PROPOSED ACTION:	Issuance of an Incidental Harassment Authorization to Apache Alaska Corporation for the Take of Marine Mammals Incidental to a 3D Seismic Survey 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 issue an Incidental Harassment Authorization, pursuant to section 101(a)(5)(D) of the Marine Mammal Protection Act, to Apache Alaska Corporation for the take of small numbers of marine mammals incidental to conducting a 3D seismic survey in Cook Inlet, Alaska.
DATE:	February 2014

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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
MHHW	Mean Higher High 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

1.1. Description of Proposed Action

The Marine Mammal Protection Act (MMPA) prohibits the incidental taking of marine mammals. The incidental take of a marine mammal falls under three categories: mortality, serious injury, or harassment, which includes injury and behavioral effects. The MMPA defines harassment as any act of pursuit, torment, or annoyance which: (1) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (2) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment). There are exceptions to the MMPA's prohibition on take such as the authority at issue here for us to authorize the incidental taking of small numbers of marine mammals by harassment upon the request of a U.S. citizen provided we follow certain statutory and regulatory procedures and make determinations. We describe this exception set forth in the MMPA at Section 101(a)(5)(D) in more detail in Section 1.2.

We propose to issue an Incidental Harassment Authorization (Authorization) to Apache Alaska Corporation (Apache) under the MMPA for the incidental taking of small numbers of marine mammals, incidental to the conduct of a three dimensional (3D) seismic survey program in Cook Inlet, Alaska. We do not have the authority to permit, authorize, or prohibit Apache's seismic survey activities under Section 101(a)(5)(D) of the MMPA, as that authority lies with a different Federal agency.

Our proposed action is a direct outcome of Apache requesting an authorization under Section 101(a)(5)(D) of the MMPA to take marine mammals, by harassment, incidental to conducting a 3D seismic survey because these activities have the potential to take marine mammals by exposing them to noise originating from the seismic airgun arrays used for seismic data acquisition. We anticipate that the acoustic stimuli associated with these activities would result in take otherwise prohibited by the MMPA. Apache therefore requires an Authorization for incidental take and has requested that we provide it through the issuance of an Incidental Harassment Authorization under section 101(a)(5)(D) of the MMPA.

Our issuance of an Authorization to Apache is a major federal action under the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations in 40 CFR §§ 1500-1508, and NOAA Administrative Order (NAO) 216-6. Thus, we are required to analyze the effects on the human environment and determine whether they are significant such that preparation of an Environmental Impact Statement (EIS) is necessary.

This Environmental Assessment (EA), titled "*Issuance of an Incidental Harassment Authorization to Apache Alaska Corporation for the Take of Marine Mammals Incidental to a 3D Seismic Survey in Cook Inlet, Alaska*," (hereinafter, Apache EA) addresses the potential environmental impacts of three alternatives available to us under section 101(a)(5)(D) of the MMPA, namely:

- Issue the Authorization to Apache for Level B harassment take of marine mammals under the MMPA during their 3D seismic survey program, taking into account the prescribed means of take, mitigation measures, and monitoring requirements required in the proposed Authorization;

- Not issue an Authorization to Apache in which case, for the purposes of NEPA analysis only, we assume that the activities would proceed and cause incidental take without the mitigation and monitoring measures prescribed in the proposed Authorization; or
- Issue the Authorization to Apache for Level B harassment take of marine mammals under the MMPA during the activities by incorporating additional required mitigation measures.

1.1.1. Background on Apache's MMPA Application

Apache proposes to conduct a 3D seismic survey in Cook Inlet, Alaska. The activity would occur for approximately eight to nine months between March 1 and December 31, 2014. Apache has acquired over 800,000 acres of oil and gas leases in Cook Inlet since 2010 with the primary objective to explore for and develop oil and gas resources in Cook Inlet. Seismic surveys are designed to collect bathymetric and sub-seafloor data that allow the evaluation of potential shallow faults, gas zones, and archeological features at prospective exploration drilling locations. This is the third section 101(a)(5)(D) MMPA Authorization request from Apache for takes of marine mammals incidental to seismic surveying in Cook Inlet. Acoustic stimuli generated by the seismic airgun array have the potential cause behavioral disturbances to marine mammals in the proposed project area.

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*)
- Steller sea lion (*Eumetopias jubatus*)

1.2. Purpose and Need

The MMPA prohibits "takes" of marine mammals, with a number of specific exceptions. The applicable exception in this case is an authorization for incidental take of marine mammals in section 101(a)(5)(D) of the MMPA.

Section 101(a)(5)(D) of the MMPA directs the Secretary of Commerce (Secretary) 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 provide a notice of a proposed authorization to the public for review. Entities seeking to obtain authorization for the incidental take of marine mammals under our jurisdiction must submit such a request (in the form of an application) to us.

We have issued regulations to implement the Incidental Take Authorization provisions of the MMPA (50 CFR Part 216) and have produced Office of Management and Budget (OMB)-approved application instructions (OMB Number 0648-0151) that prescribe the procedures necessary to apply for authorizations. All applicants must comply with the regulations at 50 CFR § 216.104 and submit applications requesting incidental take according to the provisions of the MMPA.

Purpose: The primary purpose of our proposed action—the issuance of an Authorization to Apache—is to authorize (pursuant to the MMPA) the take of marine mammals incidental to Apache's proposed activities. The Authorization, if issued, would exempt Apache from the take prohibitions contained in the MMPA.

To authorize the take of small numbers of marine mammals in accordance with Section 101(a)(5)(D) of the MMPA, we must evaluate the best available scientific information to determine whether the take would have a negligible impact on marine mammals or stocks and not have an unmitigable impact on the availability of affected marine mammal species for certain subsistence uses. We cannot issue an Authorization if it would result in more than a negligible impact on marine mammal species or stocks or if it would result in an unmitigable impact on subsistence.

In addition, we must prescribe, where applicable, the permissible methods of taking and other means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat (i.e., mitigation), paying particular attention to rookeries, mating grounds, and other areas of similar significance. If appropriate, we must prescribe means of effecting the least practicable impact on the availability of the species or stocks of marine mammals for subsistence uses. Authorizations must also include requirements or conditions pertaining to the monitoring and reporting of such taking in large part to better understand the effects of such taking on the species. Also, we must publish a notice of a proposed Authorization in the *Federal Register* for public notice and comment.

The purpose of this action is therefore to determine whether the take resulting from Apache's seismic survey activities would have a negligible impact on affected marine mammal species or stocks, would not have an unmitigable adverse impact on the availability of marine mammals for taking for subsistence uses, and develop mitigation and monitoring measures to reduce the potential impacts.

Need: On November 11, 2013, Apache submitted an adequate and complete application demonstrating both the need and potential eligibility for issuance of an Authorization in connection with the activities described in section 1.1.1. We now have a corresponding duty to determine whether and how we can authorize take by Level B harassment incidental to the activities described in Apache's application. Our responsibilities under section 101(a)(5)(D) of the MMPA and its implementing regulations establish and frame the need for this proposed action.

