vessel's speed during and leading up to the incident;
(4) Description of the incident;
(5) Status of all sound source use in the 24 hours preceding the incident;
(6) Water depth;
(7) Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
(8) Description of marine mammal observations in the 24 hours preceding the incident;
(9) Species identification or description of the animal(s) involved;
(10) The fate of the animal(s); and
(11) Photographs or video footage of the animal (if equipment is available).

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

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

incident. NMFS would work with Apache to determine whether modifications in the activities are appropriate.

In the event that Apache discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the authorized activities (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), Apache shall report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, the NMFS Alaska Stranding Hotline, and the Alaska Regional Stranding Coordinators within 24 hours of the discovery. Apache shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. Activities may continue while NMFS reviews the circumstances of the incident.

In our proposed rule *Federal Register* notice, which we incorporate by reference, we preliminarily determined that the measures included in the proposed Authorization were sufficient to reduce the effects of Apache's proposed seismic survey operations on marine mammals to the level of least practicable adverse impact. In addition, we described our analysis of impacts and preliminarily determined that the taking of small numbers of marine mammals, incidental to Apache's proposed seismic survey operations would have a negligible impact on the relevant species or stocks and would not have an unmitigable adverse impact on affected species or stocks for taking for subsistence uses. Accordingly, this Preferred Alternative would satisfy the purpose and need of our proposed action under the MMPA–issuance of Authorizations, along with required mitigation measures and monitoring that meets the standards set forth in section 101(a)(5)(A) of the MMPA and the implementing regulations.

2.3.2 Alternative 2 – No Action Alternative

Regulations (40 CFR Section 1502.14[d]) require the assessment of a no action alternative to provide a clear basis for choice among options by the decision maker and the public. For NMFS, denial of MMPA authorizations constitutes the NMFS No Action Alternative, which is consistent with our statutory obligation under the MMPA to grant or deny permit applications and to prescribe mitigation, monitoring and reporting with any authorizations. Under the No Action Alternative, there are two potential outcome scenarios. One is that the seismic surveys occur in the absence of an MMPA authorization. In this case, (1) Apache would be in violation of the MMPA if takes occur, (2) mitigation, monitoring and reporting would not be prescribed by NMFS or (3) Apache could implement the mitigation and monitoring NMFS would have required under an authorization. Another outcome scenario is Apache could choose not to proceed with their proposed activities.

NMFS analyzed both possible outcomes under the No Action Alternative. We took this approach to meaningfully evaluate the primary environmental issues in light of the scope of our authority to authorize take and prescribe mitigation to minimize impacts—the impact on marine mammals from these activities in the absence of protective measures.

2.3.3 Alternatives Considered but Eliminated from Further Consideration

NMFS considered whether other alternatives could meet the purpose and need and support Apache's proposed activities. An alternative that would allow for the issuance of Authorizations with no required mitigation or monitoring was considered but eliminated from consideration, as it would not be in compliance with the MMPA and therefore would not meet the purpose and need. For that reason, this alternative is not analyzed further in this document. In addition, an alternative that would have included

time/area restrictions beyond the one already considered in Alternatives 1 in the Susitna Delta was considered but eliminated from consideration because such measures were unnecessary given the timing and location of the seismic surveys. Alternative 3 from the Draft EA was also eliminated from further consideration. Under Alternative 3, we would promulgate regulations (valid from approximately June 2016 through May 2021) and issue subsequent, associated Authorizations annually to Apache allowing the incidental take, by Level B harassment, of nine species of marine mammals subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the proposed rule (Alternative 1). The difference under this Alternative 3 is that additional mitigation and monitoring measures would be required, as follows. A 120-dB monitoring (and shut-down safety) zone would be established for beluga whale cow/calf pairs in Cook Inlet and unmanned aerial vehicles would be required to conduct aerial monitoring would be required. At this time, these technologies are still being developed or refined. For example, while there has been some testing of unmanned aerial vehicles conducted recently, the technology has not yet been proven effective for monitoring or mitigation as would be required under an Authorization. However, once the monitoring technologies are either developed or refined, requiring the implementation of these measures would allow for increased effectiveness in implementing mitigation measures (e.g., shutdown), which would reduce potential impacts to marine mammals even further. As the technology and usage of UAVs by industry operators is still being developed and refined, an adequate analysis of the environmental consequences of the use of UAVs for monitoring outside of the realm of scientific research cannot be completed at this time, nor could a definitive statement be made regarding the effectiveness of this additional measure. Therefore, this alternative was eliminated from consideration at this time, but may be reconsidered as more information becomes available for future actions.

Chapter 3 Affected Environment

This chapter describes existing conditions in the proposed action area. Complete descriptions of the physical, biological, and social environment of the action area are contained in the documents listed in Section 1.5 of this EA. We incorporate those descriptions by reference and briefly summarize or supplement the relevant sections for marine mammals in the following subchapters.

3.1 Physical Environment

As discussed in Chapter 1, Section 1.5, our proposed action and alternatives relate only to the authorization of incidental take of marine mammals, therefore, certain aspects of the physical environment are not relevant to our proposed action.

3.1.1 Marine Mammal Habitat

We presented information on marine mammal habitat and the potential impacts to marine mammal habitat in the proposed rule *Federal Register* notice. In summary, beluga whales, harbor porpoise, and harbor seals use the waters of Cook Inlet for foraging, calving, and other important life history functions. The mouths of river streams are important beluga whale feeding habitat. Harbor seals also use coastal haul-outs in Cook Inlet. Killer whales, humpback whales, minke whales, Dall's porpoise, gray whales, and Steller sea lions more commonly use the lower Cook Inlet area, which is outside the majority of the active seismic operations area.

Pursuant to the ESA, critical habitat has been designated for Cook Inlet beluga whales and Steller sea lions. The proposed action falls within critical habitat designated in Cook Inlet for beluga whales but is not within critical habitat designated for Steller sea lions. On April 11, 2011, NMFS announced the two areas of critical habitat (76 FR 20180) comprising 7,800 km^2 (3,013 mi^2) of marine habitat (Figure 2). Critical habitat includes two areas (Areas 1 and 2) that encompass 7,800 km^2 of marine and estuarine habitat in Cook Inlet[1]. Designated beluga whale Critical Habitat Area 1 consists of 1,909 km^2 of Cook Inlet, north of Three Mile Creek and Point Possession. Critical Habitat Area 1 contains shallow tidal flats or mudflats and mouths of rivers that provide important areas for foraging, calving, molting, and escape from predators. High concentrations of beluga whales are often observed in these areas from spring through fall. Critical Habitat Area 2 consists of 5,891 km^2 located south of Critical Habitat Area 1 and includes nearshore areas along western Cook Inlet and Kachemak Bay. Critical Habitat Area 2 is known fall and winter foraging and transit habitat for beluga whales, as well as spring and summer habitat for smaller concentrations of beluga whales. Apache's proposed oil and gas exploration seismic operations area is 5,684 km^2, of which only a smaller portion would be surveyed over an eight to nine month period annually. Approximately 34.4 km^2 of Apache's proposed seismic survey area is in the designated beluga whale Critical Habitat Area 1 and approximately 3,490 km^2 is in the designated beluga whale Critical Habitat Area 2.

[1] For national security reasons, critical habitat excludes all property and waters of JBER and waters adjacent to the Port of Anchorage (Figure 2 Insert).

