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National Oceanic and Atmospheric Administration

50 CFR Part 217

Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Seismic Surveys in Cook Inlet, Alaska; Proposed Rule

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 217

[Docket No. 140912776–5025–01]

RIN 0648–BE53

Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Seismic Surveys in Cook Inlet, Alaska

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; request for comments.

SUMMARY: NMFS has received a request from Apache Alaska Corporation (Apache) for authorization to take marine mammals, by harassment, incidental to its proposed oil and gas exploration seismic survey program in Cook Inlet, Alaska, between March 1, 2015, and February 29, 2020. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue regulations and subsequent Letters of Authorization (LOAs) to Apache to incidentally harass marine mammals.

DATES: Comments and information must be received no later than March 25, 2015.

ADDRESSES: You may submit comments on this document, identified by 0648–BE53, by any one of the following methods:

- *Electronic Submissions:* Submit all electronic public comments via the Federal e-Rulemaking Portal. Go to: *www.regulations.gov,* enter NOAA–NMFS–2014–0144 in the ''Search'' box, click the ''Comment Now!'' icon, complete the required fields, and enter or attach your comments.
- *Mail:* Submit written comments to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910.
- *Fax:* 301–713–0376, Attn: Sara Young.

Comments regarding any aspect of the collection of information requirement contained in this proposed rule should be sent to NMFS via one of the means stated here and to the Office of Information and Regulatory Affairs, NEOB–10202, Office of Management and Budget (OMB), Attn: Desk Office, Washington, DC 20503, *OIRA@omb.eop.gov.*

Instructions: Comments sent by any other method, to any other address or individual, or received after the end of the comment period, may not be considered by NMFS. All comments received are a part of the public record and will generally be posted to *http://www.regulations.gov* without change. All Personal Identifying Information (for example, name, address, etc.) voluntarily submitted by the commenter may be publicly accessible. Do not submit Confidential Business Information or otherwise sensitive or protected information. NMFS will accept anonymous comments (enter N/A in the required fields if you wish to remain anonymous).

An electronic copy of the application, containing a list of references used in this document, and the Draft Environmental Assessment (EA) may be obtained by writing to the address specified above, telephoning the contact listed below (see **FOR FURTHER INFORMATION CONTACT**), or visiting the internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm.* Documents cited in this proposed rule may also be viewed, by appointment, during regular business hours at the above address. To help NMFS process and review comments more efficiently, please use only one method to submit comments.

FOR FURTHER INFORMATION CONTACT: Sara Young or Ben Laws, Office of Protected Resources, NMFS, (301) 427–8484.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. NMFS has defined ''negligible impact'' in 50 CFR 216.103 as ''an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.''

Except with respect to certain activities not pertinent here, the MMPA defines ''harassment'' as: ''any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) 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].''

Summary of Request

On July 11, 2014, NMFS received a complete application from Apache requesting authorization for the take of six marine mammal species incidental to an oil and gas exploration seismic program in Cook Inlet, AK, over the course of 5 years. The proposed activity would occur for approximately 8–9 months annually over the course of a 5-year period between March 1, 2015 and February 29, 2020. In-water airguns will only be active for approximately 2–3 hours during each of the slack tide periods. There are approximately four slack tide periods in a 24-hour period; therefore, airgun operations will be active during approximately 8–12 hours per day, if weather conditions allow. The following specific aspects of the proposed activities are likely to result in the take of marine mammals: Seismic airgun operations. Take, by Level B Harassment only, of individuals of six species or stocks of marine mammals is anticipated to result from the specified activity.

This is the fourth request (but first request for 5-year regulations and annual LOAs) that NMFS has received from Apache for takes of marine mammals incidental to conducting a seismic survey program in Cook Inlet. On April 30, 2012, NMFS issued a 1-year Incidental Harassment Authorization (IHA) to Apache for their first season of seismic acquisition in Cook Inlet (77 FR 27720). NMFS issued a second 1-year IHA to Apache in February 2013 (78 FR 12720, February 25, 2013). However, no seismic operations occurred in 2013. Most recently, NMFS issued a third IHA to Apache on March 4, 2014 to conduct 3D seismic survey operations in Cook Inlet (79 FR 13626, March 11, 2014). The third IHA expires on December 31, 2014.

Description of the Specified Activity

Overview

Apache has acquired over 850,000 acres of oil and gas leases in Cook Inlet since 2010 with the primary objective to explore for and develop oil and gas resources in Cook Inlet. Apache proposes to conduct oil and gas seismic surveys in Cook Inlet, Alaska, in an area that encompasses approximately 5,684 km^2 (2,195 mi^2) of intertidal and offshore areas. This area is slightly larger than that shown in Apache's MMPA application and corresponds with the request contained in their Biological Assessment and Figure 1 in this document, which is also available at: *http://www.nmfs.noaa.gov/pr/permits/incidental/oilgas.htm#apache2020.* Vessels will lay and retrieve nodal sensors on the sea floor in periods of low current, or, in the case of the intertidal area, during high tide over a 24-hour period. In deep water, a hull or pole mounted pinger system will be used to determine the exact location of the nodes. The two instruments used in this technique are a transceiver (operating at 33–55kHz with a maximum source level of 188 dB re 1 µPa at 1 meter) and a transponder (operating at 35–50kHz with a maximum source level of 188 dB re 1 µPa at 1 meter). Apache proposes to use two synchronized vessels. Each source vessel will be equipped with compressors and 2,400 cubic inch (in^3) airgun arrays. Additionally, one of the source vessels will be equipped with a 440 in^3 shallow water source array, which can be deployed at high tide in the intertidal area in less than 1.8 m (6 ft) of water. The two source vessels do not fire the airguns simultaneously; rather, each vessel fires a shot every 24 seconds, leaving 12 seconds between shots.

The operation will utilize two source vessels, three cable/nodal deployment and retrieval operations vessels, a mitigation/monitoring vessel, a node re-charging and housing vessel, and two small vessels for personnel transport and node support in the extremely shallow waters in the intertidal area. Water depths for the proposed program will range from 0–128 m (0–420 ft).

Seismic surveys are designed to collect bathymetric and sub-seafloor data that allow the evaluation of potential shallow faults, gas zones, and archeological features at prospective exploration drilling locations. In the spring of 2011, Apache conducted a seismic test program to evaluate the feasibility of using new nodal (no cables) technology seismic recording equipment for operations in Cook Inlet. This test program found and provided important input to assist in finalizing the design of the 3D seismic program in Cook Inlet (the nodal technology was determined to be feasible). Apache began seismic onshore acquisition on the west side of Cook Inlet in September 2011 and offshore acquisition in May 2012 under an IHA issued by NMFS for April 30, 2012 through April 30, 2013 (77 FR 27720, May 11, 2012). Apache continued seismic data acquisition for approximately 3 months in spring and summer 2014 in compliance with an IHA issued on March 4, 2014 (79 FR 13626, March 11, 2014).