Any alternatives considered under NEPA must meet the agency's statutory and regulatory requirements. Our described purpose and need guide us in developing reasonable alternatives for consideration, including alternative means of mitigating potential adverse effects. Thus, we are developing and analyzing alternative means of developing and issuing an Authorization, which may require the applicant to include additional mitigation and monitoring measures in order for us to make our determinations under the MMPA.

1.3. The Environmental Review Process

NEPA compliance is necessary for all "major" federal actions with the potential to significantly affect the quality of the human environment. Major federal actions include activities fully or partially funded, regulated, conducted, authorized, or approved by a federal agency. Because our issuance of an Authorization would allow for the taking of marine mammals consistent with provisions under the

MMPA and incidental to the applicant's activities, we consider this as a major federal action subject to NEPA.

Under the requirements of NAO 216-6 section 6.03(f)(2)(b) for incidental harassment authorizations, we prepared this EA to determine whether the direct, indirect and cumulative impacts related to the issuance of an Authorization for incidental take of marine mammals under the MMPA during the conduct of Apache's seismic survey program in Cook Inlet, Alaska, could be significant. If we deem the potential impacts to be not significant, this analysis, in combination with other analyses incorporated by reference, may support the issuance of a Finding of No Significant Impact (FONSI) for the proposed Authorization.

1.3.1. Laws, Regulations, or Other NEPA Analyses Influencing the EA's Scope

We have based the scope of the proposed action and nature of the three alternatives (i.e., issue the Authorization including prescribed means of take, mitigation measures, and monitoring requirements; not issue the Authorization; or issue the Authorization with additional mitigation measures) considered in this EA on the relevant requirements in section 101(a)(5)(D) of the MMPA. Thus, our authority under the MMPA bounds the scope of our alternatives. We conclude that this analysis—when combined with the analyses in the following documents—fully describes the impacts associated with the proposed seismic survey program with mitigation and monitoring for marine mammals. After conducting an independent review of the information and analyses for sufficiency and adequacy, we incorporate by reference the relevant analyses on Apache's proposed action as well as a discussion of the affected environment and environmental consequences within the following documents per 40 CFR 1502.21 and NAO 216-6 § 5.09(d):

- our notice of the proposed Authorization in the *Federal Register* (78 FR 80386, December 31, 2013);
- *Application for Incidental Harassment Authorization for Apache Alaska Corporation 3D Seismic Program Cook Inlet Alaska* (ASRC Energy Services, 2013);
- *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* (*Eumatopia 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); and
- *Endangered Species Act: Section 7 Consultation Biological Opinion for 3D Seismic Surveys off Cook Inlet, Alaska by Apache Alaska Corporation* (NMFS, 2013b).

MMPA APPLICATION AND NOTICE OF THE PROPOSED AUTHORIZATION

The CEQ regulations (40 CFR §1502.25) encourage federal agencies to integrate NEPA's environmental review process with other environmental review laws. We rely substantially on the public process for developing proposed Authorizations and evaluating relevant environmental information and provide a meaningful opportunity for public participation as we develop corresponding EAs. We fully consider

public comments received in response to our publication of the notice of proposed Authorization during the corresponding NEPA process.

On December 31, 2013, we published a notice of proposed Authorization in the *Federal Register* (78 FR 80386), which included the following:

- a detailed 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; and
- our preliminary findings.

We considered Apache's proposed mitigation and monitoring measures that would effect the least practicable impact on marine mammals including: (1) establishing 180- and 190-dB radii exclusion zones for cetaceans and pinnipeds, respectively; (2) monitoring by protected species observers (PSOs) for any marine mammals that would enter these exclusion zones; (3) power-down or shut-down of acoustic sources if a marine mammal is sighted within or is about to enter the applicable exclusion zones; (4) ramping up sound sources before the survey; and (5) delays or shut-downs whenever a beluga whale or an aggregation of five or more harbor porpoise or killer whales are sighted during the vessel monitoring program approaching or within the 160-dB disturbance zone around the proposed activity. Additionally, activities would not occur within 10 miles of the Susitna Delta between mid-April and mid-October. Through the MMPA process, we preliminarily determined— provided that Apache implements the required mitigation and monitoring measures —that the impact on marine mammals of conducting the proposed 3D seismic survey in Cook Inlet, Alaska, from March through December 2014, would result, at worst, in a modification in behavior and/or low-level physiological effects (Level B harassment) of certain species of marine mammals. Also through that process, we determined that the activity would not have an unmitigable adverse impact on the availability of marine mammals for subsistence uses.

Within our notice, we requested that the public submit comments, information, and suggestions concerning Apache's request, the content of our proposed Authorization, and potential environmental effects related to the proposed issuance of the Authorization. This Apache EA titled incorporates by reference and relies on Apache's application (ASRC Energy Services 2013), our notice of a proposed Authorization (78 FR 80386, December 31, 2013), and other environmental analyses (NMFS, 2008a,b,c, 2013a,b) to avoid duplication of analysis and unnecessary length.

In summary, those analyses concluded that with 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. Next, the Authorization 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 species. The frequency and duration of the harassment from the seismic survey should allow adequate time for the marine mammals to recover from potentially adverse effects. Finally, the analyses concluded that NMFS did not expect that additive or cumulative effects of the seismic survey on its own or in combination with other activities would occur. Finally, the environmental analyses did not identify any significant environmental issues or impacts.

1.3.2. Scope of Environmental Analysis

Given the limited scope of the decision for which we are responsible (*i.e.*, issue the Authorization including prescribed means of take, mitigation measures, and monitoring requirements; not issue the Authorization; or issue the Authorization with additional mitigation measures) this EA intends to provide more focused information on the primary issues and impacts of environmental concern related specifically to our issuance of the Authorization. This EA does not further evaluate effects to the elements of the human environment listed in Table 1 because previous environmental reviews, incorporated by reference (NMFS 2008a,b,c, 2013a,b) have shown that our limited action of issuing an Authorization to Apache or Apache's proposed action would not significantly affect those components of 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	

1.3.3. NEPA Public Scoping Summary

NAO 216-6 established agency procedures for complying with NEPA and the implementing NEPA regulations issued by the CEQ. Consistent with the intent of NEPA and the clear direction in NAO 216-6 to involve the public in NEPA decision-making, we requested comments on the potential environmental impacts described in Apache's MMPA application and in the *Federal Register* notice of the proposed Authorization. The CEQ regulations further encourage agencies to integrate the NEPA review process with review under the environmental statutes. Consistent with agency practice we integrated our NEPA review and preparation of this EA with the public process required by the MMPA for the proposed issuance of an Authorization.

The *Federal Register* notice of the proposed Authorization, combined with our preliminary determinations, supporting analyses, and corresponding public comment period are instrumental in providing the public with information on relevant environmental issues and offering the public a

meaningful opportunity to provide comments to us for consideration in both the MMPA and NEPA decision-making processes.

The *Federal Register* notice of the proposed Authorization summarized our proposed action; stated that we would prepare an EA for the proposed action; and invited interested parties to submit written comments concerning the application and our preliminary analyses and findings including those relevant to consideration in the EA. The notice of the proposed Authorization was available for public review and comment from December 30, 2013, through January 29, 2014.

