

**PROPOSED ACTION:** Issuance of an Incidental Harassment Authorization to Apache, Inc., for the Take of Sea Otters Incidental to Seismic Operations in Cook Inlet, Alaska.

**TYPE OF STATEMENT:** Environmental Assessment

**LEAD AGENCY:** U.S. Department of Interior  
U.S. Fish and Wildlife Service

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**LOCATION:** Cook Inlet, Alaska.

**ABSTRACT:** This Environmental Assessment analyzes the environmental impacts of the U.S. Fish and Wildlife Service, Alaska Region proposal to issue an Incidental Harassment Authorization, pursuant to section 101(a)(5)(D) of the Marine Mammal Protection Act, to Apache, Inc., for the take of small numbers of northern sea otters incidental to conducting seismic operations in Cook Inlet, Alaska.

**DATE:** July 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
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 $\mu$ Pa	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
km	kilometer
km <sup>2</sup>	square kilometer
m	meter
mi	miles
mi <sup>2</sup>	square miles
m <sup>3</sup> /sec	cubic meters per second
MHHW	Mean Higher High Water
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
PAM	Passive Acoustic Monitoring
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, including northern sea otters (*Enhydra lutris kenyoni*). 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, Inc. (Apache) under the MMPA for the incidental taking of small numbers of marine mammals, incidental to seismic operations 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 seismic operations 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 considered a major federal action under the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations in 40 CFR §§ 1500-1508. Thus, we are required to analyze the effects on the human environment and determine whether they are significant such that preparation of an Environmental Impact Statement (EIS) is necessary.

This Environmental Assessment (EA), titled "*Issuance of an Incidental Harassment Authorization to Apache, Inc., for the Take of Sea Otters Incidental to Seismic Operations in Cook Inlet, Alaska*" (hereinafter, Apache EA) addresses the potential environmental impacts of two 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 seismic operations, taking into account the prescribed means of take, mitigation measures, and monitoring requirements required in the proposed Authorization; or
- 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.

### **1.1.1. Background on Apache’s MMPA Application**

On March 6, 2014, USFWS acknowledged receipt of a complete set of application materials from Apache requesting authorization for harassment of small numbers of sea otters (*Enhydra lutris kenyoni*) incidental to conducting seismic operations in Lower Cook Inlet, Alaska. This area provides habitat for sea otters and, consequently, the incidental take of sea otters through harassment could occur as a result of this otherwise legal action. This Environmental Assessment (EA) has been prepared to implement provisions of the National Environmental Policy Act of 1969 (NEPA) [42 U.S.C. § 4321 et seq.] by evaluating the potential impacts of issuing a one-year IHA for the incidental take of sea otters in Lower Cook Inlet on the population stock and the availability of the stock for subsistence users. The proposed IHA is for take of sea otters from the Southcentral stock only based on project area (USFWS 2014). The issuance of the IHA would not affect any other sea otter stock, including the Southwest Alaska stock, which was listed as threatened under the Endangered Species Act in August 2005 (70 FR 46366). Thus, consultation under section 7 of the ESA is not necessary.

### **1.1.2. Marine Mammals in the Action Area**

The proposed seismic survey program could adversely affect northern sea otters, the one marine mammal species occurring in the Action Area that is under our jurisdiction.

## **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 Interior (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.

**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 pupping areas 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 EA is therefore to determine whether the take authorized by our issuing the requested IHA, and resulting from Apache's seismic operations, 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 March 6, 2014, the Service determined that Apache had 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 sea otters consistent with provisions under the MMPA and incidental to the applicant’s activities, we consider this as a major federal action subject to NEPA.

We prepared this EA to determine whether the direct, indirect, and cumulative impacts related to the issuance of an Authorization for incidental take of sea otters under the MMPA during the conduct of Apache’s seismic survey operation 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 two alternatives (i.e., issue the Authorization including prescribed means of take, mitigation measures, and monitoring requirements; or not issue the Authorization) 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 sea otters. 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:

- our notice of the Authorization in the *Federal Register*;
- *Proposed Issuance of an Incidental Harassment Authorization to Apache, Inc., for the Take of Sea Otters Incidental to Seismic Operations in Cook Inlet, Alaska*;
- *Northern Sea Otter (Enhydra lutris kenyoni): Southcentral Alaska Stock* (USFWS 2014).

### **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 [date], we published a notice of Authorization in the *Federal Register* ([volume]), which included the following:

- a detailed description of the proposed action and an assessment of the potential impacts on sea otters and the availability of sea otters for subsistence uses;
- plans for Apache's mitigation and monitoring measures to avoid and minimize potential adverse impacts to sea otters and their habitat and proposed reporting requirements; and
- our preliminary findings.

We considered Apache's proposed mitigation and monitoring measures that would affect the least practicable impact on sea otters including: (1) establishing exclusion zones for, respectively; (2) monitoring by protected species observers (PSOs) for sea otter that would enter these exclusion zones; (3) power-down or shut-down of acoustic sources if a sea otter is sighted within or is about to enter the applicable exclusion zones; (4) ramping up sound sources before the survey; and (5) delay power-ups until the exclusion zone is clear of otters. Through the MMPA process, we preliminarily determined — provided that Apache implements the required mitigation and monitoring measures — that the impact on sea otters by conducting the proposed seismic operations in Cook Inlet, Alaska, from August to December 2014, would result, at worst, in a modification in behavior and/or low-level physiological effects (Level B harassment) of sea otters. Also through that process, we determined that the activity would not have an unmitigable adverse impact on the availability of sea otters 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 incorporates by reference and relies on Apache's application and our notice of Authorization ([date]).

In summary, those analyses concluded that with incorporation of monitoring and mitigation measures proposed by Apache, the authorized taking of sea otters results in minor, short-term (recoverable) adverse effects on individual sea otters. 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 sea otters to recover from potentially adverse effects. Further, the analyses concluded that USFWS 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), 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

We requested comments on the potential environmental impacts described in Apache’s MMPA application and in the *Federal Register* notice of the 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 issuance of an Authorization.

The *Federal Register* notice of the 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 Authorization summarizes our proposed action; states that we would prepare an EA for the proposed action; and invites interested parties to submit written comments concerning the application and our preliminary analyses and findings including those relevant to consideration in the EA. After the conclusion of the public comment and review process, we will incorporate public comments and post the final EA, and, if appropriate, FONSI, on our website at: <http://www.fws.gov/alaska/fisheries/mmm/iha.htm>.