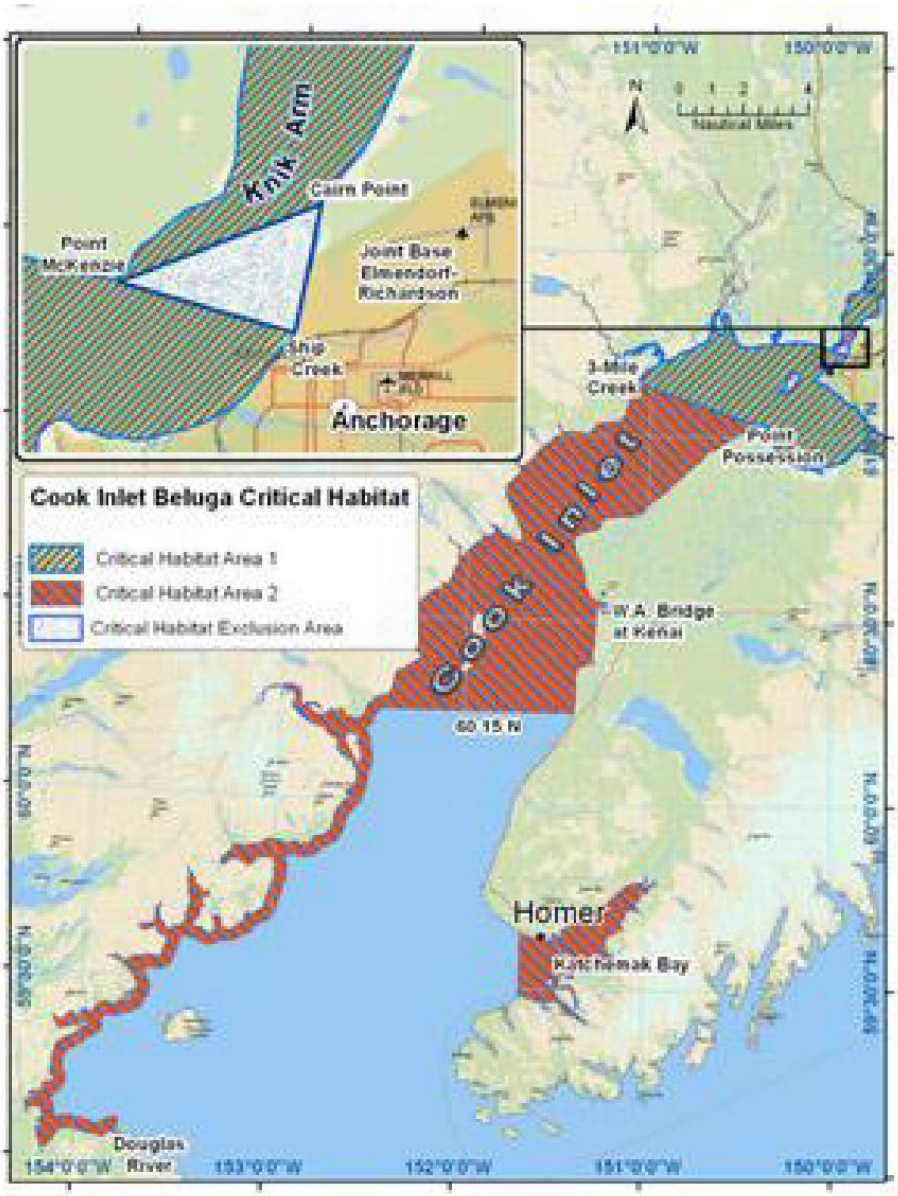

Figure 2. Final critical habitat of Cook Inlet beluga whales (76 FR 20180, April 11, 2011).

3.2 Biological Environment

3.2.1 Marine Mammals

The marine mammals most likely to be harassed incidental to conducting the seismic survey program are: Cook Inlet beluga whale, harbor seal, killer whale, harbor porpoise, gray whale, minke whale, Dall's porpoise, humpback whale, and Steller sea lion (Shelden et al. 2003). While killer, humpback, and gray whales and Steller sea lions have been sighted in upper Cook Inlet, their occurrence is considered rare. Cook Inlet beluga whales, harbor porpoises, and harbor seals are the species most likely to be sighted during the seismic program. Table 2 provides a summary of the abundance and status of the species likely to occur in the seismic survey operations area and Table 3 provides information on hearing ranges of marine mammals We provided information on the distribution, population size, and conservation status

for each species in the proposed rule (80 FR 9510). Apache's application (ASRC Energy Services 2014a), the Biological Assessment (ASRC Energy Services 2014b), and our 2013 Final EA (NMFS 2013a) on the issuance of an Authorization to Apache for the take of marine mammals incidental to conducting seismic surveys in Cook Inlet, Alaska. These documents contain detailed information on life history functions, hearing abilities, and distribution which is incorporated by reference in the following subsections. .

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

Species	Abundance	Conservation Status	Trends
Cook Inlet beluga whale	312	Depleted under MMPA; Endangered under ESA	Decreasing
Steller sea lion (western distinct population segment)	45,916	Depleted under MMPA; Endangered under ESA	Decreasing but with regional variability (some stable)
Harbor seal	22,900	No special status	Stable
Killer whale	1,123 (resident) 552 (transient)	No special status	Resident stock possibly increasing Transient stock stable
Harbor porpoise	25,987	No special status	No reliable information
Gray whale	18,017	No special status	Stable/increasing
Humpback whale	7,469	Depleted under MMPA; Endangered under ESA	Stable/increasing in Alaska region
Minke whale	1,233	No special status	No reliable information
Dall's porpoise	106,000 (Gulf of Alaska)	No special status	No reliable information

Table 3. Classification of marine mammals that could potentially occur in the proposed exploratory drilling site and for which take is proposed to be authorized by functional hearing groups (Southall et al. 2007; NMFS 2013c).

Low Frequency Hearing Range (7 Hz to 30 kHz)	Gray whale, minke whale, and humpback whale
Mid-Frequency Hearing Range (150 Hz to 160 kHz)	Killer and beluga whales
High Frequency Hearing Range (200 Hz to 180 kHz)	Harbor porpoise and Dall's porpoise
Phocid in Water Hearing Range (75 Hz to 100 kHz)	Harbor seal
Otariid in Water Hearing Range (100 Hz to 40 kHZ)	Steller sea lion

3.2.2 ESA-listed Marine Mammals

Cook Inlet Beluga Whale

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

NMFS began comprehensive, systematic aerial surveys on beluga whales in Cook Inlet in 1994. Unlike previous efforts, these surveys included the upper, middle, and lower inlet. These surveys documented a decline in abundance of nearly 50 percent between 1994 and 1998, from an estimate of 653 to 347 whales (Rugh et al. 2000). In response to this decline, NMFS initiated a status review on the Cook Inlet beluga whale stock pursuant to the MMPA and the ESA in 1998 (63 FR 64228, November 19, 1998). The annual abundance surveys conducted each June since 1999 provide the following abundance estimates: 357 beluga whales in 1999, 435 beluga whales in 2000, 386 beluga whales in 2001, 313 beluga whales in 2002, 357 beluga whales in 2003, 366 beluga whales in 2004, 278 beluga whales in 2005, 302 beluga whales in 2006, 375 beluga whales in 2007; 321 beluga whales in 2009; 340 beluga whales in 2010; 284 whales in 2011; 312 whales in 2012 (Hobbs et al. 2000; Rugh et al. 2003, 2004a, 2004b, 2005a, 2005b, 2005c, 2006, 2007, 2010; NMFS 2010; Hobbs et al. 2011, Shelden et al. 2012). The overall population trend for the past 15 years for Cook Inlet beluga whales shows them not recovering and still in decline at an annual rate of 0.6 percent (http://www.alaskafisheries.noaa.gov/newsreleases/2013/cibelugapop2012.htm).

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

The collective NMFS aerial survey results show that beluga whales have been consistently found near or in river mouths along the northern shores of upper Cook Inlet (i.e., north of East and West Foreland). In particular, beluga whale groups are seen in the Susitna River Delta, Knik Arm, and along the shores of Chickaloon Bay. Small groups were reported farther south in Kachemak Bay, Redoubt Bay (Big River), and Trading Bay (McArthur River) prior to 1996, but very rarely thereafter. Since the mid-1990s, most (96 to 100 percent) beluga whales in upper Cook Inlet have been concentrated in shallow areas near river mouths, no longer occurring in the central or southern portions of Cook Inlet (Hobbs et al. 2008). Based on these aerial surveys, the concentration of beluga whales in the northernmost portion of Cook Inlet appears to be fairly consistent from June to October (Rugh et al. 2000, 2004a, 2005a, 2006, 2007; Shelden et al. 2008, 2009, 2010).