This process served the public participation function for this EA in terms of scoping for the action and providing the public a meaningful opportunity to participate in the process. In addition, we posted Apache's application on our website concurrently with the release of the *Federal Register* notice of the proposed Authorization. We base this EA on the information included in our *Federal Register* notice, the documents it references, and the public comments provided in response. At the conclusion of this process, we will post the final EA, and, if appropriate, FONSI, on the same website.

1.3.4. Relevant Comments on Our *Federal Register* Notice

During the 30-day public comment period on the notice of the proposed Authorization, we received nine comment letters from the following: the Natural Resources Defense Council (NRDC); the Marine Mammal Commission (MMC); the Resource Development Council; Alaska Oil and Gas Association; the Alaska Big Village Network, Center for Water Advocacy, the Chickaloon Village Traditional Council, and Alaska Inter-Tribal Council; Apache; and three private citizens.

We have considered the comments regarding monitoring and mitigation measures 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.

We will provide our response to the public comment letters in the *Federal Register* notice announcing the issuance of the Authorization. We fully considered all of the public comments in preparing the final Authorization and this EA. Where appropriate, changes to the proposed Authorization that resulted from public comments have been incorporated into this EA.

1.4. Other Permits, Licenses, or Consultation Requirements

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action.

1.4.1.National Environmental Policy Act

Issuance of an Authorization is subject to environmental review under NEPA. NMFS may prepare an EA, an EIS, or determine that the action is categorically excluded from further review. While NEPA does not dictate substantive requirements for an Authorization, it requires consideration of environmental issues in federal agency planning and decision making. The procedural provisions outlining federal agency responsibilities under NEPA are provided in the CEQ's implementing regulations (40 CFR §§1500-1508).

1.4.2.Endangered Species Act

Section 7 of the ESA and implementing regulations at 50 CFR §402 require consultation with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service) for federal actions that "may affect" a listed species or critical habitat. NMFS' issuance of an Authorization affecting ESA-listed species or designated critical habitat, directly or indirectly, is a federal action subject to these section 7 consultation requirements. 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.

There are two 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, and the Steller sea lion. Additionally, the proposed action falls within designated critical habitat for the Cook Inlet beluga whale. The NMFS Office of Protected Resources (OPR) Permits and Conservation Division (PR1) consulted with the NMFS Alaska Regional Office (AKRO) Protected Resources Division (PRD) on the issuance of this and other similar Authorizations under Section 101(a)(5)(D) of the MMPA, including one issued in April 2012, because the action of issuing the Authorization may affect endangered species under NMFS' jurisdiction. 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 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. The information and analyses presented in the Biological Opinion are incorporated by reference. PR1 discussed the proposed action of issuing this third Authorization with AKRO PRD and determined that the action falls within the scope and analysis of the February 2013 Biological Opinion. The proposed action described in this EA does not trigger any of the factors requiring a reinitiation of consultation. Therefore, a new section 7 consultation will not be conducted.

1.4.3.Marine Mammal Protection Act

The MMPA and its provisions that pertain to the proposed action are discussed above in section 1.2.

1.4.4.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 action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency which may adversely affect essential fish habitat (EFH) identified under the MSFCMA. EFH has been identified in Cook Inlet for walleye Pollock, rock sole, Pacific cod, skate, weathervane scallop, Pacific salmon, and sculpin. NMFS' action of authorizing harassment of marine mammals in the form of an Authorization does not impact EFH; therefore, an EFH consultation was not conducted.

Chapter 2 Alternatives

2.1. Introduction

The NEPA and the implementing CEQ regulations (40 CFR §§ 1500-1508) require consideration of alternatives to proposed major federal actions and NAO 216-6 provides agency policy and guidance on the consideration of alternatives to our proposed action. An EA must consider all reasonable alternatives, including Alternative 1 (Preferred Alternative). It must also consider the No Action Alternative, even if it that alternative does not meet the stated purpose and need. This provides a baseline analysis against which we can compare the other alternatives.

To warrant detailed evaluation as a reasonable alternative, an alternative must meet our purpose and need. In this case, as we previously explained in Chapter 1 of this EA, an alternative only meets the purpose and need if it satisfies the requirements under section 101(a)(5)(D) the MMPA. We evaluated each potential alternative against these criteria; identified two action alternatives along with the No Action Alternative; and carried these forward for evaluation in this EA.

Alternatives 1 and 3 include a suite of mitigation measures intended to minimize potentially adverse interactions with marine mammals. This chapter describes both alternatives and compares them in terms of their environmental impacts and their achievement of objectives.

As described in Section 1.2.1, we must prescribe the means of effecting the least practicable 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 measure to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation.

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.

2.2. Description of Apache's Proposed Activities

We presented a general overview of Apache's proposed 3D seismic survey operations in our *Federal Register* notice of proposed Authorization (78 FR 80836, December 31, 2013). 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 acquire offshore/transition zone operations for approximately 8 to 9 months in offshore areas in open water periods from March 1 through December 31, 2014. 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 3D seismic surveys would occur in intertidal transition zone and marine environment areas of Cook Inlet, Alaska (as well as some on land portions that are not considered in this EA). The proposed location of Apache's acquisition plan has been divided into areas denoted as Zone 1 and Zone 2 (Figure 1). Zone 1 is located in mid-Cook Inlet and extends on the east coast from approximately 10 km (6.2 mi) south of Point Possession to 25 km (15.5 mi) north of the East Foreland. Zone 1 only reaches into mid-channel and parallels the western shoreline from the Beluga River south to Bertha Bay. Zone 2 begins at the southern edge of Zone 1 (25 km [15.5 mi] north of the East Foreland) on both the east and west coasts and extends down to approximately Harriet Point on the west coast and to an area about 12 km (7.5 mi) north of Homer. Zones 1 and 2 together encompass approximately 4,238 km2 (1,636 mi^2) of intertidal and offshore areas. Although Apache would only operate in a portion of this entire area between March 1 and December 31, 2014, Apache has requested to operate in this entire region in order to allow for operational flexibility. There are numerous factors that influence the 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 imaging of leases held by other entities with whom Apache has agreements (e.g., data sharing), overlap of sources and receivers to obtain the necessary seismic imaging 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. 3D Seismic Survey Operations

During the survey operation, 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. 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.