#### **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. USFWS 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 for federal actions that "may affect" a listed species or critical habitat. USFWS' 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, USFWS 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. However, sea otters in Apache's proposed seismic survey area are not listed under ESA.

##### **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. USFWS' action of authorizing harassment of

sea otters in the form of an Authorization does not impact EFH; therefore, an EFH consultation was not conducted.

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## **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 516 DM6 Appendix 1 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 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) of 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.

Alternative 1 includes a suite of mitigation measures intended to minimize potentially adverse interactions with sea otters. Alternative 1 is described in this chapter.

As described in Section 1.2.1, we must prescribe the means of effecting the least practicable impact of sea otters 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 sea otters; (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 sea otter injury, serious injury, or death wherever possible;
- A reduction in the numbers of sea otters taken (total number or number at biologically important time or location);
- A reduction in the number of times the activity takes individual sea otters (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 sea otter 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 sea otters, 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 ([date]). 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 seismic data in waters offshore of the east coast of Lower Cook Inlet along the east coast from Clam Gulch to just north of Ninilchik from August to December 2014.

### **2.2.2. Seismic Operations**

#### **Description of Activities**

Each phase of the Apache survey encounters land, inter-tidal transition zone, and marine environments. The following provides a general overview of the methods that will be employed during the acquisition of the seismic survey.

#### **Recording System**

The recording system that will be employed is an autonomous system "nodal" (i.e., no cables), which is expected to be made up of at least two types of nodes; one for the land and one for the intertidal and marine environment. For the land environment, this would be a single-component sensor land node; for the inter-tidal and marine zone, this would be a submersible multi-component system made up of three velocity sensors and a hydrophone. These systems have the ability to record continuous data. Inline receiver intervals for the node systems will be 50 m (165 ft).

The geometry methodology that Apache will employ to gather the data is called patch shooting. This type of seismic surveying requires the use of multiple vessels for cable layout/pickup, recording, and sourcing. Operations begin by laying nodes off the back of the layout vessels on the seafloor parallel to each other with a node line spacing of about 402 m (1,320 ft). Apache's patch will have 6–8 node lines (receivers) laid in parallel to each other. The lines are generally run perpendicular to the shoreline. The node lines will be separated by either 402 or 503 m (1,320 or 1,650 ft). Inline spacing between nodes will be 50 m (165 ft). The node vessels will lay the entire patch on the seafloor prior to the air gun activity. Individual vessels are capable of carrying up to 400 nodes. With three node vessels operating simultaneously, a patch can be laid down in a single 24 hour period, weather permitting. As the patches are acquired, the node lines will be moved either side to side or inline to the next patch's location.

## **Sensor Positioning**

Once the nodes are in place on the seafloor, the exact position of each node is required. There are several techniques used to locate the nodes on the seafloor, depending on the depth of the water. In very shallow water, a node's position is either surveyed by a land surveyor when the tide is low, or the position is accepted based on the position at which the navigator has laid the unit.

In deeper water, there are two recognized techniques. The first is to use a hull or pole-mounted pinger to send a signal to a transponder that is attached to each node. The transponders are coded and the crew knows which transponder goes with which node prior to the layout. The transponder's response (once pinged) is added together with several other responses to create a suite of ranges and bearings between the pinger boat and the node. Those data are then calculated to precisely position the node. In good conditions, the nodes can be interrogated as they are laid out. It is also common for the nodes to be pinged after they have been laid out. The pinger that will be used is a Sonardyne Shallow Water Cable Positioning system. The two instruments used are a Scout Ultra-Short BaseLine (USBL) Transceiver that operates at a frequency of 33-55 kiloHertz (kHz) at a max source level of 188 decibels referenced to one microPascal (dB re 1  $\mu$ Pa) at 1 m; and a LR USBL Transponder that operates at a frequency of 35-50 kHz at a source level of 185 dB re 1  $\mu$ Pa at 1 m.

The second technique for deeper water is called Ocean Bottom Receiver Location (OBRL). This technique uses a small volume (10 cui) air gun firing parallel to the node line. The air gun is fired along each side of the line, and the data are then gathered from the node and combined with the known position of the air gun to give a precise location of each node. Once the patch of nodes is on the sea floor and positioning information has been gathered, the source activity begins.

Onshore and intertidal locating of source and receivers will be accomplished with Differential Global Positioning System/roving units (DGPS/RTK) roving units equipped with telemetry radios which will be linked to a vessel-based base station. Survey crews will have both helicopter and light tracked vehicle support. Offshore source and receivers will be positioned with an integrated navigation system (INS) utilizing DGPS/RTK link to the land located base stations. The integrated navigation system will be capable of many features that are critical to efficient and safe operations. The system will include a hazard display system that can be loaded with known obstructions, or exclusion zones. Typically the vessel displays are also loaded with the day-to-day operational hazards, buoys, etc. This display gives a quick reference when a potential question regarding positioning or tracking arises. In the case of inclement weather, the hazard display can and has been used to vector vessels to safety.

## **Seismic Source**

Apache's methodology will employ the use of two source vessels synchronized in time. The source vessels will be equipped with compressors and 1760 cui air gun arrays. In addition, one source vessel will be equipped with a 440 cui shallow water source which it can deploy at high

tide in the intertidal area in less than 1.8 m (6 ft) of water. Source lines are orientated perpendicular to the node lines and parallel to the beach. The two source vessels will traverse source lines of the same patch using a shooting technique called ping/pong. The ping/pong methodology will have the first source boat commence the source effort. As the first air gun pop is initiated, the second gun boat is sent a command and begins a countdown to pop its guns 12 seconds later than the first vessel. The first source boat would then take its second pop 12 seconds after the second vessel has popped and so on. The vessels try to manage their speed so that they cover approximately 50 m (165 ft) between pops. The objective is to generate source positions for each of the two arrays close to a 50 m (165 ft) interval along each of the source lines in a patch. Vessel speeds will range from 2-4 knots. The source effort will average 10-12 hours per day.

Each source line is approximately 12.9 kilometer (km, 8 miles [mi]) long. A single vessel is capable of acquiring a source line in approximately 1 hour. With two source vessels operating simultaneously, a patch of approximately 3,900 source points can be acquired in a single day assuming a 10-12 hour source effort.

In addition to the marine mammal monitoring radii outlined in this document, there will be 1.6 km (1 mi) setback of source points from the mouths of any anadromous streams to comply with Alaska Department of Fish and Game (ADF&G) restrictions.

When the data from the patch of nodes have been acquired, the node vessels pick up the patch and roll it to the next location. The pickup effort will take 3/4 of a day.