Dates and Duration

Apache proposes to acquire offshore/transition zone operations for approximately 8 to 9 months in offshore areas in open water periods from March 1 through December 31 annually over the course of 5 years. During each 24-hour period, seismic support activities may be conducted throughout the entire period; however, in-water airguns will only be active for approximately 2–3 hours during each of the slack tide periods. There are approximately four slack tide periods in a 24-hour period; therefore, airgun operations will be active during approximately 8–12 hours per day, if weather conditions allow. Two airgun source vessels will work concurrently on the spread, acquiring source lines approximately 12 km (7.5 mi) in length. Apache anticipates that a crew can acquire approximately 6.2 km^2 (2.4 mi^2) per day, assuming a crew can work 8–12 hours per day. Thus, the actual survey duration each year will take approximately 160 days over the course of 8 to 9 months. The vessels will be mobilized out of Homer or Anchorage with resupply runs occurring multiple times per week out of Homer, Anchorage, or Nikiski.

Specified Geographic Region

Each phase of the Apache program would encounter land, intertidal transition zone, and marine environments in Cook Inlet, Alaska. However, only the portions occurring in the intertidal zone and marine environments have the potential to take marine mammals. The land-based portion of the proposed program would not result in underwater sound levels that would rise to the level of a marine mammal take.

The proposed location of Apache's acquisition plan is depicted in Figure 1 in this document. The total proposed seismic survey data acquisition locations encompass approximately 5,684 km^2 (2,195 mi^2) of intertidal and offshore areas. This area is approximately 18% larger than the area contained in Apache's MMPA application. The additional area proposed for seismic survey data acquisition considered in this proposed rule (and not originally noted in Apache's MMPA application) is located in northern Cook Inlet near the Susitna Delta region. Apache would only operate in a portion of this entire area between March 1 and December 31 each year. There are numerous factors that influence the survey areas, including the geology of the Cook Inlet area, other permitting restrictions (*i.e.,* commercial fishing, Alaska Department of Fish and Game refuges), seismic imaging of leases held by other entities with whom Apache has agreements (*e.g.,* data sharing), overlap of sources and receivers to obtain the necessary seismic imaging data, and general operational restrictions (ice, weather, environmental conditions, marine life activity, etc.). Water depths for the program will range from 0–128 m (0–420 ft).

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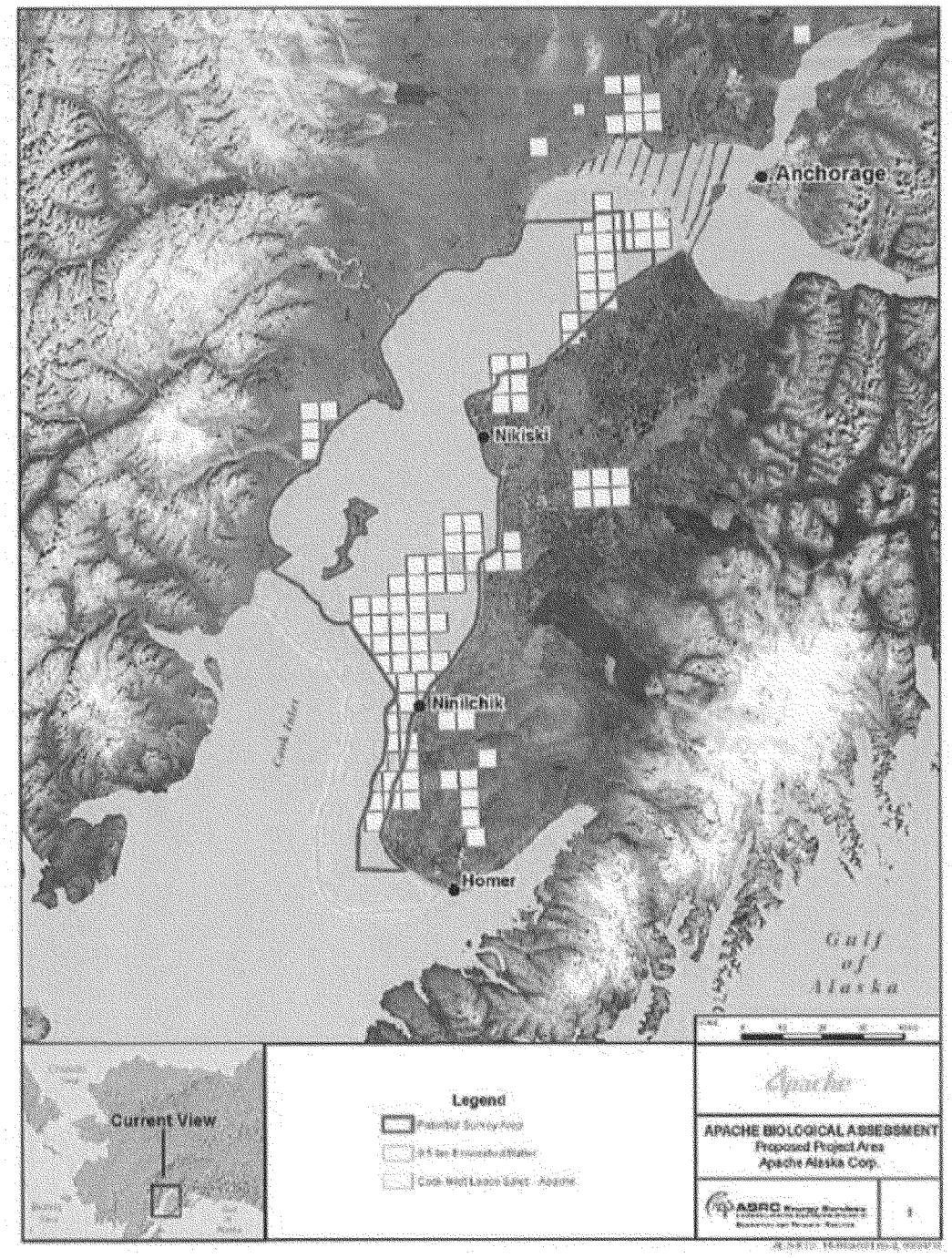

Figure 1. Proposed Project Area for Apache's 2015-2020 3D Seismic Survey Program

Detailed Description of Activities

(1) Recording System

The recording system is an autonomous system ''nodal'' (*i.e.,* no cables), made up of at least two types of nodes; one for the land and one for the intertidal and marine environment. For the land operator, a single-component sensor land node will be used (see Figure 3 in Apache's application); the inter-tidal and marine zone operators will use a submersible multi-component system made up of three velocity sensors and a hydrophone (see Figure 4 in application). These systems have the ability to record continuous data. Inline receiver intervals for the node systems will be 50 m (165 ft). The nodes are deployed in patches for the seismic source and deployed for up to 15 days. The deployment length is limited by battery length and data storage capacity.