Other studies and monitoring programs have revealed additional information about beluga whale distribution in Cook Inlet. Studies for KABATA in 2004 and 2005 confirmed the use of Knik Arm by beluga whales from July to October (Funk et al. 2005). Data from tagged whales (14 tags between July and March 2000 through 2003) show beluga whales use upper Cook Inlet intensively between summer and late autumn (Hobbs et al. 2005). As late as October, beluga whales tagged with satellite transmitters continued to use Knik Arm and Turnagain Arm and Chickaloon Bay, but some ranged into lower Cook Inlet south to Chinitna Bay, Tuxedni Bay, and Trading Bay (McArthur River) in the fall (Hobbs et al. 2005). In November, beluga whales moved between Knik Arm, Turnagain Arm, and Chickaloon Bay, similar to patterns observed in September (Hobbs et al. 2005). By December, beluga whales were distributed throughout the upper to mid-inlet. From January into March, they moved as far south as

Kalgin Island and slightly beyond in central offshore waters. Beluga whales also made occasional excursions into Knik Arm and Turnagain Arm in February and March in spite of ice cover greater than 90 percent (Hobbs et al. 2005). While they moved widely around Cook Inlet there was no indication from the tagged whales (Hobbs et al. 2005) that beluga whales had a seasonal migration in and out of Cook Inlet.

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

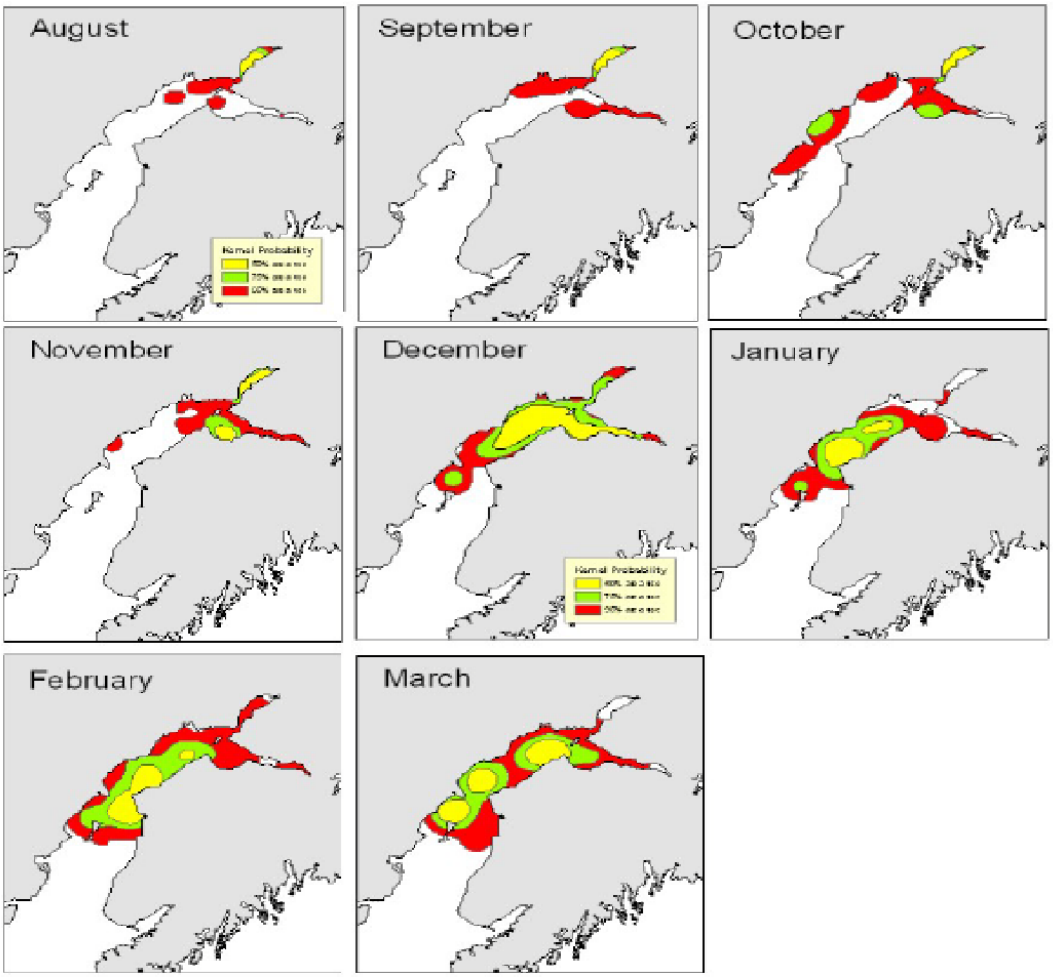

Figure 3. Predicted beluga distribution by month based upon known locations of 14 satellite tagged belugas (predictions derived via kernel probability estimates; Hobbs et al. 2005). Note the large increase in total area use and offshore locations beginning in December and continuing through March. The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

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

Beluga whale concentrations in upper Cook Inlet during April and May correspond with eulachon migrations to rivers and streams in the northern portion of upper Cook Inlet (NMFS 2003; Angliss and Outlaw 2005). Data from NMFS aerial surveys, opportunistic sightings, and satellite-tagged beluga whales confirm that they are concentrated along the rivers and nearshore areas of upper Cook Inlet (Susitna River Delta, Knik Arm, and Turnagain Arm) from May through October (NMML 2004; Rugh et al. 2004a). Beluga whales are commonly seen from early July to early October at the mouth of Ship Creek where they feed on salmon and other fish, and also in the vicinity of the Port (e.g., alongside docked ships and within 300 ft of the docks) (Blackwell and Greene 2002; NMML 2004). Beluga whales have also been observed feeding immediately offshore of the tidelands north of the Port and south of Cairn Point (NMFS 2004).

Humpback Whale

Although there is considerable distributional overlap in the humpback whale stocks that use Alaskan waters, the whales seasonally found in lower Cook Inlet are probably of the Central North Pacific stock. Listed as endangered under the Endangered Species Act (ESA), this stock has recently been estimated at 7,469, with the portion of the stock that feeds in the Gulf of Alaska estimated at 2,845 animals (Allen and Angliss 2014). The Central North Pacific stock winters in Hawaii and summers from British Columbia to the Aleutian Islands (Calambokidis et al. 1997), including Cook Inlet.

Humpback use of Cook Inlet waters is largely confined to lower Cook Inlet. They have been regularly seen near Kachemak Bay during the summer months (Rugh et al. 2005a), and there is a whale-watching venture in Homer capitalizing on this seasonal event. There are anecdotal observations of humpback whales as far north as Anchor Point, with recent summer observations extending to Cape Starichkof (Owl Ridge 2014). Humpbacks might be encountered near Anchor Point if seismic operations were to occur off the point during the summer.

Steller Sea Lion

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

3.2.3 Non-ESA Listed Marine Mammals

Harbor Seal

Harbor seals inhabit the coastal and estuarine waters of Cook Inlet. In general, harbor seals are more abundant in lower Cook Inlet than in upper Cook Inlet, but they do occur in the upper inlet throughout most of the year (Rugh et al. 2005). Harbor seals are non-migratory; their movements are associated with

tides, weather, season, food availability, and reproduction. The major haulout sites for harbor seals are located in lower Cook Inlet, and their presence in the upper inlet coincides with seasonal runs of prey species. For example, harbor seals are commonly observed along the Susitna River and other tributaries along upper Cook Inlet during the eulachon and salmon migrations (NMFS, 2003). During aerial surveys of upper Cook Inlet in 2001, 2002, and 2003, harbor seals were observed 24 to 96 km (15 to 60 mi) south-southwest of Anchorage at the Chickaloon, Little Susitna, Susitna, Ivan, McArthur, and Beluga Rivers (Rugh et al., 2005). During the 2D test program in March 2011, two harbor seals were observed by vessel-based PSOs. Harbor seals haul out on rocks, reefs, beaches, and drifting glacial ice, and feed on capelin, eulachon, cod, pollock, flatfish, shrimp, octopus, and squid in marine, estuarine, and occasionally fresh waters.