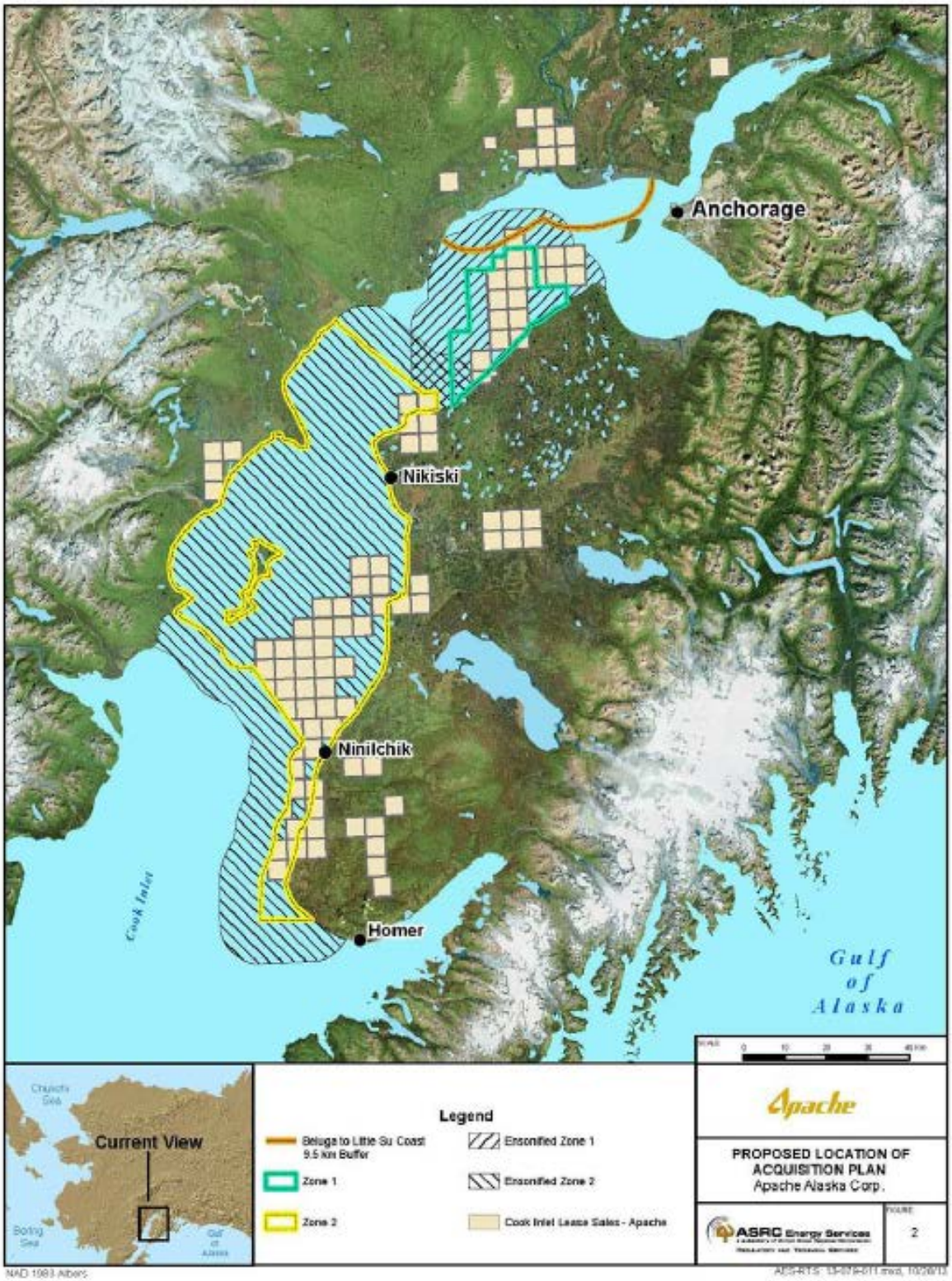

Figure 1. Proposed Project Area for Apache's 2014 3D Seismic Survey Program

2.3. Description of Alternatives

2.3.1. Alternative 1 – Issuance of an Authorization with Mitigation Measures

The Proposed Action constitutes Alternative 1 and is the Preferred Alternative. Under this alternative, we would issue an Authorization (valid from March through December 2014) to Apache allowing the incidental take, by Level B harassment, of five species of marine mammals subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the proposed Authorization, if issued, along with any additions based on consideration of public comments.

Our *Federal Register* notice requesting comments on the proposed Authorization analyzed the potential impacts of this Alternative in detail. We incorporate those analyses by reference in this EA and briefly summarize the mitigation and monitoring measures and reporting requirements that we would incorporate in the final Authorization, if issued, in the following sections.

MITIGATION AND MONITORING MEASURES

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

(1) 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.

(2) In addition to the vessel-based PSOs, 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.

(3) Weather and safety permitting, aerial surveys shall be conducted on a daily basis. When activities occur near river mouths, aerial surveys shall be conducted to identify large congregations of beluga whales and harbor seal haul-outs.

(4) 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).

(5) 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.

(6) 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) 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.

(7) 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.

(8) 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.

(9) 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.

(10) 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).

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

(12) 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).

(13) No initiation of survey operations involving the use of sound sources is permitted from a shutdown position at night or during low-light hours (such as in dense fog or heavy rain).

(14) If a beluga whale is visually sighted approaching or within the 160-dB disturbance zone, survey activity would not commence or the sound source(s) shall be shut down until the animals are no longer present within the 160-dB disturbance zone.

(15) Whenever aggregations or groups of killer whales and/or harbor porpoises are detected approaching or within the 160-dB disturbance zone, survey activity would not commence or the sound source(s) shall be shut-down until the animals are no longer present within the 160-dB zone. An aggregation or group of whales/porpoises shall consist of five or more individuals of any age/sex class.

(16) Apache must not operate airguns within 10 miles (16 km) of the mean higher high water (MHHW) line of the Susitna Delta (Beluga River to the Little Susitna River) between mid-April

and mid-October (to avoid any effects to belugas in an important feeding and potential breeding area).

(17) Seismic survey operations involving the use of air guns and pingers must cease if takes of any marine mammal are met or exceeded.

(18) In cases when the "mitigation gun" would be used between active seismic data acquisition periods, the shot interval would be set to one shot per minute.

Apache proposes 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. The researchers 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.

In 2012, Apache was required to conduct passive acoustic monitoring (PAM) during survey operations. However, for reasons explained here, PAM was not considered practicable to require under this proposed Authorization. The passive acoustic monitoring plan for Apache's 2012 survey anticipated the use of a bottom-mounted telemetry buoy to broadcast acoustic measurements using a radio-system link back to a monitoring vessel. Although a buoy was deployed during the first week of surveying under the 2012 Authorization, it was not successful. Upon deployment, the buoy immediately turned upside down due to the strong current in Cook Inlet. After retrieval, the buoy was not redeployed and the survey used a single omni-directional hydrophone lowered from the side of the mitigation vessel. During the entire 2012 survey season, Apache's PAM equipment yielded only six confirmed marine mammal detections, one of which was a Cook Inlet beluga whale. The single Cook Inlet beluga whale detection did not, however, result in a shutdown procedure.