The geometry methodology that Apache will use to gather seismic data is called *patch shooting.* This type of seismic survey requires the use of multiple vessels for cable layout/pickup, recording, and sourcing. Operations begin by laying node lines on the seafloor parallel to each other with a node line spacing of

approximately 402 m (1,320 ft). Apache's patch will have 6–8 node lines (receivers) that generally run perpendicular to the shoreline for transition zones and parallel to the shoreline for offshore areas. 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 airgun 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. A sample transition zone patch is depicted in Figure 5 in Apache's application. A sample offshore patch is depicted in Figure 6 in Apache's application.

As the patches are acquired, the node lines will be moved either side-to-side or inline to the next patch's location. Figure 7 in Apache's application depicts multiple side-to-side patches that are acquired individually but when seamed together at the processing phase, create continuous coverage along the coastline.

(2) Sensor Positioning

Transition Zone/Offshore Components: 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, the node positions are 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, a technique known as Ultra-Short Baseline (USBL) will be used. This technique uses a hull or pole mounted pinger to send a signal to a transponder which 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 USBL Transceiver that operates at a frequency of 33–55 kilohertz (kHz) at a max source level of 188 decibels referenced to one micro Pascal (dB re 1 μPa) 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 μPa at 1 m.

Onshore/Intertidal Components: Onshore and intertidal locating of source and receivers will be accomplished with Differential Global Positioning System/roving units (DGPS/RTK) equipped with telemetry radios which will be linked to a base station established on the *M/V Arctic Wolf* or similar vessel. Survey crews will have both helicopter and light tracked vehicle support. Offshore sound sources and receivers will be positioned with an integrated navigation system 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 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.

(3) Seismic Source

Transition Zone/Offshore Components: Apache proposes to use two synchronized source vessels in time. The source vessels, *M/V Peregrine Falcon* and the *M/V Arctic Wolf* (or similar vessels), will be equipped with compressors and 2,400 in^3 airgun arrays (1,200 in^3, if feasible). The *M/V Peregrine Falcon,* or similar, will be equipped with a 440 in^3 shallow water source, which it can deploy at high tide in the intertidal area in less than 1.8 m (6 ft) of water. Most of the airgun sound energy is contained at frequencies below approximately 500 Hz. The modeled broadband source level for the array was 251 dB re 1uPa peak and 238 dB re 1 μPa rms. Source lines are oriented perpendicular to the node lines and parallel to the beach (see red lines on Figure 5 in Apache's application). 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 airgun 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 range from 2–4 knots (2.3–4.6 miles/hour [mph]). The source effort will average 8–12 hours per day.

Each source line is approximately 12.9 km (8 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. 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 takes approximately 18 hours.

Onshore/Intertidal Components: 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) (8.8 pounds [lbs]) 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. At the request of NMFS, Apache conducted sound source verification (SSV) of the onshore shot hole to determine if underwater received sound levels exceeded the NMFS thresholds for harassment. The results of the SSV confirmed received sound levels in the water are not expected to exceed NMFS's MMPA harassment thresholds (see Appendix A of Apache's application), therefore, onshore sources are not discussed further in this application. However, in the event that the planned charge depth of 10 m (33 ft) is unattainable due to loose sediments collapsing the bore hole, then an SSV will be conducted on the new land-based charge depths to determine if they are within NMFS thresholds.

Description of Marine Mammals in the Area of the Specified Activity

The marine mammal species under NMFS's jurisdiction that could occur near operations in Cook Inlet include four cetacean species: beluga whale (*Delphinapterus leucas*), killer whale (*Orcinus orca*), harbor porpoise (*Phocoena phocoena*), and gray whale (*Eschrichtius robustus*) and two pinniped species: harbor seal (*Phoca*

vitulina richardsi) and Steller sea lions (*Eumetopias jubatus*). The marine mammal species that is likely to be encountered most widely (in space and time) throughout the period of the planned surveys is the harbor seal. While killer and gray whales and Steller sea lions have been sighted in upper Cook Inlet, their occurrence is considered rare in that portion of the Inlet.

Of the six marine mammal species likely to occur in the proposed marine survey area, Cook Inlet beluga whales and one stock of Steller sea lions are listed as endangered under the ESA (Steller sea lions are divided into two distinct population segments (DPSs), an eastern and a western DPS; the relevant DPS in Cook Inlet is the western DPS). The eastern DPS was recently removed from the endangered species list (78 FR 66139, November 4, 2013)).

TABLE 1—TABLE OF STOCKS EXPECTED TO OCCUR IN THE PROJECT AREA

Species	Stock	ESA/ MMPA status; [1] Strategic (Y/N)	Stock abundance (CV, N_{min}, most recent abundance survey) [2]	Relative occurrence in Cook Inlet; season of occurrence.
Gray whale	Eastern North Pacific	-; N	19,126 (0.071; 18,017; 2007)	Rare migratory visitor; late winter.
Killer whale	Alaska Resident	-;N	2,347 (N/A; 2,084; 2009)	Occasionally sighted in Lowe Cook Inlet.
	Gulf of Alaska, Aleutian Island, Bering Sea Transient.	-:N	345 (N/A; 303; 2003).	
Beluga whale	Cook Inlet	E/D;Y	312 (0.10; 280; 2012)	Use upper Inlet in summer and lower in winter: annual.
Harbor porpoise	Gulf of Alaska	-;Y	31,046 (0.214; 25,987; 1998)	Widespread in the Inlet: annual (less in winter).
Steller sea lion	Western DPS	E/D;Y	79,300 (N/A; 45,659; 2012)	Primarily found in lower Inlet.
Harbor seal	Alaska—Cook Inlet	-;N	22,900 (0.053; 21,896; 2006)	Frequently found in upper and lower inlet; annual (more in northern Inlet in summer).

[1] Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR (see footnote 3) or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

[2] CV is coefficient of variation; Nmin is the minimum estimate of stock abundance. In some cases, CV is not applicable. For certain stocks of pinnipeds, abundance estimates are based upon observations of animals (often pups) ashore multiplied by some correction factor derived from knowledge of the specie's (or similar species') life history to arrive at a best abundance estimate; therefore, there is no associated CV. In these cases, the minimum abundance may represent actual counts of all animals ashore.