Killer Whale

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

Harbor Porpoise

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

only 0.7 percent of the Gulf of Alaska population, the increase of sightings in the upper Cook Inlet may reflect movement of harbor porpoise distribution than previously known.

Dall's Porpoise

Dall's porpoise are widely distributed across the entire North Pacific Ocean, with one of the only known gaps in their distribution being Upper Cook Inlet (Allen & Angliss, 2012). Their preference is for deep ocean water, which is not the bathymetry found in Cook Inlet. However, they were included in the applicant's request for take because they have been sighted occasionally in lower Cook Inlet. The last NMFS survey sighting of a Dall's porpoise was in 2000. Dall's porpoise have been observed in lower Cook Inlet, including Kachemak Bay and near Anchor Point (Glenn Johnson, pers. comm.), but sightings there are rare. There is only the remote chance that Dall's porpoise might be observed during Apache's proposed survey.

Minke Whale

Numbers of minke whales are very small compared to other species considered in this project. One minke whale was sighted during a NMFS aerial survey in 2006, with anecdotal records of additional minke sightings more recently (NMFS, 2012). Minke whales are much more common in the Bering and Chuckchi Seas, but they are not considered abundant in inshore Gulf of Alaska waters (Allen & Angliss, 2012). Very little is known about the Alaska stock structure, but their low levels of human-related removals and frequent sightings in Alaska waters mean they are not considered strategic, despite a lack of population information.

Gray Whale

Numbers of gray whales in Cook Inlet are small compared to the overall population, but Apache observers recorded nine sightings of nine individuals (including possible resights of the same animals) from May-July 2012. Of those sightings, seven were observed from project vessels, and two were observed from land; no animals were observed during aerial surveys. Gray whales were not previously recorded in Cook Inlet during NMFS aerial surveys, so they were not expected to be observed during Apache's operations (Lomac-MacNair et al. 2013). Sightings in the seismic survey operations area are expected to be minimal. The eastern North Pacific gray whales observed in Cook Inlet are likely migrating to summer feeding grounds in the Bering, Chukchi, and Beaufort seas, though a small number feed along the coast between Kodiak Island and northern California (Matkin 2009; Carretta et al. 2014).

3.3 Socioeconomic Environment

3.3.1 Subsistence

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

The principal wild foods harvested and consumed by Dena'ina communities are fish, land mammals (moose), and marine mammals. Salmon consistently provides the major portion of the region's

subsistence food, and sockeye is the most harvested. Shellfish, plants, and birds and eggs each make up approximately 2% of the total annual harvest (BOEM 2003).

Native hunters historically have hunted beluga whales and harbor seals for food. The subsistence harvest of beluga transcends nutritional and economic value of the whale as the harvest is an integral part of the cultural identity of the region's Alaska Native communities. Inedible parts of the whale provide Native artisans with materials for cultural handicrafts, and the hunting perpetuates Native traditions by transmitting traditional skills and knowledge to younger generations. However, due to dramatic declines in the Cook Inlet beluga whale population, on May 21, 1999, legislation was passed to temporarily prohibit (until October 1, 2000) the taking of Cook Inlet belugas under the subsistence harvest exemption in section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected Alaska Native Organizations (ANOs) (Public Law No. 106-31, section 3022, 113 Stat. 57,100). That prohibition was extended indefinitely on December 21, 2000 (Public Law No. 106-553, section 1(a)(2), 114 Stat. 2762). NMFS subsequently entered into six annual co-management agreements (2000-2003, 2005-2006) with the Cook Inlet Marine Mammal Council, an ANO representing Cook Inlet beluga hunters, which allowed for the harvest of 1-2 belugas. On October 15, 2008, NMFS published a final rule that established long-term harvest limits on the Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibited harvest for a five-year period (2008-2012), if the average abundance for the Cook Inlet beluga whales from the prior five years (2003-2007) was below 350 whales. There will be no beluga harvest during the current five year period (2013-2017), as the previous five-year average (2008-2012) was not above 350 whales.

Since November 2010, Apache has met and continues to meet with many of the villages and traditional councils throughout the Cook Inlet region. During these meetings, no concerns have been raised regarding potential conflict with subsistence harvest.[2]

Additionally, Apache met with the Cook Inlet Marine Mammal Council (CIMMC) to describe the seismic survey activities and discuss subsistence concerns. The meeting provided information on the time, location, and features of the proposed program, opportunities for involvement by local people, potential impacts to marine mammals, and mitigation measures to avoid impacts. Discussions regarding marine seismic operations continued with the CIMMC until its disbandment in 2012.

In 2014, Apache held meetings or discussions regarding project activities with the following entities: Native Village of Tyonek, Tyonek Native Corporation, Cook Inlet Region, Inc., Ninilchik Native Association, Ninilchik Tribal Council, Salamatof Native Association, Cook Inlet Keeper, Alaska Salmon Alliance, Upper Cook Inlet Drift Association, and the Kenai Peninsula Fisherman's Association. Further, Apache has placed posters in local businesses, offices, and stores in nearby communities and published newspaper ads in the Peninsula Clarion.

There is a low level of subsistence hunting for harbor seals in Cook Inlet. Seal hunting occurs opportunistically among Alaska Natives who may be fishing or travelling in the upper Inlet near the mouths of the Susitna River, Beluga River, and Little Susitna River. Some data are available on the

[2] Past meetings have been held with Alexander Creek, Knikatnu, Native Village of Tyonek, Salamatof, Tyonek Native Corporation, Ninilchik Traditional Council, Ninilchik Native Association, Village of Eklutna, Kenaitze Indian Tribe, and Cook Inlet Region, Inc.

subsistence harvest of harbor seals, harbor porpoises, and killer whales in Alaska in the marine mammal stock assessments. However, these numbers are for the Gulf of Alaska including Cook Inlet, and they are not indicative of the harvest in Cook Inlet. Some detailed information on the subsistence harvest of harbor seals is available from past studies conducted by the Alaska Department of Fish & Game (Wolfe et al., 2009). In 2008, only 33 harbor seals were taken for harvest in the Upper Kenai-Cook Inlet area. In the same study, reports from hunters stated that harbor seal populations in the area were increasing (28.6%) or remaining stable (71.4%). The specific hunting regions identified were Anchorage, Homer, Kenai, and Tyonek, and hunting generally peaks in March, September, and November (Wolfe et al., 2009).

Chapter 4 Environmental Consequences

Under the MMPA, we have evaluated the potential impacts of Apache's seismic operations in order to determine whether to authorize incidental take of marine mammals. Under NEPA, we have determined that an EA is appropriate to evaluate the potential significance of environmental impacts resulting from the issuance of our regulations and related annual Authorizations.

4.1 Effects of Alternative 1 – Issuance of Authorizations with Mitigation Measures

Alternative 1 is the Preferred Alternative where we would promulgate regulations (valid from approximately June 2016 through May 2021) and issue subsequent, associated Authorizations annually to Apache allowing the incidental take, by Level B harassment, of nine species of marine mammals, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the regulations and associated annual Authorizations (see Section 2.3.1), if issued.

4.1.1 Impacts to Marine Mammal Habitat

Our proposed action would have no additive or incremental effect on the physical environment beyond those resulting from Apache's proposed activities. Apache's proposed seismic survey area is not located within a marine sanctuary or a National Park. State wildlife conservation areas have been designated in Cook Inlet; however, those occur mostly on land with some portions along the coasts and would not be impacted by our proposed action of the issuance of an Authorization to take marine mammals. The proposed seismic survey would minimally add to vessel traffic in the region. The proposed activities would not result in substantial damage to ocean and coastal habitats that might constitute marine mammal habitat. Placement and retrieval of the nodes may cause temporary and localized increases in turbidity on the seafloor; however, the turbidity created by placing and removing nodes on the seafloor would settle to background levels within minutes after the cessation of activity. We do not anticipate that the seismic survey operations would physically alter the marine environment or negatively impact the physical environment in the proposed action area. The Authorizations would not impact physical habitat features, such as substrates and/or water quality.