The onshore source effort will be shot holes. These holes are drilled every 50 m (165 ft) along source lines which are orientated perpendicular to the receiver lines and parallel to the coast. To access the onshore drill sites, Apache would use a combination of helicopter portable and tracked vehicle drills. At each source location, Apache will drill to the prescribed hole depth of approximately 10 m (35 ft) and load it with 4 kilograms (kg) of explosive (likely Orica OSX Pentolite Explosive). The hole will be capped with a “smart cap” that will make it impossible to detonate the explosive without the proper blaster.

### **Vessels**

The M/V Peregrine Falcon, M/V Miss Diane I and II, M/V Arctic Wolf, M/V Maxime, and M/V Dreamcatcher or similar vessels will serve as the primary offshore acquisition platforms.

### **Aircraft**

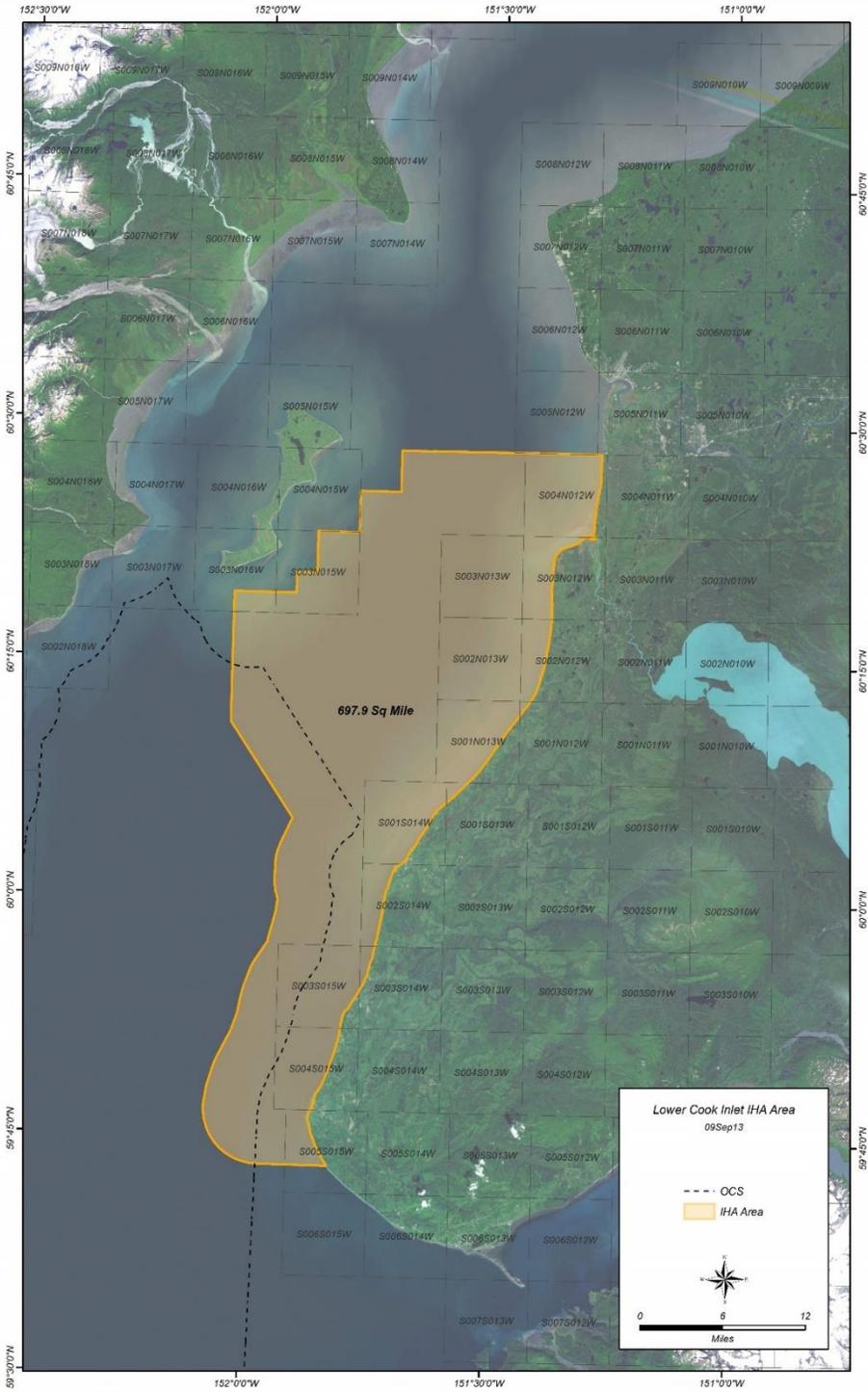
A Bell 204 helicopter and Jet Ranger 407 helicopter (or similar aircraft) would be used for support and transport during the seismic survey. The Bell 204 would generally be used for long-lining equipment, while the Jet Ranger 407 would be used for personnel and equipment transport (via long line). When practicable, the helicopters would be used to conduct aerial surveys near

river mouths prior to the commencement of seismic survey operations in order to identify locations where beluga whales and other marine mammals may be concentrated.

### **Fuel Storage**

Any fuel storage required within the program site will be positioned away from waterways and lakes and located in modern containment enclosures. The capacity of the containment will be 125 percent of the total volume of the fuel stored in the bermed enclosures. All storage fuel sites will be equipped with additional absorbent material and spill clean-up tools. Any transfer or bunkering of fuel for offshore activities will either occur dock side or comply with U.S. Coast Guard (USCG) bunkering at sea regulations (33 CFR 155 and 33 CFR 156).

Apache would implement several procedures to reduce the potential for such spills from occurring. For example, Apache has prepared a Spill Prevention and Countermeasure Plan, which provides guidance for the management of fuel storage tanks, personnel training, spill response, emergency preparedness, and the routine inspection of equipment. For onshore operations, fuel tanks would be located at least 100 ft from any water body per state regulations and would be located in secondary containment vessels per federal regulations. Secondary containment vessels are lined containment areas with side wall supports and are sized to contain, at a minimum, 110 percent minimum capacity of all fuel tanks located in the containment area when filled to capacity. During offshore operations, the operating vessels will receive fuel either at the dock or from the M/V Arctic Wolf (or another vessel approved for bunkering at sea). The ship's fuel transfer procedure would comply with federal regulations found at 33 CFR 155 and 33 CFR 156. Personnel in charge of fueling would have the appropriate certification and training in spill response.



## **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 for one year) to Apache allowing the incidental take, by Level B harassment, of sea otters subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the Authorization, if issued, along with any additions based on consideration of public comments.