Pursuant to the ESA, critical habitat has been designated for Cook Inlet beluga whales and Steller sea lions. The proposed action falls within critical habitat designated in Cook Inlet for beluga whales but is not within critical habitat designated for Steller sea lions. On April 11, 2011, NMFS announced the two areas of beluga whale critical habitat (76 FR 20180) comprising 7,800 km^2 (3,013 mi^2) of marine habitat. Designated beluga whale Critical Habitat Area 1 consists of 1,909 km^2 of Cook Inlet, north of Three Mile Creek and Point Possession. Critical Habitat Area 1 contains shallow tidal flats or mudflats and mouths of rivers that provide important areas for foraging, calving, molting, and escape from predators. High concentrations of beluga whales are often observed in these areas from spring through fall. Critical Habitat Area 2 consists of 5,891 km^2 located south of Critical Habitat Area 1 and includes nearshore areas along western Cook Inlet and Kachemak Bay. Critical Habitat Area 2 consists of known fall and winter foraging and transit habitat for beluga whales, as well as spring and summer habitat for smaller concentrations of beluga whales. Apache's total proposed oil and gas exploration seismic operations area is 5,684 km^2, of which a smaller portion would be surveyed over an eight to nine month period annually. Approximately 711 km^2 of Apache's proposed seismic survey area is in the designated beluga whale Critical Habitat Area 1 and approximately 4,200 km^2 is in the designated beluga whale Critical Habitat Area 2.

There are several species of mysticetes that have been observed infrequently in lower Cook Inlet, including minke whale (*Balaenoptera acutorostrata*), humpback whale (*Megaptera novaeangliae*), and fin whale (*Balaenoptera physalus*). Because of their infrequent occurrence in the location of seismic acquisition, they are not included in this proposed rule. Sea otters also occur in Cook Inlet. However, sea otters are managed by the U.S. Fish and Wildlife Service and are therefore not considered further in this proposed rule.

Cetaceans

1. Beluga Whales

Despite the ESA listing and critical habitat designations already mentioned, Cook Inlet beluga whales have not made significant progress towards recovery. Data indicate that the Cook Inlet population of beluga whales (which was listed in 2008) has been decreasing at a rate of 0.6 percent annually between 2002 and 2012 (Allen and Angliss, 2014). One review of the status of the population indicated that there is an 80% chance that the population will decline further (Hobbs and Shelden, 2008).

Cook Inlet beluga whales reside in Cook Inlet year-round although their distribution and density changes seasonally. Factors that are likely to influence beluga whale distribution within the inlet include prey availability, predation pressure, sea-ice cover and other environmental factors, reproduction, sex and age class, and human activities (Rugh *et al.,* 2000; NMFS 2008). Seasonal movement and density patterns as well as site fidelity appear to be closely linked to prey availability, coinciding with seasonal salmon and eulachon concentrations (Moore *et al.,* 2000). For example, during spring and summer, beluga whales are generally concentrated near the warmer waters of river mouths where prey availability is high and predator occurrence is low (Huntington 2000; Moore *et al.,* 2000). During the

winter (November to April), belugas disperse throughout the upper and mid-inlet areas, with animals found between Kalgin Island and Point Possession (Rugh *et al.,* 2000). During these months, there are generally fewer observations of beluga whales in the Anchorage and Knik Arm area (NMML 2004; Rugh *et al.,* 2004).

Beluga whales use several areas of the upper Cook Inlet for repeated summer and fall feeding. The primary hotspots for beluga feeding include the Big and Little Susitna rivers, Eagle Bay to Eklutna River, Ivan Slough, Theodore River, Lewis River, and Chickaloon River and Bay (NMFS, 2008). Availability of prey species appears to be the most influential environmental variable affecting Cook Inlet beluga whale distribution and relative abundance (Moore *et al.,* 2000). The patterns and timing of eulachon and salmon runs have a strong influence on beluga whale feeding behavior and their seasonal movements (Nemeth *et al.,* 2007; NMFS, 2008). The presence of prey species may account for the seasonal changes in beluga group size and composition (Moore *et al.,* 2000). Aerial and vessel-based monitoring conducted by Apache during the March 2011 2D test program in Cook Inlet reported 33 beluga sightings. One of the sightings was of a large group (~25 individuals on March 27, 2011) of feeding/milling belugas near the mouth of the Drift River. If belugas are present during the late summer/early fall, they are more likely to occur in shallow areas near river mouths in upper Cook Inlet. For example, no beluga whales were sighted in Trading Bay during the SSV conducted in September 2011 because during that time of year they are more likely to be in the upper regions of Cook Inlet.

2. Killer Whales

In general, killer whales are rare in upper Cook Inlet. Transient killer whales are known to feed on beluga whales, and resident killer whales are known to feed on anadromous fish (Shelden *et al.,* 2003). The availability of these prey species largely determines the likeliest times for killer whales to be in the area. Between 1993 and 2004, 23 sightings of killer whales were reported in the lower Cook Inlet during aerial surveys by Rugh *et al.* (2005). Surveys conducted over a span of 20 years by Shelden *et al.* (2003) reported 11 sightings in upper Cook Inlet between Turnagain Arm, Susitna Flats, and Knik Arm. No killer whales were spotted during surveys by Funk *et al.* (2005), Ireland *et al.* (2005), Brueggeman *et al.* (2007a, 2007b, 2008), or Prevel Ramos *et al.* (2006, 2008). Eleven killer whale strandings have been reported in Turnagain Arm, six in May 1991 and five in August 1993. NMFS aerial survey data spanning 13 years conducted in June each year have reported sightings ranging from 0 to 33 whales in a single year. Sightings data can be found in Table 5 of Apache's application. Therefore, very few killer whales, if any, are expected to approach or be in the vicinity of the action area.

3. Harbor Porpoise

Previously estimated density for harbor porpoises in Cook Inlet is 7.2 per 1,000 km^2 (Dahlheim *et al.,* 2000), suggesting that only a small number use Cook Inlet. Data from NMFS aerial surveys (Table 5 in Apache's application) flown annually in June from 2000–2012 sighted anywhere from 0 to 100 porpoises in a single season. The densities derived from this data range from 0 to 0.014 animals per km^2. Harbor porpoise have been reported in lower Cook Inlet from Cape Douglas to the West Foreland, Kachemak Bay, and offshore (Rugh *et al.,* 2005). Small numbers of harbor porpoises have been consistently reported in upper Cook Inlet between April and October, but more recent observations have recorded higher numbers (Prevel Ramos *et al.,* 2008). Prevel Ramos *et al.* (2008) reported 17 harbor porpoises from spring to fall 2006, while other studies reported 14 in the spring of 2007 (Brueggeman *et al.* 2007) and 12 in the fall of 2007 (Brueggeman *et al.* 2008). During the spring and fall of 2007, 129 harbor porpoises were reported between Granite Point and the Susitna River; however, the reason for the increase in numbers of harbor porpoise in the upper Cook Inlet remains unclear and the disparity between this result and past sightings suggests that it may be an anomaly. The spike in reported sightings occurred in July, which was followed by sightings of 79 harbor porpoises in August, 78 in September, and 59 in October 2007. It is important to note that the number of porpoises counted more than once was unknown, which suggests that the actual numbers are likely smaller than those reported. In 2012, Apache marine mammal observers recorded 137 sightings of 190 estimated individuals; a similar count to the 2007 spike previously observed. In addition, recent passive acoustic research in Cook Inlet by the Alaska Department of Fish and Game and the National Marine Mammal Laboratory have indicated that harbor porpoises occur in the area more frequently than previously thought, particularly in the West Foreland area in the spring (NMFS 2011); however overall numbers are still unknown at this time.