Additionally, Joint Base Elmendorf-Fort Richardson (JBER), National Marine Mammal Laboratory (NMML), and Alaska Department of Fish & Game (ADF&G) conducted a 2012 study (Gillespie et al. 2013) to determine if beluga whale observations at the mouth of Eagle River corresponded with acoustic detections received by a PAMBuoy data collection system. The PAMBuoy data collection system was deployed in the mouth of Eagle River from 12-31 August 2012. This study was a trial period conducted with one hydrophone at the mouth of the river. Overall, it was successful in detecting beluga whale echolocation clicks and whistles, but came with several limitations:

- The PAM system was able to reliably detect all whales approaching or entering the river but still performs less well than a human observer;

- Sounds from vessels in Cook Inlet (e.g. vessel noise) have a large chance of interfering with detections from PAM. The mouth of Eagle River has very little vessel traffic, which is likely why the study was successful there and not likely to be successful in Cook Inlet;
- PAMbouys could be a navigational hazard in Cook Inlet for commercial, subsistence, and sport fishing, as well as the commercial vessel traffic traveling thorough Cook Inlet;
- The limited testing in a very small area should not become the new standard of monitoring in the entire Cook Inlet. The tide, vessel traffic, bathymetry, and substrate of Cook Inlet are far more complex than the study area;
- It appears the hydrophone must be hardwired to the shore which is not practical for mobile marine seismic operations;
- Currently, deployment of the system is done by walking tripods onto the mudflats. This is not feasible for the vast majority of the Apache project area. Walking onto the mudflats in parts of Cook Inlet also poses a safety risk;
- The study found considerable investment would be necessary to develop an ice and debris proof mounting system. Other issues with hydrophone configuration include: at extreme low tides, the hydrophone was uncovered and therefore not usable; the hydrophone had to be located in such a position so that it could be occasionally visually inspected; hydrophone battery supply has to constantly be checked; the costs and practicalities of long-term hydrophone mounting and data transmission have not been determined.; and only one hydrophone was tested, and Apache would need several hydrophones;
- Observer sightings and acoustic detections of belugas generally corresponded with one another. Thus PAMBuoys would be simply duplicating PSO and aerial efforts;
- The wireless modem that transmits the acoustic data to the "base station" was only tested to 3.2 km; and
- The study did not conclude anything about the detection range of the system, except that it was greater than 400 m.

Therefore, given the limited capability of various PAM methodologies for Apache's project in Cook Inlet (see Austin and Zeddies, 2012 for more information), as compared to visual monitoring methods, including expanded daily aerial surveys, the bottom-mounted telemetry buoy and omni-directional hydrophone are no longer considered practicable, and are not proposed to be a component of the 2014 seismic survey.

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 field reports would summarize species detected, in-water activity occurring at the time of the sighting, behavioral reactions to in-water activities, and the number of marine mammals taken. 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.
(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 Incidental Harassment 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 Endangered Species Act-listed marine mammals.

After conclusion of the seismic survey and the effectiveness of the Authorization, Apache would submit a draft Technical Report on all activities and monitoring results to NMFS' Permits and Conservation Division within 90 days. The Technical Report would include:

(1) Summaries of monitoring effort (e.g., total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals);
(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 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 90-day Technical Report. Apache must then submit a final report to the Chief, Permits and Conservation Division, Office of Protected Resources, NMFS, within 30 days after receiving comments from NMFS on the draft report. If NMFS decides that the draft 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 Condition 9(a) 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 *Federal Register* notice of proposed Authorization, 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 activity on marine mammals to the level of least practicable 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 action would have a negligible impact on the relevant species or stocks and would not have an unmitgable adverse impact on affected species or stocks for taking for subsistence uses.

Based on public comments received, we have included one additional mitigation requirement in the final Authorization that was not included in the proposed Authorization. However, we have not received any information that would cause us to change our preliminary determinations under the MMPA. Accordingly, this Preferred Alternative would satisfy the purpose and need of our proposed action under the MMPA–issuance of an Authorization, along with required mitigation measures and monitoring that meets the standards set forth in section 101(a)(5)(D) of the MMPA and the implementing regulations.

2.3.2. Alternative 2 – No Action Alternative

We are required to evaluate the No Action Alternative per CEQ NEPA regulations. The No Action Alternative serves as a baseline to compare the impacts of the Preferred and other Alternatives.

Under the No Action Alternative, Apache could choose not to proceed with their proposed activities or to proceed without an Authorization. If they choose the latter, Apache would not be exempt from the MMPA prohibitions against the take of marine mammals and would be in violation of the MMPA if take of marine mammals occurs.

For purposes of this EA, we characterize the No Action Alternative as Apache not receiving an Authorization and Apache conducting the Cook Inlet 3D seismic survey program without the protective measures and reporting requirements required by an Authorization under the MMPA. We take this approach to meaningfully evaluate the primary environmental issues—the impact on marine mammals from these activities in the absence of protective measures.

2.3.3. Alternative 3—Issuance of an Authorization with Additional Mitigation and Monitoring Measures

Under Alternative 3, NMFS would issue an Authorization under section 101(a)(5)(D) of the MMPA to Apache, allowing the incidental take by Level B harassment only of small numbers of marine mammal species incidental to conducting seismic survey activities in the upper Cook Inlet during the effective period of the Authorization. While all of the mitigation, monitoring, and reporting measures that would be required under Alternative 1 would also be required under Alternative 3, the difference under this alternative is that additional mitigation and monitoring measures would be required. Additional measures that would be required by NMFS under this alternative include: a 120-dB monitoring (and safety) zone for beluga whale cow/calf pairs in Cook Inlet; active acoustic monitoring; and the use of unmanned aerial vehicles to conduct aerial monitoring. 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.

2.4. 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 an Authorization 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 and 3 in the Susitna Delta was considered but eliminated from consideration because such measures were unnecessary given the timing and location of the seismic survey.

Chapter 3 Affected Environment

This chapter describes existing conditions in the proposed action areas. Complete descriptions of the physical, biological, and social environment of the action area are contained in the documents listed in Section 1.3.1 of this Apache 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

We are required to consider impacts to the physical environment under NOAA NAO 216-6. As discussed in Chapter 1, our proposed action and alternatives relate only to the authorization of incidental take of marine mammals and not to the physical environment. Certain aspects of the physical environment are not relevant to our proposed action (see subchapter 1.3.2 - Scope of Environmental Analysis). Because of the requirements of NAO 216-6, we briefly summarize the physical components of the environment here.

3.1.1. Marine Mammal Habitat

We presented information on marine mammal habitat and the potential impacts to marine mammal habitat in the *Federal Register* notice of the proposed Authorization. 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 and Steller sea lions more commonly use the lower Cook Inlet area, which is outside the active seismic operation 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. Additionally, anthropogenic threats have the greatest potential to adversely impact beluga whales and their habitat in Critical Habitat Area 1. Critical Habitat Area 2 consists of 5,891 km^2 located south of Critical Habitat Area 1 and includes nearshore areas along western Cook Inlet and Kachemak Bay. Critical Habitat Area 2 is known fall and winter foraging and transit habitat for beluga whales as well as spring and summer habitat for smaller concentrations of beluga whales. Apache's proposed study area is 4,238 km^2, of which only a smaller portion would be surveyed. 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.