Our *Federal Register* notice requesting comments on the 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**

Based on the current understanding of the sea otter's lower hearing acuity, general lack of responsiveness to sound, and ecology, Apache has developed a mixed monitoring and mitigation strategy for its seismic surveys in Lower Cook Inlet that relies on assessment of short-term behavioral responses of sea otters to sound and a fixed shut down buffer. When a sea otter's exposure to sound indicates that there is potential for the animal to be taken at the harassment level (Level B), the animal's short-term behavioral responses will be used as a way to assess the impacts to the animal, and to determine whether the animal is potentially being taken (harassed). A set of potential responses of sea otters to sound that includes responses that are likely to be biologically significant and may therefore represent take under the MMPA, and responses that are not likely to be biologically significant and therefore do not represent take under the MMPA, has been developed.

To prevent Level A take of sea otters, airgun activity will shut down if a sea otter approaches a fixed buffer of 500 m (see Table 1 for isopleth information) from a source vessel. By terminating the sound source, sea otters will be prevented from hearing sound at potentially harmful levels and no Level A take (injury) will occur. While this 500 m buffer zone is smaller than that recommended for other marine mammal species, this distance was chosen because it is twice the 250 m distance that Harris et al. (2001) reported ringed, bearded, and spotted seals moved when exposed to the sound field produced by a full seismic array in the Beaufort Sea.

If a sea otter enters an area between 900 and 500 meters from a source vessel, it would be exposed at the received levels shown in Table 1, but mere exposure to a sound does not necessarily mean that the animal perceives the sound or responds in a way that would be

considered “take;” there is a range of possible responses to a sound, and only some of those responses could be considered “take.” When a sea otter enters this zone, Protected Species Observers (PSOs) will monitor the animal for behaviors that indicate harassment or disturbance. While this 900 meter distance is smaller than that recommended for other marine mammals, this distance was determined based on the relatively low sensitivity of sea otter hearing as compared with other marine mammals (Reichmuth and Ghaul 2012), sea otters’ observed lack of responsiveness to sound, and our understanding of sound propagation.

If a sea otter maintains typical behavior and does not respond to the seismic activity in a way that is biologically significant, then the seismic activity will continue. If a sea otter exhibits a significant response to the seismic activity or vessel, then the seismic activity will ramp down until the otter is visually observed to have left the 900 meter observation zone or to have resumed normal behavior for a period of time greater than 15 minutes. This temporal window was chosen based on the quick habituation to stimuli demonstrated by sea otters (Davis et al. 1988, Reichmuth and Ghaul 2012) and the shut down period for harbor porpoises and pinnipeds recommended in the 2014 Marine Mammal Mitigation and Monitoring Protocol (Smultea et al. 2014). In the event that the sea otter is determined to have left the 900 m buffer zone, the seismic operations will be restarted at full volume. If the shut down of seismic operations is longer than the allowed 10-minute window (as defined in the 2014 Marine Mammal Mitigation and Monitoring Protocol (Smultea et al. 2014)) or if the sea otter is still within the 900 meter buffer zone but has resumed normal behavior for a period of time greater than 15 minutes, a full ramp up will be implemented following the defined ramp-up procedure.

To qualify as take, a sea otter’s behavioral pattern must be disrupted in a biologically significant way. Important things to watch for include interactions between pups and females. Females leave young pups at the surface while they dive for food, because the pups are not able to submerge themselves until they are older. Pups often call while their mothers are submerged, and the mothers quickly reunite with their calling pups when they surface. This is typical sea otter behavior. Separation of mothers and pups for other reasons is not normal, however. If a sea otter’s response to a vessel or other activity causes mother-pup separation, it would be considered take for each animal. Other significant behavioral responses include repeated, agitated diving and surfacing; dropping prey items before agitated swimming; and movements that involve separation of groups.

Merely changing a behavior, such as turning the head, swimming, or even swimming from one area to another, is not biologically significant if the animal resumes its previous activity, such as foraging or resting, within a short period of time.

Behavioral Responses: Not Significant (Not Considered Take under the MMPA)

- Swimming away from a vessel or activity at a normal pace

- Swimming to an area further away from a vessel or activity
- Turning the head to look
- Resting on back and watching vessel or activity
- Stopping and looking at a vessel or activity
- Pausing to look or watch a vessel or activity
- Diving under water in a typical way
- Slight or moderate shifting/jostling/agitation in a raft of sea otters
- Floating by on the tide and watching a vessel or activity
- Allowing a vessel to approach and not swimming away from the vessel and its activity

Behavioral Responses or Impacts: Potentially Significant (Potentially Level B Take under the MMPA)

- Female swimming away at such a fast pace that her pup cannot keep up
- Unintentional separation of mother and pup (pup may be heard calling)
- Repeated diving and surfacing in an agitated manner
- Dropping a prey item and swimming away at a fast pace in an agitated manner
- Pups are prevented from nursing or resting
- Adults are prevented from resting
- Mating is disturbed or interrupted
- Foraging and feeding are inhibited or prevented
- Communication inhibited due to loud noise or separation of individuals
- Shifting/jostling/agitation of a raft of sea otters that leads to a group flight response
- Separation of group members that had been rafted together

### **Power Down Procedure**

A power down procedure involves reducing the number of air guns in use so as to decrease the source level and radius of the sound isopleth being produced. In contrast, a shut down procedure occurs when all air gun activity is suspended. During a power down, a mitigation air gun, typically the 10 cui, is operated. If a sea otter enters the 500 – 900 m harassment zone and displays a potentially biologically significant biological response indicative of disturbance, the air guns may be powered down as an alternative to a complete shut down.

Following a power down initiated by potentially significant sea otter behavioral response to seismic activity, the mitigation gun will continue to operate while the sea otter clears the harassment zone. Air gun activity will resume when the sea otter has cleared the 900 m harassment zone. The animal will be considered to have cleared the 900 m harassment zone if it:

- Is visually observed to have done so, or
- Has not been seen within the harassment zone for 15 min
- Has been observed to have resumed normal behavior for a period greater than 15 minutes

### **Shut Down Procedure**

As noted previously, a shut down occurs when all air gun activity is suspended, including the mitigation gun. The operating air gun(s) will be shut down completely if a sea otter enters the 500 m safety zone and displays a significant biological reaction. The mitigation gun may continue during a shut down. The shut down procedure will be accomplished within several seconds (of a “one shot” period) of the determination that a sea otter is either in or about to enter the 500 m safety zone.