4. Gray Whale

Numbers of gray whales in Cook Inlet are small compared to the overall population (18,017 individuals). However, Apache marine mammal observers recorded nine sightings of nine individuals (including possible resights of the same animals) from May-July 2012. Of those sightings, seven were observed from project vessels, and two were observed from land-based observation stations. The eastern North Pacific gray whales observed in Cook Inlet are likely migrating to summer feeding grounds in the Bering, Chukchi, and Beaufort Seas, though a small number feed along the coast between Kodiak Island and northern California (Matkin, 2009; Carretta *et al.,* 2014). NMFS aerial surveys flown annually in June have not sighted a gray whale during survey season since 2001. Occurrences in the seismic survey area (especially in the upper parts of the Inlet) are expected to be low.

Pinnipeds

Two species of pinnipeds may be encountered in Cook Inlet: Harbor seal and Steller sea lion.

1. Harbor Seals

Harbor seals inhabit the coastal and estuarine waters of Cook Inlet. Historically, harbor seals have been more abundant in lower Cook Inlet than in upper Cook Inlet (Rugh *et al.* 2005a,b). Harbor seals are non-migratory; their movements are associated with tides, weather, season, food availability, and reproduction. The major haulout sites for harbor seals are located in lower Cook Inlet, and their presence in the upper inlet coincides with seasonal runs of prey species. For example, harbor seals are commonly observed along the Susitna River and other tributaries along upper Cook Inlet during the eulachon and salmon migrations (NMFS, 2003). During aerial surveys of upper Cook Inlet in 2001, 2002, and 2003, harbor seals were observed 24 to 96 km (15 to 60 mi) south-southwest of Anchorage at the Chickaloon, Little Susitna, Susitna, Ivan, McArthur, and Beluga Rivers (Rugh *et al.,* 2005). NMFS aerial surveys flown in June have reported sightings ranging from 956 to 2037 harbor seals over the course of surveys from 2000 to 2012. Apache aerial observers recorded approximately 900 harbor seals north of the Forelands in 2012 (Lomac-MacNair *et al.,* 2013). Moreover, preliminary reports from Apache's 2014 vessel, aerial, and land observations suggest

harbor seals may be more abundant north of the Forelands than previously understood. During the 2D test program in March 2011, two harbor seals were observed by vessel-based PSOs. On March 25, 2011, one harbor seal was observed approximately 400 m (0.2 mi) from the *M/V Miss Diane.* At the time of the observation, the vessel was operating the positioning pinger, and PSOs instructed the operator to implement a shut-down. The pinger was shut down for 30 minutes while PSOs monitored the area and re-started the device when the animal was not sighted again during the 30 minute site clearing protocol. No unusual behaviors were reported during the time the animal was observed. The second harbor seal was observed on March 26, 2011, by vessel-based PSO onboard the *M/V Dreamcatcher* approximately 4,260 m (2.6 mi) from the source vessel, which was operating the 10 in^3 airgun at the time. NMFS and Apache do not anticipate encountering large haulouts of seals (the closest haulout site to the action area is located on Kalgin Island, which is approximately 22 km [14 mi] south of the McArthur River), but we do expect to see curious individual harbor seals; especially during large fish runs in the various rivers draining into Cook Inlet.

Important harbor seal life functions, such as breeding and molting may occur within portions of Apache's proposed survey area in June and August, but the co-occurrence is expected to be minimal. From November through January, harbor seals leave Cook Inlet to forage in Shelikof Strait (Boveng *et al.,* 2007).

2. Steller Sea Lion

Two separate stocks of Steller sea lions are recognized within U.S. waters: An eastern DPS, which includes animals east of Cape Suckling, Alaska; and a western DPS, which includes animals west of Cape Suckling (NMFS, 2008). Individuals in Cook Inlet are considered part of the western DPS, which is listed as endangered under the ESA.

Regional variation in trends in Steller sea lion pup counts in 2000–2012 is similar to that of non-pup counts (Johnson and Fritz, 2014). Overall, there is strong evidence that pup counts in the western stock in Alaska increased (1.45 percent annually). Between 2004 and 2008, Alaska western non-pup counts increased only 3%: Eastern Gulf of Alaska (Prince William Sound area) counts were higher and Kenai Peninsula through Kiska Island counts were stable, but western Aleutian counts continued to decline. Johnson and Fritz (2014) analyzed western Steller sea lion population trends in Alaska and noted that there was strong evidence that non-pup counts in the western stock in Alaska increased between 2000 and 2012 (average rate of 1.67 percent annually). However, there continues to be considerable regional variability in recent trends across the range in Alaska, with strong evidence of a positive trend east of Samalga Pass and strong evidence of a decreasing trend to the west (Allen and Angliss, 2014).

Steller sea lions primarily occur in lower, rather than upper Cook Inlet and are rarely sighted north of Nikiski on the Kenai Peninsula. NMFS aerial surveys conducted in June, primarily in lower Cook Inlet, have sighted 0 to 104 Stellers during survey seasons ranging from 2000 to 2012. Haul-outs and rookeries are located near Cook Inlet at Gore Point, Elizabeth Island, Perl Island, and Chugach Island (NMFS, 2008). No Steller sea lion haul-outs or rookeries are located in the vicinity of the proposed seismic survey. Furthermore, no sightings of Steller sea lions were reported by Apache during the 2D test program in March 2011. During the 3D seismic survey, one Steller sea lion was observed from the *M/V Dreamcatcher* on August 18, 2012, during a period when the air guns were not active. Although Apache has requested takes of Steller sea lions, Steller sea lions would be rare in the action area during seismic survey operations.

Apache's application contains more information on the status, distribution, seasonal distribution, and abundance of each of the species under NMFS jurisdiction mentioned in this document. Please refer to the application for that information (see **ADDRESSES**). Additional information can also be found in the NMFS Stock Assessment Reports (SAR). The Alaska 2013 SAR is available on the Internet at: *http://www.nmfs.noaa.gov/pr/sars/pdf/ak2013_final.pdf.*

Potential Effects of the Specified Activity on Marine Mammals

This section includes a summary and discussion of the ways that components (*e.g.,* seismic airgun operations, vessel movement) of the specified activity, including mitigation, may impact marine mammals. The ''Estimated Take by Incidental Harassment'' section later in this document will include a quantitative analysis of the number of individuals that are expected to be taken by this activity. The ''Negligible Impact Analysis'' section will include the analysis of how this specific activity will impact marine mammals and will consider the content of this section, the ''Estimated Take by Incidental Harassment'' section, the ''Proposed Mitigation'' section, and the ''Anticipated Effects on Marine Mammal Habitat'' section to draw conclusions regarding the likely impacts of this activity on the reproductive success or survivorship of individuals and from that on the affected marine mammal populations or stocks.