NMFS has established critical habitat for both the western distinct population segment of Steller sea lions and Cook Inlet beluga whales (described in section 3.1.1 of this EA). The proposed seismic survey would not occur in locations designated as critical habitat for Steller sea lions, so there would be no effect. Approximately 34.4 km^2 of Apache's proposed study area is in the designated beluga whale Critical Habitat Area 1 and approximately 3,490 km^2 is in the designated beluga whale Critical Habitat Area 2; however, only a portion of this would be surveyed during each proposed eight to nine month annual operating time frame, as surveying this entire area in one survey season is not operationally feasible. The primary impacts are acoustic in nature, which would not result in permanent destruction of any critical habitat. Additionally, mitigation measures would be required in the annual Authorizations, if issued, to seasonally limit activity in critical habitat Area 1 during periods when beluga whales are present in high numbers. Therefore, impacts to beluga access to habitat would be minimal. More information on potential impacts to marine mammal habitat is contained in Apache's application (ASRC Energy Services 2014a), the Biological Assessment (ASRC Energy Services 2014b), NMFS' 2013 ESA section 7 Biological Opinion on the effects of seismic surveys by Apache in Cook Inlet (NMFS 2013b), and our proposed rule notice, which are incorporated herein by reference.

4.1.2 Impacts to Marine Mammals

We expect that disturbance from acoustic stimuli associated with the seismic survey program have the potential to impact marine mammals. Acoustic stimuli generated by the airgun arrays (and to a lesser extent the pingers) may affect marine mammals in one or more of the following ways: tolerance, masking of natural sounds, behavioral disturbance, and temporary or permanent hearing impairment, or non-auditory physical effects (Richardson et al. 1995a). The proposed rule notice, Apache's application (ASRC Energy Services 2014a), and our 2013 EA on this action (NMFS 2013a) provided detailed descriptions of these potential effects of seismic surveys on marine mammals. This information is incorporated by reference and summarized below.

Numerous studies have shown that underwater sounds from industry activities are often readily detectable by marine mammals in the water at distances of many kilometers. Studies have also shown that marine mammals at distances more than a few kilometers away often show no apparent response to industry activities of various types (Miller et al., 2005; Bain and Williams, 2006). This is often true even in cases when the sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales, toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to underwater sound such as airgun pulses or vessels under some conditions, at other times mammals of all three types have shown no overt reactions (e.g., Malme et al., 1986; Richardson et al., 1995a, b; Madsen and Mohl, 2000; Croll et al., 2001; Jacobs and Terhune, 2002; Madsen et al., 2002; Miller et al., 2005).

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

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

There is little concern regarding masking in this case due to the brief duration of these pulses and relatively longer silence between airgun shots (9 – 12 seconds) near the sound source. Therefore,

masking effects are anticipated to be limited, especially in the case of odontocetes, given that they typically communicate at frequencies higher than those of the airguns. Additionally, gray whales (which depend on lower frequency ranges) are not anticipated to occur regularly or in high numbers in the proposed seismic survey operational areas.

Marine mammals may behaviorally react to sound when exposed to anthropogenic noise. These behavioral reactions are often shown as: changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where noise sources are located; and/or flight responses (e.g., pinnipeds flushing into water from haul-outs or rookeries). The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography) and is also difficult to predict (Richardson et al. 1995a; Southall et al. 2007).

Little systematic information is available about reactions of beluga whales, killer whales, and harbor porpoise to noise pulses. In general, small toothed whales more often tend to head away, or to maintain a somewhat greater distance from the vessel, when a large airgun array is operating (e.g., Stone and Tasker 2006; Weir 2008; Barry et al. 2010). Beluga whales exhibit changes in behavior when exposed to strong, pulsed sounds similar in duration to those typically used in seismic surveys (Finneran et al. 2000, 2002). However, the animals tolerated high received levels of sound (peak–peak level >200 dB re 1 μPa) before exhibiting aversive behaviors (Richardson et al. 1995b). Baleen whales generally tend to avoid operating airguns, but avoidance radii are quite variable. Whales are often reported to show no overt reactions to pulses from large arrays of airguns at distances beyond a few kilometers, even though the airgun pulses remain well above ambient noise levels out to much greater distances (Miller et al. 2005). Results of studies of gray, bowhead, and humpback whales have determined that received levels of pulses in the 160–170 dB re 1 μPa rms range seem to cause obvious avoidance behavior in a substantial fraction of the animals exposed. In many areas, seismic pulses from large arrays of airguns diminish to those levels at distances ranging from 2.8-9 mi (4.5-14.5 km) from the source. Baleen whales within those distances may show avoidance or other strong disturbance reactions to the airgun array. However, gray whales are not common in the seismic survey area, and humpback whales are a rare occurrence.

While there are no published data on seismic effects on sea lions or harbor seals, anecdotal data and data on arctic seals suggest that sea lions and other pinnipeds generally tolerate strong noise pulses due to the similarity in anatomy and physiology (Richardson et al. 1995a). Monitoring studies in the Alaskan and Canadian Beaufort Sea during 1996–2002 provided considerable information regarding behavior of arctic seals exposed to seismic pulses (Miller et al. 2005; Harris et al. 2001; Moulton and Lawson 2002). These seismic projects generally were much larger than the proposed survey and usually involved arrays of 6 to 16 with as many as 24 airguns with total volumes 560 to 1500 cui. The combined results suggest that some seals avoid the immediate area around seismic vessels. Reactions are expected to be very localized and confined to relatively small distances and durations, with no long-term effects on individuals or populations.

The seismic survey operations and potential take of marine mammals is proposed to occur over the course of five years. However, the surveys would not occur continuously for five years. Rather, Apache

proposes to conduct seismic surveys over an eight to nine month period annually for a total of five years. During that time, active seismic airgun operations would occur at most for a few hours several times a day. Therefore, airguns are not intended to be operated continuously for days or weeks on end. Thus, marine mammals in the ensonified areas will not be exposed to airgun sounds continuously for periods beyond a few hours.

Table 4 outlines our current acoustic thresholds for estimating marine mammal harassment, and Tables 5 and 6 outline the various radii for the airgun arrays proposed for use during Apache's oil and gas exploration seismic survey operations in both the nearshore and channel survey locations.

Table 4. Current acoustic exposure criteria used by NMFS.

Criterion	Criterion Definition	Threshold
Level A Harassment (Injury)	Permanent Threshold Shift (PTS) (Any level above that which is known to cause TTS)	180 dB re 1 µPa-m (cetaceans) / 190 dB re 1 µPa-m (pinnipeds) root mean square (rms)
Level B Harassment	Behavioral Disruption (for impulse noises)	160 dB re 1 µPa-m (rms)
Level B Harassment	Behavioral Disruption (for continuous, noise)	120 dB re 1 µPa-m (rms)

Table 5. Distances to Level B and Level A harassment sound level thresholds for the nearshore surveys.

Sound Level Threshold (dB re 1 µPa)	Water Depth at Source Location (m)	Distance in the Onshore Direction (km)	Distance in the Offshore Direction (km)	Distance in the Parallel to Shore Direction (km)
160	5	1.03	4.73	2.22
	25	5.69	7.77	9.5
	45	6.75	5.95	9.15
180	5	0.46	0.6	0.54
	25	1.06	1.07	1.42
	45	0.7	0.83	0.89
190	5	0.28	0.33	0.33
	25	0.35	0.36	0.44
	45	0.1	0.1	0.51

Table 6. Distances to Level B and Level A harassment sound level thresholds for the channel surveys.

Sound Level Threshold (dB re 1 µPa)	Water Depth at Source Location (m)	Distance in the Broadside Direction (km)	Distance in the Endfire Direction (km)

160	80	5.14	7.33
180	80	0.91	0.98
190	80	0.15	0.18

In sum, we interpret these effects on all marine mammals as falling within the MMPA definition of Level B (behavioral) harassment. We expect these impacts to be minor because we do not anticipate measurable changes to the population or impacts to rookeries, mating grounds, and other areas of similar significance.