Following a shut down, air gun activity will not resume until the sea otter has cleared the 500 m safety zone. The animal will be considered to have cleared the safety zone if it:

- Is visually observed to have done so;
- Has not been seen within the zone for 15 min

### **Ramp Up Procedure**

A ramp up procedure gradually increases air gun volume at a specified rate. Ramp up is used at the start of air gun operations, including after a power down or shut down, and after any period greater than 10 minutes in duration without air gun operations. The purpose of ramp up is to give any marine mammal, including sea otters, the opportunity to move away from a sound source before sound levels can cause harassment or injury. NMFS normally requires that the rate of ramp up be no more than 6 dB per 5 minute period. Ramp up will begin with the smallest gun in the array that is being used for all air gun array configurations.

If the entire 900 m harassment zone has not been visible for at least 30 minutes prior to the start of operations, ramp up will not commence unless the mitigation gun has been operating during the interruption of seismic survey operations. This means that it will not be permissible to ramp up the 24-gun source from a complete shut down in thick fog or at other times when the outer part of the 900 m harassment zone is not visible, except when the mitigation gun has been operating during the interruption. During the ramp up, the 500 m safety zone and 900 m harassment zone for the full air gun array will be observed for sea otters. Ramp up will cease before all airguns are engaged if a sea otter remains within the 500 m safety zone and does not move away. Ramp up will continue if a sea otter remains within the 500 – 900 m harassment zone and does not show any significant behavioral response to the seismic activity.

### **Speed or Course Alterations**

If a sea otter is detected outside the 500 m safety zone and, based on its position and relative movement of the vessel, is likely to enter the safety zone, the vessel's speed and/or direct course may, when practical and safe, be altered. Course and speed alterations can be used in coordination with a power down procedure. The sea otter's activities and movements relative to the seismic and support vessels will be closely monitored to ensure that the sea otter does not approach within the 500 m safety zone. If the otter appears likely to enter the safety zone, further mitigative actions will be taken, i.e., either further course alterations, power down, or shut down of the air gun(s).

### **Vessel-Based Monitoring**

Vessel-based PSOs will monitor sea otters during all daylight air gun operations. These observations will provide the real-time data needed to implement some of the key mitigation measures. When sea otters are observed within, or about to enter, the 500 m shut down safety zone where there is a possibility of significant effects on hearing or other physical effects, air gun operations will be shut down immediately. Mitigation measures will be communicated by the PSO on the source vessel to the air gun operators and vessel captain/crew.

During day light operations, vessel-based PSOs will watch for sea otters at the project location during all periods of seismic operations and for a minimum of 30 minutes prior to the planned start of air gun or pinger operations after a shut down. PSOs will also observe opportunistically during daylight hours when no seismic activity is taking place.

Apache proposes to conduct both daytime and nighttime operations. Nighttime operations can be initiated only if a mitigation gun has been continuously operational from the time that the PSO monitoring was taking place. That is, seismic activity will not ramp up from an extended shut down (i.e., a period of more than 10 minutes without air gun operations) during operations in darkness. PSOs will not visually monitor during seismic operations in the dark. Vessel captain and crew will watch for sea otters (insofar as practical during periods of darkness) and will call

for the air gun(s) to be shut down if sea otters are observed in or about to enter the 500 m safety zone. After a shut down during night operations, seismic activity will be suspended until daylight. Ramp up will take place only if the entire 500 m safety zone is visible.

### **Visual Monitoring**

Three vessels will employ PSOs to identify sea otters during all daylight hours of air gun operations: the two source vessels and one support vessel. Two PSOs will be on each source vessels and two PSOs will be on the support vessel in order to better observe the 500 m safety zone and 900 m harassment zone. When sea otters are about to enter or are sighted within the 500 m safety zone, air gun or pinger operations will be powered down or shut down immediately, based on sea otter behavior. The vessel-based observers will watch for sea otters during all periods of source effort and for a minimum of 30 minutes prior to the planned start of air gun or pinger operations after an extended shut down (i.e., more than 10 minutes). Apache personnel will also watch for sea otters (insofar as practical) and alert the PSOs in the event of a sighting. Apache personnel will be responsible for the implementation of mitigation measures only when a PSO is not on duty (e.g., operations in darkness).

Seismic operations will not be initiated or continue when adequate observation of the 900 m harassment zone is not possible due to environmental conditions such as high sea state, fog, ice and low light. Termination of seismic operations will be at the discretion of the lead PSO based on continual observation of environmental conditions and communication with other PSOs.

With USFWS consultation, PSOs will be hired by Apache. Apache will provide the curriculum vitae and references for all PSOs to the USFWS. PSOs will follow a schedule so observers will monitor sea otters near the seismic vessel during all ongoing operations and air-gun ramp ups. PSOs will normally be on duty in shifts no longer than 4 hours with 2 hour minimum breaks to avoid observation fatigue. The vessel crew will also be instructed to assist in detecting sea otters and implementing mitigation requirements (if practical). Before the start of the seismic survey, the crew will be given additional instruction on how to do so.

The source and support vessels are suitable platforms for sea otter observations. When stationed on the flying bridge, the observer will have an unobstructed view around the entire vessel. If surveying from the bridge, the observer's eye level will be about 6 m (20 ft) above sea level. During operations, the PSO(s) will scan the area around the vessel systematically with reticle binoculars (e.g., 7 × 50 or equivalent) and with the naked eye. Laser range finders (Leica LRF1200 laser rangefinder or equivalent) will be available to assist with distance estimation. They are useful in training observers to estimate distances visually, but are generally not useful in measuring distances to animals directly.

All marine mammal observations and implemented mitigation measures will be recorded in a standardized format. Data will be entered into a custom database using a notebook computer. The accuracy of data entry will be verified by computerized validity data checks as the data are

entered and by subsequent manual checking of the database. These procedures will allow initial summaries of data to be prepared during and shortly after the field program, and will facilitate transfer of the data to statistical, graphical, or other programs for further processing and archiving.

Results from the vessel-based visual observations will provide:

- The basis for real-time mitigation (air gun shut down, power down, and ramp up);
- Data on the occurrence, distribution, and activities of sea otters in the area where the seismic study is conducted;
- Information to compare the distance and distribution of sea otters relative to the source vessel at times with and without seismic activity; and
- Data on the behavior and movement patterns of sea otters seen at times with and without seismic activity.