Operating active acoustic sources, such as airgun arrays, has the potential for adverse effects on marine mammals. The majority of anticipated impacts would be from the use of acoustic sources.

Acoustic Impacts

When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Based on available behavioral data, audiograms have been derived using auditory evoked potentials, anatomical modeling, and other data. Southall *et al.* (2007) designate ''functional hearing groups'' for marine mammals and estimate the lower and upper frequencies of functional hearing of the groups. The functional groups and the associated frequencies are indicated below (note that animals are less sensitive to sounds at the outer edge of their functional range and most sensitive to sounds of frequencies within a smaller range somewhere in the middle of their functional hearing range):

- Low frequency cetaceans (13 species of mysticetes): Functional hearing is estimated to occur between approximately 7 Hz and 30 kHz;
- Mid-frequency cetaceans (32 species of dolphins, six species of larger toothed whales, and 19 species of beaked and bottlenose whales): Functional hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- High frequency cetaceans (eight species of true porpoises, six species of river dolphins, Kogia, the franciscana, and four species of cephalorhynchids): Functional hearing is estimated to occur between approximately 200 Hz and 180 kHz;
- Phocid pinnipeds in Water: Functional hearing is estimated to occur between approximately 75 Hz and 100 kHz; and
- Otariid pinnipeds in Water: Functional hearing is estimated to occur between approximately 100 Hz and 40 kHz.

As mentioned previously in this document, six marine mammal species (four cetacean and two pinniped

species) are likely to occur in the proposed seismic survey area. Of the four cetacean species likely to occur in Apache's proposed project area, one is classified as a low-frequency cetacean (gray whale), two are classified as mid-frequency cetaceans (*i.e.,* beluga and killer whales), and one is classified as a high-frequency cetacean (*i.e.,* harbor porpoise) (Southall *et al.,* 2007). Of the two pinniped species likely to occur in Apache's proposed project area, one is classified as a phocid (*i.e.,* harbor seal), and one is classified as an otariid (*i.e.,* Steller sea lion). A species's functional hearing group is a consideration when we analyze the effects of exposure to sound on marine mammals.

1. Potential Effects of Airgun Sounds on Marine Mammals

The effects of sounds from airgun pulses might include one or more of the following: Tolerance, masking of natural sounds, behavioral disturbance, and temporary or permanent hearing impairment or non-auditory effects (Richardson *et al.,* 1995). As outlined in previous NMFS documents, the effects of noise on marine mammals are highly variable, often depending on species and contextual factors (based on Richardson *et al.,* 1995).

Tolerance: Numerous studies have shown that pulsed sounds from air guns are often readily detectable in the water at distances of many kilometers. Numerous studies have also shown that marine mammals at distances more than a few kilometers from operating survey vessels often show no apparent response. That is often true even in cases when the pulsed sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. In general, pinnipeds and small odontocetes (toothed whales) seem to be more tolerant of exposure to air gun pulses than baleen whales. Although various toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to airgun pulses under some conditions, at other times, mammals of both types have shown no overt reactions. Weir (2008) observed marine mammal responses to seismic pulses from a 24 airgun array firing a total volume of either 5,085 in^3 or 3,147 in^3 in Angolan waters between August 2004 and May 2005. Weir recorded a total of 207 sightings of humpback whales (n = 66), sperm whales (n = 124), and Atlantic spotted dolphins (n = 17) and reported that there were no significant differences in encounter rates (sightings/hr) for humpback and sperm whales according to the airgun array's operational status (*i.e.,* active versus silent).

Behavioral Disturbance: Marine mammals may behaviorally react to sound when exposed to anthropogenic noise. These behavioral reactions are often shown as: Changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where noise sources are located; and/or flight responses (*e.g.,* pinnipeds flushing into water from haulouts or rookeries).

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences of behavioral modification have the potential to be biologically significant if the change affects growth, survival, or reproduction. Examples of behavioral modifications that could impact growth, survival or reproduction include:

- Drastic changes in diving/surfacing/swimming patterns that lead to stranding (such as those associated with beaked whale strandings related to exposure to military mid-frequency tactical sonar);
- Habitat abandonment (temporary or permanent) due to loss of desirable acoustic environment; and
- Disruption of feeding or social interaction resulting in significant energetic costs, inhibited breeding, or cow-calf separation.

The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography) and is also difficult to predict (Southall *et al.,* 2007).

Toothed whales. Few systematic data are available describing reactions of toothed whales to noise pulses. However, systematic work on sperm whales is underway (Tyack *et al.,* 2003), and there is an increasing amount of information about responses of various odontocetes to seismic surveys based on monitoring studies (*e.g.,* Stone, 2003; Smultea *et al.,* 2004; Moulton and Miller, 2005).

Seismic operators and marine mammal observers sometimes see dolphins and other small toothed whales near operating airgun arrays, but, in general, there seems to be a tendency for most delphinids to show some limited avoidance of seismic vessels operating large airgun systems. However, some dolphins seem to be attracted to the seismic vessel and floats, and some ride the bow wave of the seismic vessel even when large arrays of airguns are firing. Nonetheless, there have been indications that small toothed whales sometimes move away or maintain a somewhat greater distance from the vessel when a large array of airguns is operating than when it is silent (*e.g.,* Goold, 1996a,b,c; Calambokidis and Osmek, 1998; Stone, 2003). The beluga may be a species that (at least in certain geographic areas) shows long-distance avoidance of seismic vessels. Aerial surveys during seismic operations in the southeastern Beaufort Sea recorded much lower sighting rates of beluga whales within 10–20 km (6.2–12.4 mi) of an active seismic vessel. These results were consistent with the low number of beluga sightings reported by observers aboard the seismic vessel, suggesting that some belugas might have been avoiding the seismic operations at distances of 10–20 km (6.2–12.4 mi) (Miller *et al.,* 2005).

Captive bottlenose dolphins and (of more relevance in this project) beluga whales exhibit changes in behavior when exposed to strong pulsed sounds similar in duration to those typically used in seismic surveys (Finneran *et al.,* 2002, 2005). However, the animals tolerated high received levels of sound (pk–pk level >200 dB re 1 µPa) before exhibiting aversive behaviors.

Observers stationed on seismic vessels operating off the United Kingdom from 1997–2000 have provided data on the occurrence and behavior of various toothed whales exposed to seismic pulses (Stone, 2003; Gordon *et al.,* 2004). Killer whales were found to be significantly farther from large airgun arrays during periods of shooting compared with periods of no shooting. The displacement of the median distance from the array was approximately 0.5 km (0.3 mi) or more. Killer whales also appear to be more tolerant of seismic shooting in deeper water.

Reactions of toothed whales to large arrays of airguns are variable and, at least for delphinids, seem to be confined to a smaller radius than has been observed for mysticetes. However, based on the limited existing evidence, belugas should not be grouped with delphinids in the ''less responsive'' category.