[1] For national security reasons, critical habitat excludes all property and waters of JBER and waters adjacent to the Port of Anchorage (Figure 11 Insert)

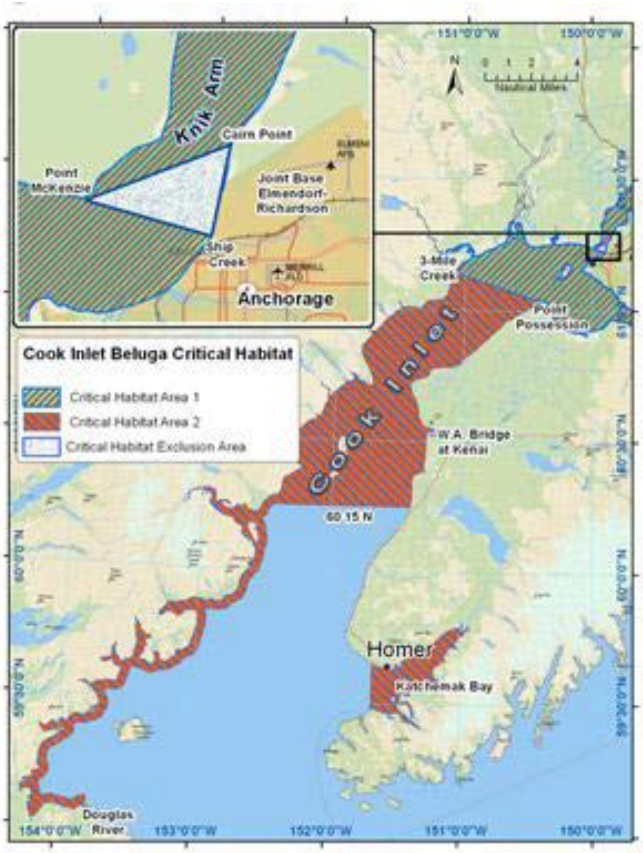

Figure 2. Final critical habitat of Cook Inlet beluga whales (76 FR 20180, April 11, 2011).

3.2. Biological Environment

3.2.1. Marine Mammals

We provide information on the occurrence of marine mammals most likely present in the proposed seismic survey areas in section 1.1.2 of this EA. The marine mammals most likely to be harassed incidental to conducting the 3D seismic survey program are: Cook Inlet beluga whale, harbor seal, killer whale, harbor porpoise, and Steller sea lion (Shelden et al. 2003). While killer 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. Recent passive acoustic monitoring research has indicated that harbor porpoises occur more frequently in the project area than was previously estimated based solely on visual observations (NMML 2011, personal communication). Table 2 provides a summary of the abundance and status of the species likely to occur in the project area. We provided information on the distribution, population size, and conservation status for each species in the *Federal Register* notice on the proposed Authorization and we incorporate those descriptions by reference here. We briefly summarize this information here. Apache's application (ASRC Energy Services 2013) and our 2013 EA (NMFS 2013a) on this action contain detailed information on life history functions, hearing abilities, and distribution, which is also incorporated by reference.

Table 2. Marine Mammal Species Likely to Occur in the Seismic Survey Area

Species	Abundance	Comments
Beluga whale (*Delphinapterus leucas*)	312 [1]	Occurs in the project area. Listed as Depleted under the MMPA, endangered under ESA, critical habitat in project area.
Harbor seal *(Phoca vitulina richardsi)*	22,900 [2]	Occurs in the project area. No special status or ESA listing.
Killer whale *(Orcinus orca)*	1,123 Resident 552 Transient [3]	Occurs rarely in the project area. No special status or ESA listing.
Harbor porpoise *(Phocoena phocoena)*	25,987 [4]	Occurs in the project area. No special status or ESA listing.
Steller sea lion (*Eumetopias jubatus*)	45,916 [5]	Occurs infrequently in the project area. Listed as Depleted under the MMPA, endangered under ESA.

Notes: MMPA = Marine Mammal Protection Act, ESA = Endangered Species Act

[1] Abundance estimate for the Cook Inlet stock (Allen and Angliss 2013)

[2] Abundance estimate for the Cook Inlet/Shelikof stock (Allen and Angliss 2013)

[3] Resident estimate from Alaska resident stock; transient estimate from Gulf of Alaska, Aleutian Islands, and Bering Sea transient stock (Allen and Angliss 2013)

[4] Abundance estimate for the Gulf of Alaska stock (Allen and Angliss 2013)

[5] Abundance estimate for the western stock (Allen and Angliss 2013)

3.2.2.ESA-listed Marine Mammals

3.2.2.1. 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 area.

NMFS began comprehensive, systematic aerial surveys on beluga whales in Cook Inlet in 1994. Unlike previous efforts, these surveys included the upper, middle, and lower inlet. These surveys documented a decline in abundance of nearly 50 percent between 1994 and 1998, from an estimate of 653 to 347 whales (Rugh et al. 2000). In response to this decline, NMFS initiated a status review on the Cook Inlet beluga whale stock pursuant to the MMPA and the ESA in 1998 (63 FR 64228, November 19, 1998). The annual abundance surveys conducted each June since 1999 provide the following abundance estimates: 357 beluga whales in 1999, 435 beluga whales in 2000, 386 beluga whales in 2001, 313 beluga whales in 2002, 357 beluga whales in 2003, 366 beluga whales in 2004, 278 beluga whales in 2005, 302 beluga whales in 2006, 375 beluga whales in 2007; 321 beluga whales in 2009; 340 beluga whales in 2010; 284

whales in 2011; 312 whales in 2012 (Hobbs et al. 2000; Rugh et al. 2003, 2004a, 2004b, 2005a, 2005b, 2005c, 2006, 2007, 2010; NMFS 2010; Hobbs et al. 2011, Shelden et al. 2012). The overall population trend for the past 10 years for Cook Inlet beluga whales shows them not recovering and still in decline at an annual rate of 0.6 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 in recent years 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.