Under the Preferred Alternative, we would authorize incidental take, by Level B harassment only, of nine species of marine mammals. We expect no long-term or substantial adverse effects on marine mammals, their habitats, or their role in the environment. We base our conclusion on the results of previous monitoring reports submitted by Apache for the 2012 Cook Inlet 3D seismic survey.

Apache proposed a number of monitoring and mitigation measures for marine mammals, and we included some additional mitigation measures not proposed by Apache, as part of our evaluation for the Preferred Alternative. In consideration of the potential effects of the proposed seismic survey, we determined that the mitigation and monitoring measures described in Section 2.3.1 of this EA would be appropriate for the preferred alternative to meet the Purpose and Need.

Injury: Apache did not request authorization to take marine mammals by injury (Level A harassment), serious injury, or mortality. Based on the results of our analyses, Apache's environmental analyses, and previous monitoring reports for the same activities, there is no evidence that Apache's planned activities could result in injury, serious injury, or mortality within the action area. The mitigation and monitoring measures described in Section 2.3.1 of this EA would minimize any potential risk for marine mammals.

Vessel Strikes: The potential for striking marine mammals is a concern with vessel traffic. Studies have associated ship speed with the probability of a ship strike resulting in an injury or mortality of an animal. However, it is highly unlikely that Apache would strike a marine mammal. Typical vessel speeds of the source vessels while collecting seismic data is between 2-4 knots. Moreover, mitigation measures would be required of Apache to reduce speed or alter course if collisions with marine mammals appear likely.

Entanglement: Although some of Apache's equipment contains cables or lines, the risk of entanglement is extremely remote. Additionally, mortality from entanglement is not anticipated. The material used by Apache and the amount of slack is not anticipated to allow for marine mammal entanglements.

Estimated Take of Marine Mammals by Level B Incidental Harassment: Apache has requested take by Level B harassment as a result of the acoustic stimuli generated by their proposed seismic survey. We expect that the survey would cause a short-term behavioral disturbance for marine mammals in the proposed areas.

As mentioned previously, we estimate that the activities could potentially affect, by Level B harassment only, nine species of marine mammals under our jurisdiction. For each species, these estimates are small numbers (less than two percent for each species, except beluga whales for which estimated takes are 8.8 percent) relative to the population sizes. The number of Level B exposures for harbor seals is calculated as a high number of exposures, at 24,279. The Cook Inlet/Shelikof stock of harbor seals extends well south and west of Cook Inlet, with Apache's activity overlapping only a small portion of the stock's

habitat. Harbor seals are known to haul out in large numbers in Kachemak Bay and at the mouth of several rivers, including Fox River, with both of these locations well south of Apache's survey area. Previous monitoring reports also help to provide context for the number of individual harbor seals likely to be taken. In 2012, SAExploration Inc. detected less than 300 seals during 116 days of operations, with the most seen at once were 100 seals and that was at a river mouth, hauled out, not in the water or exposed to seismic activity. In 2014, Apache saw an estimated 613 individuals in 82 days of operation, mostly during non-seismic periods. Most harbor seals were recorded from the land station, not source vessels. The known preference for haulouts at river mouths as well as the southern portion of Cook Inlet, combined with low incidences of exposure in previous seismic activities in the area, suggest that the number of exposures calculated through the daily ensonified method is an overestimate and not reflective of the number of individual seals likely to be taken. Therefore, the exposure of pinnipeds to sounds produced by this phase of Apache's seismic survey is not anticipated to have an effect on annual rates of recruitment or survival on those species or stocks. Table 7 outlines the number of Level B harassment takes that we propose to authorize on an annual basis in the Authorizations, the regional population estimates for marine mammals in the action area, and the percentage of each population or stock that may be taken as a result of Apache's activities.

Our proposed rule notice and Apache's application (ASRC Energy Services 2014a) contain complete descriptions of how these take estimates were derived. A short summary is provided here. For all marine mammal species (except for beluga whales), take estimates were derived by multiplying the expected density by the anticipated area ensonified to sound levels $\geq$ 160 dB rms by the expected number of seismic survey days per year in the project area. For beluga whales, Apache used the habitat model developed by Goetz et al. (2012a) to derive density estimates for the whales throughout Cook Inlet. Based on expected densities and known seasonal distribution of Cook Inlet beluga whales, Apache proposes to develop annual operational plans to minimize beluga whale takes and to operate in a way so as not to exceed 30 takes in a given year. The annual take estimate for beluga whales takes into consideration the mitigation measures described in Section 2.3.1 of this EA. We do not expect the proposed activities to impact rates of recruitment or survival for any affected species or stock. Further, the activities would not adversely affect marine mammal habitat.

Table 7. Proposed Level B harassment take levels, species or stock abundance, and percentage of population proposed to be taken.

Species	Annual Proposed Level B Take	Abundance	Percentage of Population
Beluga Whale	30	312	9.62
Harbor Seal	5,725	22,900	25
Harbor Porpoise	283	31,046	0.91
Killer Whale	70	1,123 (resident) 345(transient)	6.26 12.74
Steller Sea Lion	20	79,300	0.025
Gray Whale	8	19,126	0.042
Humpback Whale	2	7,469	0.027
Minke whale	1	1,233	0.08
Dall's porpoise	17	106,000	0.016

4.1.3 Impacts on Subsistence

Under the Alternative 1 (the Preferred Alternative), Apache's seismic survey in the Cook Inlet is expected to have minor and temporary effects on subsistence wildlife and marine mammals in the area. Sound from seismic activities and array guns might temporarily displace wildlife from the area, but animals are expected to return to the area following the cessation of use of sound sources during survey activities.

Residents of the Native Village of Tyonek are the primary marine mammal subsistence users in Knik Arm area. However, due to dramatic declines in the Cook Inlet beluga whale population, on May 21, 1999, legislation was passed to temporarily prohibit (until October 1, 2000) the taking of Cook Inlet belugas under the subsistence harvest exemption in section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected Alaska Native Organizations (ANOs) (Public Law No. 106-31, section 3022, 113 Stat. 57,100).. That prohibition was extended indefinitely on December 21, 2000 (Public Law No. 106-553, section 1(a)(2), 114 Stat. 2762). NMFS subsequently entered into six annual co-management agreements (2000-2003, 2005-2006) with the Cook Inlet Marine Mammal Council, an ANO representing Cook Inlet beluga hunters, which allowed for the harvest of 1-2 belugas. On October 15, 2008, NMFS published a final rule that established long-term harvest limits on the Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibited harvest for a five-year period (2008-2012), if the average abundance for the Cook Inlet beluga whales from the prior five years (2003-2007) was below 350 whales. The next five-year period that could allow for a harvest (2013-2017), would require the previous five-year average (2008-2012) to be above 350 whales. Tyonek Natives occasionally harvest harbor seals, but their primary source of red meat is moose.

Data on the harvest of other marine mammals in Cook Inlet are lacking. The only data available for subsistence harvest of harbor seals, harbor porpoises, and killer whales in Alaska are in the marine mammal stock assessments. However, these numbers are for the entire Gulf of Alaska not just Cook Inlet, and they are not indicative of the harvest in Cook Inlet. Because of the relatively small proportion of marine mammals occurring in Cook Inlet, the number harvested is expected to be extremely low. For example, there is a low level of subsistence hunting for harbor seals in Cook Inlet. Seal hunting occurs opportunistically among Alaska Natives who may be fishing or travelling in the upper Inlet near the mouths of the Susitna River, Beluga River, and Little Susitna River (B. Smith, NMFS, pers. comm.).

Apache has identified the following features that are intended to reduce impacts to marine mammal subsistence users:

- In-water seismic activities would follow mitigation procedures to minimize effects on the behavior of marine mammals and, therefore, opportunities for harvest by Alaska Native communities; and

- Regional subsistence representatives may support recording marine mammal observations along with marine mammal biologists during the monitoring programs and would be provided with annual reports.