In addition to the vessel-based PSOs, Apache proposes to utilize a shore-based station when possible. The shore-based station will follow all safety procedures, including bear safety. The shore-based location will need to have sufficient height to observe sea otters; the PSO would be outfitted on scaffolding with big-eye binoculars. The PSO would scan the area prior to, during, and after the air gun operations. The PSO would be in contact with the other PSOs on the vessels, as well as the source vessel operator via radio to be able to communicate the sighting of a sea otter approaching or sighted within the project area.

When practicable, Apache also proposes to utilize the crew helicopter to conduct aerial surveys near river mouths prior to the commencement of operations. The helicopter will not be used every day, but will be used when operating near a river mouth. The types of helicopters currently planned for use by Apache include a Bell 407, Bell UH1B, and ASB3. Aerial surveys will fly at an altitude of 305 m (1,000 ft) when practical and weather conditions permit. In the event of a sea otter sighting, aircraft will attempt to maintain a radial distance of 457 m (1,500 ft) from the sea otter(s). Aircraft will avoid approaching sea otters from head-on, flying over or passing the shadow of the aircraft over the sea otters. Using these operational requirements, sound levels underwater are not expected to reach NMFS harassment thresholds (Richardson et al. 1995; Blackwell et al. 2002).

Results from the aerial and shore-based observations will provide:

- The basis for real-time mitigation (air gun power down, shut down, and ramp up);
- Data on the occurrence, distribution, and activities of sea otters in the area where the seismic study is conducted;

- Information to compare the distance and distribution of sea otters relative to the source vessel at times with and without seismic activity; and
- Data on the behavior and movement patterns of sea otters seen at times with and without seismic activity.

## **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 sea otters taken. 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 sea otters, as well as associated seismic activity (number of power-downs and shutdowns), observed throughout all monitoring activities;
- (3) An estimate of the number of sea otters that have been exposed to the seismic activity (based on visual observation) at received levels greater than or equal to 160 dB re 1  $\mu$ Pa (rms) and 190 dB re 1  $\mu$ Pa (rms) with a discussion of any specific behaviors those individuals exhibited.

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 the USFWS Marine Mammals Management Office (MMM) 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 sea otters);
- (2) Analyses of the effects of various factors influencing detectability of sea otters (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 sea otters 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.

USFWS would review the draft 90-day Technical Report. Apache must then submit a final report to the USFWS within 30 days after receiving comments from USFWS on the draft report. If USFWS decides that the draft report needs no comments, the draft report shall be considered to be the final report.

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 USFWS MMM. 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 sea otter 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 USFWS is able to review the circumstances of the prohibited take. USFWS 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 USFWS 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 USFWS MMM. The report must include the same information identified in the Condition 9(a) above. Activities may continue while USFWS reviews the circumstances of the incident. USFWS 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 USFWS MMM within 24 hours of the discovery. Apache shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to USFWS. Activities may continue while USFWS 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 sea otters 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 sea otters, incidental to Apache's action would have a negligible impact on the relevant species or stocks and would not have an unmitigable adverse impact on affected species or stocks for taking for subsistence uses.

The 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, USFWS would not issue an IHA to Apache for the proposed seismic survey in Lower Cook Inlet. The MMPA prohibits takings of marine mammals unless authorized by an MMPA authorization or exemption. If USFWS did not issue an authorization to Apache to incidentally take sea otters from the Southcentral Alaska stock, Apache could decide either to cancel their seismic operations or to continue their activities as described in this EA. If the latter decision is made, Apache could independently implement mitigation measures or proceed without any mitigation; however, in either case, they would be proceeding without take authorization from USFWS pursuant to the MMPA. If the No Action Alternative were selected, the impacts on the environment would be as follows:

- If Apache did not proceed with the survey, there would be no environmental consequences;
- If Apache proceeds with the survey and implements mitigation and monitoring measures described in Alternative 2, then the environmental effects would be the same as those described under Alternative 2; and

- If Apache proceeds with the survey without any mitigation and monitoring measures, the impacts would be greater than those described, including the possibility for more Level A and Level B harassment.

#### **2.4. Alternatives Considered but Eliminated from Further Consideration**

USFWS 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.

#### **2.5. Physical Environment**

As discussed in 2.3.1, our proposed action and alternative relate only to the authorization of incidental take of sea otters and not to the physical environment. We briefly summarize the physical components of the environment here.

##### **2.5.1. Sea Otter Habitat**

We presented information on sea otter habitat and the potential impacts to sea otter habitat in the *Federal Register* notice of the proposed Authorization.

#### **2.6. Biological Environment**

##### **2.6.1. Sea Otters**

Gorbics and Bodkin (2001) determined that the sea otters inhabiting Cook Inlet are members of the unlisted Southcentral Alaska Stock. This stock extends from Cape Yakataga to the eastern shoreline of lower Cook Inlet, and includes Prince William Sound and the Kenai Peninsula coast (Allen and Angliss 2013). Sea otter populations found along the western shoreline of lower Cook Inlet, including Kamishak Bay, are part of the listed Southwest Alaska Stock. The most recent population estimate (2000-2003) for this stock is 15,090 (Allen and Angliss 2013). While this stock was thought to be stabilizing by 2002 (Bodkin et al. 2002) after several decades of growth (Irons et al. 1988, Bodkin and Udevitz 1999), the Kachemak Bay population alone increased 26 percent annually between 2002 and 2008, with the most recent bay estimate at about 3,600 animals (Gill et al. 2009). However, until recently, only a very small fraction of these otters were recorded north of Anchor Point (Rugh et al. 2005, Gill et al. 2009, Doroff and Badajos 2010), especially during the winter (Hansen and Hubbard 1999, Larned 2006). Doroff and Badajos (2010) tracked 44 radio-tagged sea otters in Kachemak Bay for three years and did not find any of them to travel north of Anchor Point. In 2004 and 2005, Larned (2006) recorded sea otters during intensive (approximately 30 percent area coverage) winter (December to April) surveys for Steller's eiders between Anchor Point and Clam Gulch. The survey teams observed an average of less than 8 otters per survey month (9 months total). The highest estimate was 92 otters inhabiting about 300 square kilometers north of Anchor Point during December 2004.

During June surveys for beluga whales conducted between 1993 and 2004, Rugh et al. (2005) recorded 2,111 sea otters in lower Cook Inlet, but virtually none north of Anchor Point (although the length of the Kenai Peninsula was surveyed each year).