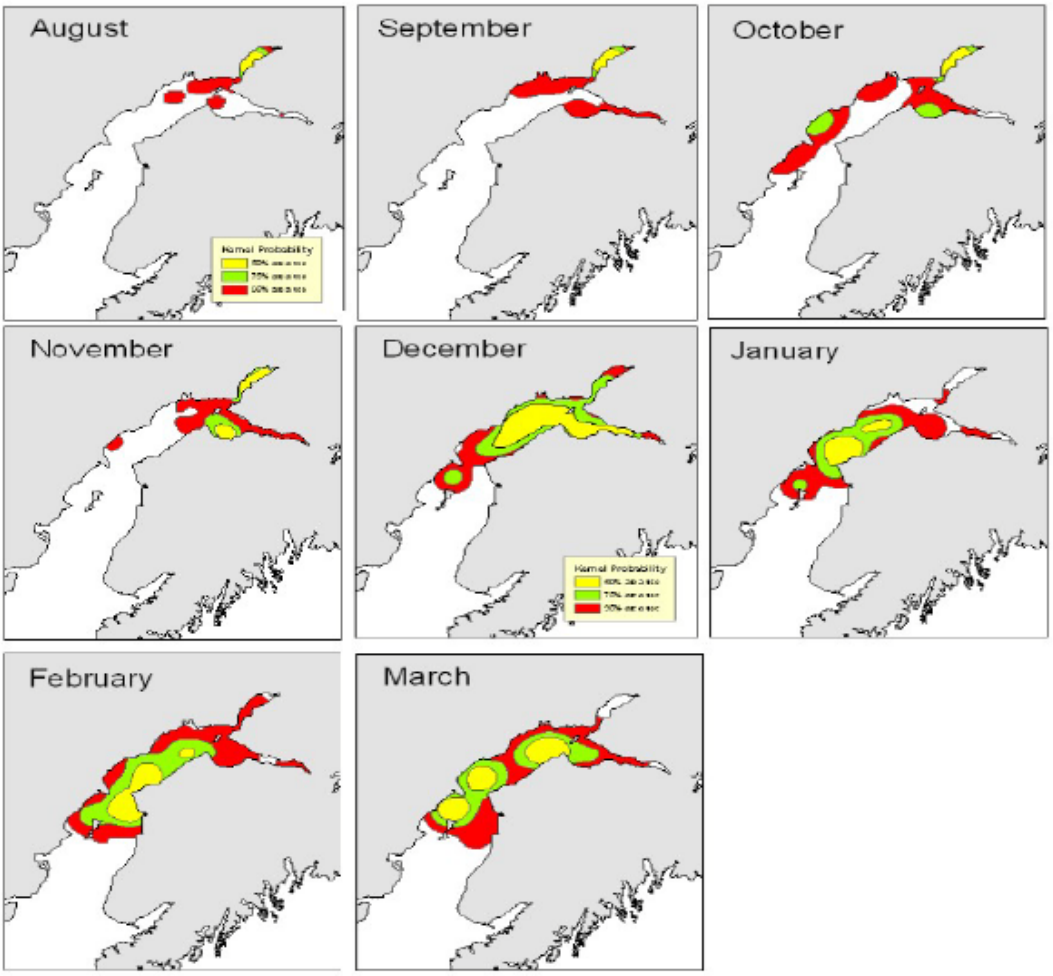

Figure 3. Predicted beluga distribution by month based upon known locations of 14 satellite tagged belugas (predictions derived via kernel probability estimates; Hobbs et al. 2005). Note the large increase in total area use and offshore locations beginning in December and continuing through March. The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

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).

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).

3.2.2.2. 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 project 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

3.2.3.1. 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.

3.2.3.2. 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 project area.

3.2.3.3. 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.

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 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.

Consistent with NMFS' implementing regulations, Apache met with the CIMMC - a now dissolved ANO that represented Cook Inlet tribes - on March 29, 2011, to discuss the proposed activities and discuss subsistence concerns. Apache also met with the Tyonek Native Corporation on November 9, 2010, and the Salamatof Native Corporation on November 22, 2010. Additional meetings were held with the Native Village of Tyonek, the Kenaitze Indian Tribe, the Knik Tribal Council, and the Ninilchik Traditional Council. According to Apache, during all these meetings, no concerns were stated regarding potential conflict with subsistence harvest of marine mammals. 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;

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

Since the issuance of the April 2012 Authorization, Apache has maintained regular and consistent communication with federally recognized Alaska Natives. The Alaska Natives, Native Corporations, and ANOs that Apache has communicated with include: the Native Village of Tyonek; Tyonek Native Corporation; Ninilchik Native Association; Ninilchik Traditional Council; Salamatof Native Association; Knikatnu; Knik Native Council; Alexander Creek; Cook Inlet Region, Inc.; the Native Village of Eklutna; Kenaitze Indian Tribe; and Seldovia Native Assocaition. Apache has shared information gathered during the seismic survey conducted under the April 2012 Authorization, and plans on hosting an information exchange with Alaska Native Villages, Native Corporations, and other Non-Governmental Organizations in the spring of 2013 where data from the past year's monitoring operations would be presented.

Apache concluded, and NMFS agrees, that the size of the affected area, mitigation measures, and input from the Native Organizations 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 ANOs and federally recognized tribes are informed, engaged, and involved during the permitting process and will continue to work with the ANOs and tribes to discuss their operations and activities.

On February 6, 2012, in response to requests for government-to-government consultations by the CIMMC and Native Village of Eklutna, for the first Authorization, NMFS met with representatives from these two

groups and a representative from the Ninilchik. The parties engaged in discussions about the proposed Authorization, the MMPA process for issuing an Authorization, concerns regarding Cook Inlet beluga whales, and achieving greater coordination with NMFS on issues that impact tribal concerns. NMFS considered these communications before issuing its first Authorization. Following the publication of the third proposed Authorization, NMFS contacted the local Native Villages to inform them of the availability of the *Federal Register* notice and the opening of the public comment period. During the public comment period, NMFS received a letter from the Alaska Big Village Network, Center for Water Advocacy, the Chickaloon Village Traditional Council, and Alaska Inter-Tribal Council, and the issues raised in that letter were addressed in the Comment and Responses Section of the *Federal Register* notice announcing the issuance of the third Authorization. The comment letter opposed the proposed issuance of the Authorization.

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.

Chapter 4 Environmental Consequences

This chapter of the EA analyzes the impacts of the three alternatives and addresses the potential direct, indirect, and cumulative impacts of our issuance of an Authorization. Apache's application, our notice of a proposed Authorization, and other related environmental analyses identified previously, facilitate an analysis of the direct, indirect, and cumulative effects of our proposed issuance of an Authorization.

Under the MMPA, we have evaluated the potential impacts of Apache's seismic survey activities 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 Authorization.

4.1. Effects of Alternative 1 – Issuance of an Authorization with Mitigation Measures

Alternative 1 is the Preferred Alternative where we would issue an Authorization to Apache allowing the incidental take, by Level B harassment, of five species of marine mammals from March through December 2014, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the Authorization, if issued. We would incorporate the mitigation and monitoring measures and reporting described earlier in this EA into a final Authorization.

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 the 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 3D seismic survey operations would physically alter the marine environment or negatively impact the physical environment in the proposed action area. The Authorization 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, this entire area would not be surveyed under this Authorization, as that 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 Authorization, if issued, to reduce activity in critical habitat Area 1 when beluga whales are present in high numbers. Therefore, impacts to habitat would be minimal. More information on potential impacts to marine mammal habitat is contained in Apache's application (ASRC Energy Services 2013) and our proposed Authorization notice, which are incorporated herein by reference.

4.1.2. Impacts to Marine Mammals

We expect that disturbance from acoustic stimuli associated with the 3D 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). Our notice of proposed Authorization, Apache's application (ASRC Energy Services 2013), and our 2013 EA on this action (NMFS 2013a) provide detailed descriptions of these potential effects of seismic surveys on marine mammals. That information is incorporated herein by reference and summarized next.

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. Numerous 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.

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). 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.

Based on this information, we expect that these takes would result, at worst, in a temporary modification in behavior, temporary changes in animal distribution, and/or low-level physiological effects (Level B harassment) of certain species or stocks of marine mammals. At most, we interpret these effects on 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 five 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 (see pages 12-14) 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 required mitigation and monitoring measures 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.

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, five 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 9.6 percent) relative to the population sizes. Table 3 outlines the number of Level B harassment takes that we propose to authorize in this Authorization, 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.