Pinnipeds. Pinnipeds are not likely to show a strong avoidance reaction to the airgun sources proposed for use. Visual monitoring from seismic vessels has shown only slight (if any) avoidance of

airguns by pinnipeds and only slight (if any) changes in behavior. Monitoring work in the Alaskan Beaufort Sea during 1996–2001 provided considerable information regarding the behavior of Arctic ice seals exposed to seismic pulses (Harris *et al.,* 2001; Moulton and Lawson, 2002). These seismic projects usually involved arrays of 6 to 16 airguns with total volumes of 560 to 1,500 in^3. The combined results suggest that some seals avoid the immediate area around seismic vessels. In most survey years, ringed seal sightings tended to be farther away from the seismic vessel when the airguns were operating than when they were not (Moulton and Lawson, 2002). However, these avoidance movements were relatively small, on the order of 100 m (328 ft) to a few hundreds of meters, and many seals remained within 100–200 m (328–656 ft) of the trackline as the operating airgun array passed by. Seal sighting rates at the water surface were lower during airgun array operations than during no-airgun periods in each survey year except 1997. Similarly, seals are often very tolerant of pulsed sounds from seal-scaring devices (Mate and Harvey, 1987; Jefferson and Curry, 1994; Richardson *et al.,* 1995a). However, initial telemetry work suggests that avoidance and other behavioral reactions by two other species of seals to small airgun sources may at times be stronger than evident to date from visual studies of pinniped reactions to airguns (Thompson *et al.,* 1998). Even if reactions of the species occurring in the present study area are as strong as those evident in the telemetry study, reactions are expected to be confined to relatively small distances and durations, with no long-term effects on pinniped individuals or populations.

Masking: Masking is the obscuring of sounds of interest by other sounds, often at similar frequencies. Marine mammals use acoustic signals for a variety of purposes, which differ among species, but include communication between individuals, navigation, foraging, reproduction, avoiding predators, and learning about their environment (Erbe and Farmer, 2000; Tyack, 2000). Masking, or auditory interference, generally occurs when sounds in the environment are louder than, and of a similar frequency to, auditory signals an animal is trying to receive. Masking is a phenomenon that affects animals trying to receive acoustic information about their environment, including sounds from other members of their species, predators, prey, and sounds that allow them to orient in their environment. Masking these acoustic signals can disturb the behavior of individual animals, groups of animals, or entire populations.

Masking occurs when anthropogenic sounds and signals (that the animal utilizes) overlap at both spectral and temporal scales. For the airgun sound generated from the proposed seismic surveys, sound will consist of low frequency (under 500 Hz) pulses with extremely short durations (less than one second). Lower frequency man-made sounds are more likely to affect detection of communication calls and other potentially important natural sounds such as surf and prey noise. There is little concern regarding masking near the sound source due to the brief duration of these pulses and relatively longer silence between air gun shots (approximately 12 seconds). However, at long distances (over tens of kilometers away), due to multipath propagation and reverberation, the durations of airgun pulses can be ''stretched'' to seconds with long decays (Madsen *et al.,* 2006), although the intensity of the sound is greatly reduced.

This could affect communication signals used by low frequency mysticetes when they occur near the noise band and thus reduce the communication space of animals (*e.g.,* Clark *et al.,* 2009) and cause increased stress levels (*e.g.,* Foote *et al.,* 2004; Holt *et al.,* 2009); however, no baleen whales are expected to occur within the proposed action area. Marine mammals are thought to be able to compensate for masking by adjusting their acoustic behavior by shifting call frequencies, and/or increasing call volume and vocalization rates. For example, blue whales are found to increase call rates when exposed to seismic survey noise in the St. Lawrence Estuary (Di Iorio and Clark, 2010). The North Atlantic right whales (*Eubalaena glacialis*) exposed to high shipping noise increase call frequency (Parks *et al.,* 2007), while some humpback whales respond to low-frequency active sonar playbacks by increasing song length (Miller *et al.,* 2000). Additionally, beluga whales have been known to change their vocalizations in the presence of high background noise possibly to avoid masking calls (Au *et al.,* 1985; Lesage *et al.,* 1999; Scheifele *et al.,* 2005). Although some degree of masking is inevitable when high levels of manmade broadband sounds are introduced into the sea, marine mammals have evolved systems and behavior that function to reduce the impacts of masking. Structured signals, such as the echolocation click sequences of small toothed whales, may be readily detected even in the presence of strong background noise because their frequency content and temporal features usually differ strongly from those of the background noise (Au and Moore, 1988, 1990). The components of background noise that are similar in frequency to the sound signal in question primarily determine the degree of masking of that signal.

Redundancy and context can also facilitate detection of weak signals. These phenomena may help marine mammals detect weak sounds in the presence of natural or manmade noise. Most masking studies in marine mammals present the test signal and the masking noise from the same direction. The sound localization abilities of marine mammals suggest that, if signal and noise come from different directions, masking would not be as severe as the usual types of masking studies might suggest (Richardson *et al.,* 1995). The dominant background noise may be highly directional if it comes from a particular anthropogenic source such as a ship or industrial site. Directional hearing may significantly reduce the masking effects of these sounds by improving the effective signal-to-noise ratio. In the cases of higher frequency hearing by the bottlenose dolphin, beluga whale, and killer whale, empirical evidence confirms that masking depends strongly on the relative directions of arrival of sound signals and the masking noise (Penner *et al.,* 1986; Dubrovskiy, 1990; Bain *et al.,* 1993; Bain and Dahlheim, 1994). Toothed whales, and probably other marine mammals as well, have additional capabilities besides directional hearing that can facilitate detection of sounds in the presence of background noise. There is evidence that some toothed whales can shift the dominant frequencies of their echolocation signals from a frequency range with a lot of ambient noise toward frequencies with less noise (Au *et al.,* 1974, 1985; Moore and Pawloski, 1990; Thomas and Turl, 1990; Romanenko and Kitain, 1992; Lesage *et al.,* 1999). A few marine mammal species are known to increase the source levels or alter the frequency of their calls in the presence of elevated sound levels (Dahlheim, 1987; Au, 1993; Lesage *et al.,* 1993, 1999; Terhune, 1999; Foote *et al.,* 2004; Parks *et al.,* 2007, 2009; Di Iorio and Clark, 2009; Holt *et al.,* 2009).

These data demonstrating adaptations for reduced masking pertain mainly to the very high frequency echolocation signals of toothed whales. There is less information about the existence of corresponding mechanisms at moderate or low frequencies or in other types of

marine mammals. For example, Zaitseva *et al.* (1980) found that, for the bottlenose dolphin, the angular separation between a sound source and a masking noise source had little effect on the degree of masking when the sound frequency was 18 kHz, in contrast to the pronounced effect at higher frequencies. Directional hearing has been demonstrated at frequencies as low as 0.5–2 kHz in several marine mammals, including killer whales (Richardson *et al.,* 1995a). This ability may be useful in reducing masking at these frequencies. In summary, high levels of sound generated by anthropogenic activities may act to mask the detection of weaker biologically important sounds by some marine mammals. This masking may be more prominent for lower frequencies. For higher frequencies, such as that used in echolocation by toothed whales, several mechanisms are available that may allow them to reduce the effects of such masking.