However, recent (2013) marine mammal monitoring (for the Cosmopolitan State exploratory drilling program) conducted 3 miles offshore of Cape Starichkof revealed that during July and August, relatively large numbers of sea otters can be found riding the tides between Anchor Point and some point well north of Cape Starichkof. It is likely that this late summer phenomenon is a result of seasonal weather conditions that allow otters to safely ride the daily tides to foraging grounds outside Kachemak Bay. Since none of the previous surveys were conducted during the fall, it is unknown how late into fall large numbers of sea otters are found north of Anchor Point. Doroff and Badajos (2010) could not relocate 10 of the radio-tagged otters in August 2009 but these were subsequently relocated in September 2009. It is possible that these otters had moved north of Anchor Point (outside the study area) during August, only to return to Kachemak Bay in September.

## **2.7. Socioeconomic Environment**

### **2.7.1. Subsistence**

Under the Preferred Alternative, Apache's seismic survey in Lower Cook Inlet is expected to have minor and temporary effects on subsistence wildlife and sea otters in the area. Noise 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 sound sources during survey activities.

Consistent with USFWS' implementing regulation requirements, Apache maintains open lines of communication with several Tribal and subsistence groups in the Cook Inlet area and has consulted with these groups regarding the impact of seismic activities on sea otters. Apache will continue to work directly with these groups prior to engaging in work that could affect Tribal and/or subsistence interests.

In-water seismic activities will follow mitigation procedures to minimize effects on the behavior of sea otters and, therefore, protect opportunities for harvest by Alaska Native communities. Apache has concluded, and USFWS agrees, that the size of the affected area and the mitigation measures should result in the proposed action having no effect on the availability of sea otters for subsistence uses. Apache and USFWS recognize the importance of ensuring that Alaska Native Organizations and federally recognized tribes are informed, engaged, and involved during the permitting process.

USFWS anticipates that any effects from Apache's seismic survey on sea otters that could be taken for subsistence uses would be short-term, site specific, and limited to inconsequential changes in behavior and mild stress responses. USFWS does not anticipate that the authorized

taking of affected species or stocks will result in changes in reproduction, survival, or longevity rates, or result in changes to population levels or distribution.

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## **Chapter 3 Environmental Consequences**

This chapter of the EA analyzes the impacts of the two 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 operations in order to determine whether to authorize incidental take of sea otters. 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.

### **3.1. 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 sea otters from August to 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.

#### **3.1.1. Impacts to Sea Otter 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 operations 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 sea otters. 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 sea otter habitat. Placement and retrieval of the nodes may cause temporary and localized increases in turbidity on the seafloor; however, the turbidity created by placing and removing nodes on the seafloor would settle to background levels within minutes after the cessation of activity. We do not anticipate that the seismic 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. More information on potential impacts to marine mammal habitat is contained in Apache's application and our Authorization notice, which are incorporated herein by reference.

#### **3.1.2. Impacts to Sea Otters**

We expect that disturbance from acoustic stimuli associated with seismic operations 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. 1995). Our notice of proposed Authorization and Apache's application provide detailed descriptions of these potential effects of seismic surveys on sea otters. That information is incorporated herein by reference and summarized next.

The primary potential impact of the proposed Apache seismic operations to local sea otters is impulsive acoustical harassment from the operating 2,400-cubic-inch air gun arrays. Disruptions are not likely to be significant enough to rise to the level of a "take" unless the sound source displaces a marine mammal from an important feeding or breeding area for a prolonged period, and this project is unlikely to do so. Further, the requested "take" is based on the distribution of otters relative to the air guns, and does not take into account most of those otters would be at the surface and unaffected by underwater noise.

Previous work suggests that sea otters may be less responsive to marine seismic pulses than some other marine mammals, such as mysticetes and odontocetes. Riedman (1983, 1984) monitored the behavior of sea otters along the California coast while they were exposed to a single 100-cubic-inch air gun and a 4,089-cubic-inch air gun array. No disturbance reactions were evident when the air gun array was as close as 0.9 kilometers. Sea otters also did not respond noticeably to the single air gun. Sea otters spend a great deal of time at the surface feeding and grooming (Riedman 1983, 1984; Wolt et al. 2012). While at the surface, the potential noise exposure of sea otters would be much reduced by pressure-release and interference (Lloyd's mirror) effects at the surface (Greene and Richardson 1988; Richardson et al. 1995). Finally, the average dive time of a northern sea otter has been measured at only 85 seconds (Bodkin et al. 2004) to 149 seconds (Wolt et al. 2007), thereby limiting exposure during active seismic operations. It remains unclear whether seismic generated sound levels even rise to the level of harassment "take" at distances beyond 0.9 kilometers, given the animal's poor underwater hearing ability and surface behavior.

Noise has the potential to induce temporary threshold shift (TTS) or permanent threshold shift (PTS) hearing loss (Weilgart 2007). The level of loss is dependent on sound frequency, intensity, and duration. Similar to masking, hearing loss reduces the ability for marine mammals to forage efficiently, maintain social cohesion, and avoid predators (Weilgart 2007).

TTS could occur as a result of Apache's seismic operations, but there is no information on TTS impacts to sea otters, an animal that spends much time at the surface. The average dive time of a northern sea otter, the period the otter's ears would be underwater and exposed to underwater sounds, is only 85 seconds (Bodkin et al. 2004) to 149 seconds (Wolt et al. 2012). Wolt et al. (2012) found Prince William Sound sea otters to average 8.6 dives per feeding bout. Multiplied by the average dive time (149 seconds), the average total time a sea otter spends underwater during a feeding bout is about 21 minutes, or 12 to 18 percent of the time of a typical 2 to 3 hour slack-tide seismic shoot. Except for loud screams between pups and mothers (McShane et al. 1995), sea otters do not appear to communicate vocally, either at the surface or under water, and

they do not use sound to detect prey. Thus, any TTS due to seismic noise is unlikely to mask communication or reduce foraging efficiency. Finally, sea otters are unlikely to rely on sound to detect and avoid predators. For example, sea otters at the surface are not likely to hear killer whale vocalizations.

PTS occurs when continuous noise exposure causes hairs within the inner ear system to die. This can occur due to moderate durations of very loud noise levels, or long-term continuous exposure of moderate noise levels. However, PTS is also not an issue with sea otters and impulsive seismic noise. Sea otter exposure to underwater noises generated by vessels (propellers) would be of very short duration because the average dive time of a northern sea otter is only 85 seconds (Bodkin et al. 2004) to 149 seconds (Wolt et al. 2012).

Airborne exposure is also of little concern since pressure release and Lloyd's mirror-effect will reduce underwater seismic noise transmitted to the air. Riedman's (1983, 1984) observations of sea otters lack of reaction to seismic noise was likely due largely to these transmission limits.