Apache concluded, and NMFS agrees, that the size of the affected area, mitigation measures, and input from the consultations from Alaska Natives should result in the proposed action having no unmitigable adverse impact on the availability of marine mammals for subsistence uses. Apache and NMFS recognize the importance of ensuring that Alaska Native Organizations and federally recognized tribes are informed,

engaged, and involved during the permitting process and will continue to work with the ANOs and tribes to discuss their operations and activities.

NMFS anticipates that any effects from Apache's proposed seismic survey on marine mammals, especially harbor seals and Cook Inlet beluga whales, which are or have been taken for subsistence uses, would be short-term, site-specific, and limited to inconsequential changes in behavior and mild stress responses. NMFS does not anticipate that the authorized taking of affected species or stocks would reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (1) Causing the marine mammals to abandon or avoid hunting areas; (2) directly displacing subsistence users; or (3) placing physical barriers between the marine mammals and the subsistence hunters; and that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

4.2 Effects of Alternative 2 – No Action Alternative

Under the No Action Alternative, we would not promulgate regulations or issue associated annual Authorizations to Apache. As a result, Apache would not receive an exemption from the MMPA prohibitions against the take of marine mammals and would, if they proceeded with their activities, be in violation of the MMPA if take of marine mammals occurs.

The impacts to elements of the human environment resulting from the No Action alternative—conducting the seismic survey program in the absence of required protective measures for marine mammals under the MMPA—would be greater than those impacts resulting from Alternative 1, the Preferred Alternative. The impacts to the elements of the human environment resulting from the No Action alternative – not conducting the seismic surveys – would maintain the status quo and be consistent with the environmental baseline.

4.2.1 Impacts to Marine Mammal Habitat

Under the No Action Alternative of conducting the survey without an Authorization, the survey would have no additive effects on the physical environment beyond those resulting from Apache's activities, which we evaluated in the referenced documents. This Alternative would result in similar effects on the physical environment as Alternative 1. The only potential difference in impacts to marine mammal habitat under the no action alternative would be additional ensonification of the marine environment during use of the mitigation gun because Apache would not be required to increase the shot interval. Moreover, there could be additional acoustic impacts to Cook Inlet beluga whale critical habitat, as Apache would not be required to abide by the 10-mile seasonal exclusion zone from the MLLW line of the Susitna River.

Under the No Action Alternative of not conducting the survey in the absence of an Authorization, there would be no additional impacts to marine mammal habitat beside the existing environmental baseline.

4.2.2 Impacts to Marine Mammals

Under the No Action Alternative, Apache's activities would likely result in increased amounts of Level B harassment to marine mammals and possibly takes by injury (Level A harassment), serious injury, or mortality—specifically related to acoustic stimuli—due to the absence of mitigation and monitoring measures required under the Authorizations. While it is difficult to provide an exact number of takes that might occur under the No Action Alternative, the numbers would be expected to be larger than those

presented in Table 7 above because Apache would not be restricted in the total area that could be surveyed and would not be required to abide by seasonal restrictions to reduce the impacts on beluga whales. Moreover, Apache would not be required to shutdown activities when belugas and groups of five or more harbor porpoises and killer whales are seen approaching the Level B isopleths, which is meant to reduce disturbance to the animals.

If the activities proceeded without the protective measures and reporting requirements required by final Authorizations under the MMPA, the direct, indirect, or cumulative effects on the human or natural environment of not issuing the Authorizations would include the following:

- Marine mammals within the survey area could experience injury (Level A harassment) and potentially serious injury or mortality. The lack of mitigation measures required in the Authorizations could lead to vessels not altering course around marine mammals, not ramping up or powering or shutting down airguns when marine mammals are within applicable injury harassment zones, and no seasonal restrictions on activity locations;
- Increases in the number of behavioral responses and frequency of changes in animal distribution because of the lack of mitigation measures required in the Authorizations. Thus, the incidental take of marine mammals would likely occur at higher levels than we have already identified and evaluated in our proposed rule *Federal Register* notice; and
- We would not be able to obtain the monitoring and reporting data needed to assess the anticipated impact of the activity upon the species or stock; and increased knowledge of the species as required under the MMPA.

4.2.3 Impacts to Subsistence

Under the No Action Alternative, the survey would have no additive effects on subsistence beyond those resulting from Apache's activities, which we evaluated in the referenced documents. Subsistence hunting of Cook Inlet beluga whales is not allowed at this time, and subsistence hunts of other marine mammal species is limited, as described earlier in this EA. The only potential difference in impacts is that Apache would not be required to ensure availability of marine mammals for subsistence uses and would not be required to implement mitigation measures to that effect.

4.3 Unavoidable Adverse Impacts

Apache's application, our proposed rule notice, and other environmental analyses identified previously summarize unavoidable adverse impacts to marine mammals or the populations to which they belong or on their habitats, as well as subsistence uses of marine mammals, occurring in the seismic survey area. We incorporate those documents by reference.

We acknowledge that the incidental take authorized would potentially result in unavoidable adverse impacts. However, we do not expect Apache's activities to have adverse consequences on the viability of marine mammals in Cook Inlet or on the availability of marine mammals for subsistence uses, and we do not expect the marine mammal populations in that area to experience reductions in reproduction, numbers, or distribution that might appreciably reduce their likelihood of surviving and recovering in the wild. We expect that the numbers of individuals of all species taken by harassment would be small (relative to species or stock abundance), that the seismic survey and the take resulting from the seismic survey activities would not adversely affect annual rates of recruitment or survival, and therefore would

have a negligible impact on the affected species or stocks of marine mammals, and that there would not be an unmitigable adverse impact to subsistence uses of marine mammals in Cook Inlet.

4.4 Cumulative Effects

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

The Cook Inlet region is a major population center in the State of Alaska and supports a wide range of activities. The proposed seismic survey would add another, albeit temporary, industrial activity to upper Cook Inlet. This activity would be limited to a small area of the upper Inlet, and there would be no objects or materials permanently released into the water column. This section provides a summary of the human-related activities affecting the marine mammal species in the action area.

4.4.1 Subsistence Hunting

In Cook Inlet, Native hunters historically have hunted beluga whales and harbor seals for food. The subsistence harvest of beluga transcends nutritional and economic value of the whale as the harvest is an integral part of the cultural identity of the region's Alaska Native communities. Inedible parts of the whale provide Native artisans with materials for cultural handicrafts, and the hunting perpetuates Native traditions by transmitting traditional skills and knowledge to younger generations. However, due to dramatic declines in the Cook Inlet beluga whale population, on May 21, 1999, legislation was passed to temporarily prohibit (until October 1, 2000) the taking of Cook Inlet belugas under the subsistence harvest exemption in section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected ANOs (Public Law No. 106-31, section 3022, 113 Stat. 57,100). That prohibition was extended indefinitely on December 21, 2000 (Public Law No. 106-553, section 1(a)(2), 114 Stat. 2762). NMFS subsequently entered into six annual co-management agreements (2000-2003, 2005-2006) with the Cook Inlet Marine Mammal Council, an ANO representing Cook Inlet beluga hunters, which allowed for the harvest of 1-2 belugas. On October 15, 2008, NMFS published a final rule that established long-term harvest limits on the Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibits harvest for a five-year period (2008-2012), if the average abundance for the Cook Inlet beluga whales from the prior five years (2003-2007) is below 350 whales. The next five-year period that could allow for a harvest (2013-2017), would require the previous five-year average (2008-2012) to be above 350 whales. Additional information on the Cook Inlet beluga harvest can be found in NMFS (2008a).

4.4.2 Pollution

As the population in urban areas continue to grow, an increase in amount of pollutants that enter Cook Inlet is likely to occur. Sources of pollutants in urban areas include runoff from streets and discharge from wastewater treatment facilities. Gas, oil, and coastal zone development projects (e.g., the Chuitna Coal Mine) also contribute to pollutants that enter Cook Inlet through discharge. Gas, oil, and coastal zone development will continue to take place in Cook Inlet; therefore, it would be expected that pollutants could increase in Cook Inlet. However, the EPA and the ADEC will continue to regulate the amount of pollutants that enter Cook Inlet from point and non-point sources through NPDES permits. As a result,

permittees will be required to renew their permits, verify they meet permit standards and potentially upgrade facilities. Additionally, the extreme tides and strong currents in Cook Inlet may contribute in reducing the amount of pollutants found in the Inlet.