Table 3. Proposed Level B harassment take levels, species or stock abundance, and percentage of population proposed to be taken.

Species	Proposed Level B Take	Abundance	Percentage of Population
Beluga Whale	30	312	9.6
Harbor Seal	440	22,900	1.9
Harbor Porpoise	20	25,987	0.08
Killer Whale	10	1,123 (resident) 552 (transient)	0.89 1.8
Steller Sea Lion	20	45,916	0.04

Our proposed Authorization notice and Apache's application (ASRC Energy Services 2013) contain complete descriptions of how these take estimates were derived. None of these have changed since those documents except for harbor seals. We increased the number of proposed harbor seal Level B takes based on a comment from the Marine Mammal Commission that we did not account for the potential for large haulouts of harbor seals in the vicinity of the proposed survey activities. 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.

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 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. 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 issue an Authorization 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 3D 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.

4.2.1. Impacts to Marine Mammal Habitat

Under the No Action Alternative, 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 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 MHHW line of the Susitna River.

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 Authorization. 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 3 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 number of takes.

If the activities proceeded without the protective measures and reporting requirements required by a final Authorization under the MMPA, the direct, indirect, or cumulative effects on the human or natural environment of not issuing the Authorization 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 Authorization 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 Authorization. Thus, the incidental take of marine mammals would likely occur at higher levels than we have already identified and evaluated in our *Federal Register* notice on the proposed Authorization; 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. Effects of Alternative 3 – Issuance of an Authorization with Additional Mitigation and Monitoring Measures

4.3.1. Impacts to Marine Mammal Habitat

Effects to the physical environment would be the same under Alternative 3 as those described above for Alternative 1. No additional effects beyond those already described would be expected.

4.3.2. Impacts to Marine Mammals

Marine mammals would still be expected to be harassed by the proposed seismic survey in upper Cook Inlet. As described in Alternative 1, anticipated impacts to marine mammals associated with Apache's proposed activities (primarily resulting from noise propagation) are from vessel movements and airgun and other active acoustic sources operations. Potential impacts to marine mammals might include one or more of the following: tolerance, masking of important natural signals, behavioral disturbance, and temporary or permanent hearing impairment or non-auditory effects. These are the same types of reactions that would be anticipated under the Preferred Alternative (Alternative 1).

The primary difference under Alternative 3 is that additional mitigation and monitoring measures for detecting marine mammals would be required. These additional measures include a 120-dB monitoring (safety) zone for beluga whale cow/calf pairs, active acoustic monitoring, and the use of unmanned aerial vehicles to conduct aerial monitoring. While the technologies for these monitoring methods are still being developed and refined, it is expected that they would allow for additional detection of marine mammals beyond visual observations from shipboard observers. These additional monitoring measures could allow for necessary mitigation measures (i.e., power-downs and shutdowns) to be implemented more quickly and more frequently, thereby potentially reducing further the number of marine mammal

takes. However, until these technologies are developed and fully tested, we are unable to provide a reasonable estimate of this reduction in take levels.

4.3.3. Impacts to Subsistence

Under Alternative 3, impacts to marine mammal subsistence are anticipated to be the same as those described for Alternative 1 earlier in this EA.

4.4. Compliance with Necessary Laws – Necessary Federal Permits

We have determined that the issuance of an Authorization is consistent with the applicable requirements of the MMPA, ESA, MSFMCA, and our regulations. Please refer to Section 1.4 of this Apache EA for more information.

4.5. Unavoidable Adverse Impacts

Apache's application, our notice of a proposed Authorization, 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 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.

4.6. 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 for a relatively short period of time, and there would be no objects or materials permanently released into the water column. This section provides a brief summary of the human-related activities affecting the marine mammal species in the action area.

4.6.1. 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).

4.6.2. 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.

4.6.3. 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.

4.6.4. 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 three to five years, and NMFS has received Authorization applications from other oil and gas companies requesting takes of marine mammals incidental to seismic surveys and drilling operations, including two requests to conduct seismic survey programs very similar to that proposed by Apache with some spatial overlap and also temporal overlap. 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. 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.

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 did not conduct activities under the 2013 Authorization. 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.

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.

4.6.5. 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 ORPC Tidal Energy Project. The Port of Anchorage (POA) is currently expanding their facilities and Port MacKenzie is scheduled to expand their facilities. Both port facilities may have an effect on beluga whales in the action area due to increased vessel traffic passing through the area on their way to both facilities.

Port of Anchorage and Port MacKenzie Expansions

The POA and Port MacKenzie in upper Cook Inlet are either currently expanding or scheduled to expand their facilities. These ports will contribute to increased vessel traffic throughout Cook Inlet. The POA is expanding its facilities to accommodate increased growth in Alaska and to support military services at JBER. In the next five years at Port MacKenzie a fuel tank farm, the Rail Extension, and a deep draft dock are scheduled for construction. The Rail Extension would connect Port MacKenzie to the Alaska Railroad Corporation's existing mainline between Wasilla and Willow, providing freight service between Port MacKenzie and Interior Alaska. Port MacKenzie will be exporting coal from Healy, Alaska with the construction of the Rail Extension. The fuel tank farm is scheduled to be completed by fall 2012 and the

Rail Extension should be completed by 2014. Additionally, Port MacKenzie is currently preparing permits to construct a deep draft dock. As a result, number of ships calling to port at Port MacKenzie is expected to increase over the next five years. Increased vessel traffic may result in increased in water noise and potential ship strikes with beluga whales.

Chuitna Coal Project

The Chuitna Coal Project is located within the action area of the proposed Cook Inlet 3D Seismic Program. PanRim Coal, LP is proposing to develop, construct and operate a coal mine and export facility 19 km (12 mi) northwest of the Village of Tyonek. Potential impacts on the Cook Inlet beluga whale 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 (PamRim 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 (PamRim 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 Alaska Pollutant Discharge Elimination Systems permit (PamRim Coal, LP 2011).

ORPC Alaska Tidal Energy Projects

The Ocean Renewable Power Company (ORPC) is proposing two tidal energy projects in Cook Inlet. The first tidal energy project would be located on the Westside of Fire Island near Anchorage and the second project would be located adjacent to the East Foreland in the vicinity of Nikiski on the Kenai Peninsula (ORPC 2011). The tidal energy projects would require the installation of an array of turbine generator units and transmission cables on the seafloor to harness the tidal energy. The tidal energy will be converted to electrical energy at stations on land. These projects are still in preliminary testing and environmental monitoring phases (ORPC 2010, ORPC 2011).

4.6.6.Marine Mammal Research

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

4.6.7. 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. Although NMFS recognizes that climate change is a concern for the sustainability of the entire ecosystem in Cook Inlet, it is unclear at this time the full extent to which climate change will affect marine mammal species.

4.6.8. Conclusion

Based on the summation of activity in the area provided in this section, NMFS believes that the incremental impact of an Authorization for the proposed Apache seismic survey 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 mitigation and monitoring requirements of the Authorization.

Chapter 5 List of Preparers and Agencies Consulted

Agencies Consulted

No other persons or agencies were consulted in preparation of this EA.

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