Masking occurs when louder noises interfere with marine mammal vocalizations or their ability to hear natural sounds in their environment (Richardson et al. 1995). These noise levels limit their ability to communicate and/or avoid predation or other natural hazards. However, as mentioned above, sea otters do not vocally communicate underwater (Ghoul and Reichmuth 2012) and masking due to exposure to underwater noise is not relevant.

Sea otters do communicate above water with the loud screams between separated mothers and pups of most importance (McShane et al. 1995). Ghoul and Reichmuth (2012) measured these vocalizations and found that the intensity of these calls ranged between 50 and 113 dB SPL re 20  $\mu$ Pa, and were loud enough that they can be heard by humans at distances exceeding 1 kilometer (McShane et al. 1995). Any potential masking effect from any noise entering the air from the seismic guns would be brief (a shot) and would likely disappear a few meters from the source.

**Injury:** Apache did not request authorization to take sea otters 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 sea otters.

**Vessel Strikes:** The potential for striking sea otters is generally not 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, while vessel strikes of sea otters have been reported, the typical vessel speeds of the source vessels while collecting seismic data is between 2-4 knots, or slow enough for otters to avoid. Moreover, mitigation measures would be required of Apache to reduce speed or alter course if collisions with sea otters appear likely.

**Estimated Take of Sea Otters 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 operations. We expect that these operations would cause a short-term behavioral disturbance for sea otters in the proposed areas.

As mentioned previously, we estimate that the activities could potentially affect, by Level B harassment only, sea otters under our jurisdiction. Table 3 outlines the number of Level B harassment takes that we propose to authorize in this Authorization, the regional (Southcentral Alaska Stock) population estimate for sea otters in the action area, and the percentage of the stock that may be taken as a result of Apache's activities.

**Table 2. Proposed Level B harassment take levels and sea otter stock abundance.**

Species	Proposed Level B Take	Abundance
Sea Otter	1,150	351

Our proposed Authorization notice and Apache's application contain complete descriptions of how these take estimates were derived.

### **3.1.3. 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 sea otters 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 in the lower Cook Inlet area are the primary marine mammal subsistence users in the Action Area. Sea otter subsistence harvest is allowed under Section 109 of the MMPA, as long as the harvest is not wasteful. All otters harvested are to be reported to the USFWS within 30 days where the pelt is tagged.

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 sea otters and, therefore, opportunities for harvest by Alaska Native communities; and
- Representatives of regional subsistence organizations may provide staff support to help record sea otter observations, in addition to the marine mammal observers, during the monitoring program. This information will be included in annual reports.

Apache concluded, and the USFWS 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 sea otters for subsistence uses. Apache and USFWS 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. Apache has reached out and coordinated with numerous local communities including the cities and villages of Kenai and Ninilchik, as well as the Kenai Peninsula Borough, Cook Inlet Region, Inc., Cook Inlet Keepers, and the United Cook Inlet Drift Association.

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

### **3.2. 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 sea otters and would, if they proceeded with their activities, be in violation of the MMPA if take of sea otters occurs.

The impacts to elements of the human environment resulting from the No Action alternative—conducting seismic operations in the absence of required protective measures for sea otters under the MMPA—would be greater than those impacts resulting from Alternative 1, the Preferred Alternative.

#### **3.2.1. Impacts to Sea Otter 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.

#### **3.2.2. Impacts to Sea Otters**

Under the No Action Alternative, Apache's activities would likely result in increased amounts of Level B harassment to sea otters 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:

- Sea otters 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 sea otters, and not ramping up or powering or shutting down airguns when sea otters are within applicable injury harassment zones;
- 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 sea otters would likely occur at higher levels than we have already identified and evaluated in our *Federal Register* notice on the 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.

### **3.2.3. 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. The only potential difference in impacts is that Apache would not be required to ensure availability of sea otters for subsistence uses and would not be required to implement mitigation measures to that effect.

### **3.3. 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, and our regulations. Please refer to Section 1.4 of this Apache EA for more information.

### **3.4. Unavoidable Adverse Impacts**

Apache's application, our notice of a proposed Authorization, and other environmental analyses identified previously summarize unavoidable adverse impacts to sea otters or the populations to which they belong or on their habitats, as well as subsistence uses of sea otters, 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 sea otters in Cook Inlet or on the availability of sea otters for subsistence uses, and we do not expect the sea otter 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 sea otters 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 sea otters, and that there would not be an unmitigable adverse impact to subsistence uses of sea otters in Cook Inlet.

### **3.5. 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 sea otters in the action area.

#### **3.5.1. Subsistence Hunting**

Apache’s proposed seismic surveys will not make what few otters annually occur in this region unavailable for subsistence harvest.

#### **3.5.2. 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.

#### **3.5.3. 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, and potential for entanglement in fishing gear. NMFS, USFWS, and the ADF&G will continue to manage fish stocks and monitor and regulate fishing in Cook Inlet to maintain sustainable stocks.

#### **3.5.4. 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 sea otters incidental to seismic surveys and drilling operations, including another request to conduct seismic surveys very similar to that proposed by APACHE with some spatial 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 sea otters and their habitat in the area and would be subject to the same MMPA and ESA standards.

#### **3.5.5. 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. The Port of Anchorage (POA) is currently expanding their facilities and Port MacKenzie is scheduled to expand their facilities. Both port facilities may have a very slight effect on sea otters in the action area due to increased vessel traffic passing through the area on their way to both facilities, although sea otters are rarely found in shipping channels.

##### ***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 Rail Extension should be completed in 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 sea otters, although otters are rarely found in the deeper water shipping channels.

### **3.5.6. Sea Otter Research**

Because many important aspects of sea otter biology remain unknown, or are incompletely studied, and because management of this species requires knowledge of their distribution, abundance, migration, population, ecology, physiology, genetics, behavior, and health, free-ranging sea otters 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; attachment of scientific instruments (tagging); live capture for health assessments. USFWS anticipates that scientific research on sea otters in Cook Inlet will continue, and possibly expand, due to the increasing need to better understand distribution and abundance relative to temporal and spatial parameters.

### **3.5.7. 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 20<sup>th</sup> 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. USFWS 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 also dependent upon ice formation and prey availability, although a loss of sea ice might benefit sea otters given sea ice limits otter distribution wherever it prevents otters from foraging.

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 USFWS 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 sea otters.

### **3.5.8. Conclusion**

Based on the summation of activity in the area provided in this section, USFWS believes that the incremental impact of an Authorization for the proposed Apache seismic operations 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 sea otters, 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 4 List of Preparers and Agencies Consulted**

Agencies and groups Consulted

Add other people and organizations.

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