4.4.3 Fisheries Interaction

Fishing is a major industry in Alaska. As long as fish stocks are sustainable, subsistence, personal use, recreational and commercial fishing will continue to take place in Cook Inlet. As a result there will be continued prey competition, risk of ship strikes, potential harassment, potential for entanglement in fishing gear and potential displacement from important foraging habitat for the Cook Inlet beluga whales. NMFS and the ADF&G will continue to manage fish stocks and 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 Port of Anchorage (POA) is a major Alaskan port located adjacent to Anchorage in upper Cook Inlet (more than 100 miles north of the proposed Cosmopolitan drill site). While the POA is outside the action area considered in this EA, the POA yields a high volume of vessels traffic that must pass through or near the action area described in this EA. The POA provides 90 percent of the consumer goods for 85 percent of the state of Alaska. The POA handles the majority of Alaska's refined petroleum products and the bulk of jet fuel for Joint Base Elmendorf-Richardson and the Ted Stevens Anchorage International Airport (100 and 60 percent respectively; POA, 2014). Major vessels calling to the POA include cargo ships, barges, tankers, dredgers, military ships and tug boats (POA, 2009). Based on data from 1998-2011, an average of approximately 450 vessels call to the POA annually (POA, 2014). The POA is currently under construction and expanding its facilities. As a result, vessel traffic will increase once the project is complete.

Port MacKenzie is located in upper Cook Inlet and also contributes to vessel traffic that passes through or near the EA action area. It receives about two large ships annually (i.e. a landing craft and/or a barge), which is substantially less than the POA. However, the number of ships calling to port at Port MacKenzie is expected to increase over the next five years; the Rail Extension and expanding the currently existing deep draft dock are planned for construction. Smaller port facilities that contribute to vessel traffic in the action area include Nikiski, the City of Kenai, Kasilof, Ninilchik, Anchor River, Tyonek and Drift River. Vessels ranging from tankers to fishing boats call to these ports (Kenai Peninsula Borough, 2003). Gas and oil development also contribute to vessel traffic in the action area, as well as commercial and recreational fishing vessels.

4.4.5 Gas and Oil Development

Currently, there are several gas and oil development projects in the proposed action area, and it is likely that future gas and oil development will continue to take place in the action area. Apache, for example, will be conducting seismic surveys in Cook Inlet for the next five years, and NMFS has received Authorization applications from one other oil and gas company requesting takes of marine mammals incidental to seismic surveying. NMFS also received a request for one geophysical survey with some spatial overlap and also temporal overlap, as well as one request for MMPA Authorization to take marine mammals incidental to an exploratory drilling program in lower Cook Inlet.

Impacts from gas and oil development include increased noise from seismic activity, vessel and air traffic and well drilling; discharge of wastewater; 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. 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. Support vessels are required for gas and oil development to transport supplies and products to and from the facilities. Not only will the support vessels from increased gas and oil development likely increase noise in the action area, there is a potential for a slightly increased risk of ship strikes with beluga whales; however, ship strikes have not been definitively confirmed in a Cook Inlet beluga whale death, and monitoring measures should reduce this risk by placing visual monitors on ships to look out for whales and by deploying acoustic monitors to listen for vocalizing marine mammals. If Authorizations are issued to these other applicants, they would be required to implement mitigation and monitoring measures to reduce impacts to marine mammals and their habitat in the area and would be subject to the same MMPA and ESA standards. NMFS plans to address these annual IHA requests cumulatively under NEPA through a Programmatic EA .

Under the 2012 Authorization, Apache reported a total of 17 Level B harassment takes between May 6 and September 30, 2012, including harbor porpoise (n=4) and harbor seals (n=13). No other marine mammal species were detected in the Level B harassment zone. There were no Level A takes of either cetaceans or pinnipeds during the 2012 seismic survey. Apache received an Authorization in 2013 but did not conduct seismic surveys that year. No other projects were operating under an MMPA Authorization at this time, so we do not have monitoring reports outlining potential takes for those activities.

4.4.6 Coastal Zone Development

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

Chuitna Coal Project

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

ORPC Alaska Tidal Energy Projects

The ORPC is proposing two tidal energy projects in Cook Inlet. The first tidal energy project would be located on the Westside of Fire Island near Anchorage, and the second project would be located adjacent

to the East Foreland in the vicinity of Nikiski on the Kenai Peninsula (ORPC, 2011), both of which are relatively near the proposed Cosmopolitan State #B-1 drill site. The tidal energy projects would require the installation of an array of turbine generator units and transmission cables on the seafloor to harness the tidal energy. The tidal energy will be converted to electrical energy at stations on land. These projects are still in preliminary testing and environmental monitoring phases (ORPC, 2011).

4.4.7 Marine Mammal Research

Because many important aspects of marine mammal biology remain unknown, or are incompletely studied, and because management of these species and stocks requires knowledge of their distribution, abundance, migration, population, ecology, physiology, genetics, behavior, and health, free-ranging marine mammal species are frequently targeted for scientific research and studies. Research activities normally include close approach by vessel and aircraft for line-transect surveys; behavioral observation; photo-identification and photo-video-grammetry; passive acoustic recording; attachment of scientific instruments (tagging), both by implantable and suction cup tags; biopsy sampling, including skin and blubber biopsy and swabbing; land-based surveys; live capture for health assessments, and blood and tissue sampling, pinniped tooth extraction, and related pinniped anesthesia procedures. All researchers are required to obtain a scientific research permit from NMFS under the MMPA and/or ESA (if an ESA-listed species is involved). Currently, the permits authorizing research on beluga whales in Cook Inlet, as wells as permits authorizing research on harbor seals, harbor porpoises, Steller sea lions, and killer whales in Alaskan waters may have cumulative effects on these species and stocks. NMFS anticipates that scientific research on marine mammals in Cook Inlet will continue, and possibly expand, due to the increasing need to better understand distribution and abundance relative to temporal (seasonal, diel, or tidal) and spatial (geographic or bathymetric) parameters.

4.4.8 Climate Change

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

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

- Average arctic temperatures increased at almost twice the global average rate in the last 100 years.

- Satellite data since 1978 show that perennial arctic sea ice extent has shrunk by 2.7 percent per decade, with larger decreases in sea ice extent in summer of 7.4 percent per decade.
- Arctic sea ice thickness has declined by about 40 percent during the late summer and early autumn in the last three decades of the 20th century.

Marine mammals are classified as sentinel species because they are good indicators of environmental change. Arctic marine mammals are ideal indicator species for climate change, due to their circumpolar distribution and close association with ice formation. NMFS recognizes that warming of the Arctic, which results in the diminishing of ice, could be a cause for concern to marine mammals. In Cook Inlet, marine mammal distribution is dependent upon ice formation and prey availability, among other factors. For example, belugas often travel just along the ice pack and feed on prey beneath it (Richardson et al., 1990, 1991). Any loss of ice could result in prey distribution changes or loss; however, beluga whales do not use ice for resting, reproduction, or rearing of young like pinnipeds.

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

4.4.9 Conclusion

Based on the summation of activity in the area, NMFS determined the incremental impact of issuing regulations and annual LOAs for a period of five years for the proposed Apache seismic surveys in Cook Inlet would not be expected to result in a cumulative significant impact to the human environment from past, present, and future activities. The potential impacts to marine mammals, their habitats, and the human environment in general are expected to be minimal based on the limited and temporary noise footprint and if the mitigation and monitoring requirements of the LOAs are implemented.

Chapter 5 List of Preparers and Agencies Consulted

Agencies Consulted

The NMFS Alaska Regional Office was informally consulted in preparation of this document.

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