Threshold Shift (noise-induced loss of hearing)—When animals exhibit reduced hearing sensitivity (*i.e.,* sounds must be louder for an animal to detect them) following exposure to an intense sound or sound for long duration, it is referred to as a noise-induced threshold shift (TS). An animal can experience temporary threshold shift (TTS) or permanent threshold shift (PTS). TTS can last from minutes or hours to days (*i.e.,* there is complete recovery), can occur in specific frequency ranges (*i.e.,* an animal might only have a temporary loss of hearing sensitivity between the frequencies of 1 and 10 kHz), and can be of varying amounts (for example, an animal's hearing sensitivity might be reduced initially by only 6 dB or reduced by 30 dB). PTS is permanent, but some recovery is possible. PTS can also occur in a specific frequency range and amount as mentioned above for TTS.

The following physiological mechanisms are thought to play a role in inducing auditory TS: Effects to sensory hair cells in the inner ear that reduce their sensitivity, modification of the chemical environment within the sensory cells, residual muscular activity in the middle ear, displacement of certain inner ear membranes, increased blood flow, and post-stimulatory reduction in both efferent and sensory neural output (Southall *et al.,* 2007). The amplitude, duration, frequency, temporal pattern, and energy distribution of sound exposure all can affect the amount of associated TS and the frequency range in which it occurs. As amplitude and duration of sound exposure increase, so, generally, does the amount of TS, along with the recovery time. For intermittent sounds, less TS could occur than compared to a continuous exposure with the same energy (some recovery could occur between intermittent exposures depending on the duty cycle between sounds) (Kryter *et al.,* 1966; Ward, 1997). For example, one short but loud (higher SPL) sound exposure may induce the same impairment as one longer but softer sound, which in turn may cause more impairment than a series of several intermittent softer sounds with the same total energy (Ward, 1997). Additionally, though TTS is temporary, prolonged exposure to sounds strong enough to elicit TTS, or shorter-term exposure to sound levels well above the TTS threshold, can cause PTS, at least in terrestrial mammals (Kryter, 1985). Although in the case of the seismic survey, animals are not expected to be exposed to levels high enough or durations long enough to result in PTS.

PTS is considered auditory injury (Southall *et al.,* 2007). Irreparable damage to the inner or outer cochlear hair cells may cause PTS; however, other mechanisms are also involved, such as exceeding the elastic limits of certain tissues and membranes in the middle and inner ears and resultant changes in the chemical composition of the inner ear fluids (Southall *et al.,* 2007).

Although the published body of scientific literature contains numerous theoretical studies and discussion papers on hearing impairments that can occur with exposure to a loud sound, only a few studies provide empirical information on the levels at which noise-induced loss in hearing sensitivity occurs in nonhuman animals. For marine mammals, published data are limited to the captive bottlenose dolphin, beluga, harbor porpoise, and Yangtze finless porpoise (Finneran *et al.,* 2000, 2002b, 2003, 2005a, 2007, 2010a, 2010b; Finneran and Schlundt, 2010; Lucke *et al.,* 2009; Mooney *et al.,* 2009a, 2009b; Popov *et al.,* 2011a, 2011b; Kastelein *et al.,* 2012a; Schlundt *et al.,* 2000; Nachtigall *et al.,* 2003, 2004). For pinnipeds in water, data are limited to measurements of TTS in harbor seals, an elephant seal, and California sea lions (Kastak *et al.,* 1999, 2005; Kastelein *et al.,* 2012b).

Marine mammal hearing plays a critical role in communication with conspecifics, and interpretation of environmental cues for purposes such as predator avoidance and prey capture. Depending on the degree (elevation of threshold in dB), duration (*i.e.,* recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious (similar to those discussed in auditory masking, below). For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that occurs during a time where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts. Also, depending on the degree and frequency range, the effects of PTS on an animal could range in severity, although it is considered generally more serious because it is a permanent condition. Of note, reduced hearing sensitivity as a simple function of aging has been observed in marine mammals, as well as humans and other taxa (Southall *et al.,* 2007), so we can infer that strategies exist for coping with this condition to some degree, though likely not without cost.

Given the higher level of sound necessary to cause PTS as compared with TTS, it is considerably less likely that PTS would occur during the proposed seismic surveys in Cook Inlet. Cetaceans generally avoid the immediate area around operating seismic vessels, as do some other marine mammals. Some pinnipeds show avoidance reactions to airguns, but their avoidance reactions are generally not as strong or consistent as those of cetaceans, and occasionally they seem to be attracted to operating seismic vessels (NMFS, 2010).

Non-auditory Physical Effects: Non-auditory physical effects might occur in marine mammals exposed to strong underwater pulsed sound. Possible types of non-auditory physiological effects or injuries that theoretically might occur in mammals close to a strong sound source include stress, neurological effects, bubble formation, and other types of organ or tissue damage. Some marine mammal species (*i.e.,* beaked whales) may be especially susceptible to injury and/or stranding when exposed to strong pulsed sounds.

Classic stress responses begin when an animal's central nervous system perceives a potential threat to its homeostasis. That perception triggers stress responses regardless of whether a stimulus actually threatens the animal; the mere perception of a threat is sufficient to trigger a stress response (Moberg, 2000; Sapolsky *et al.,* 2005; Seyle, 1950). Once an animal's central nervous system perceives a threat, it

mounts a biological response or defense that consists of a combination of the four general biological defense responses: behavioral responses; autonomic nervous system responses; neuroendocrine responses; or immune responses.

In the case of many stressors, an animal's first and most economical (in terms of biotic costs) response is behavioral avoidance of the potential stressor or avoidance of continued exposure to a stressor. An animal's second line of defense to stressors involves the sympathetic part of the autonomic nervous system and the classical ''fight or flight'' response, which includes the cardiovascular system, the gastrointestinal system, the exocrine glands, and the adrenal medulla to produce changes in heart rate, blood pressure, and gastrointestinal activity that humans commonly associate with ''stress.'' These responses have a relatively short duration and may or may not have significant long-term effects on an animal's welfare.

An animal's third line of defense to stressors involves its neuroendocrine or sympathetic nervous systems; the system that has received the most study has been the hypothalmus-pituitary-adrenal system (also known as the HPA axis in mammals or the hypothalamus-pituitary-interrenal axis in fish and some reptiles). Unlike stress responses associated with the autonomic nervous system, virtually all neuroendocrine functions that are affected by stress—including immune competence, reproduction, metabolism, and behavior—are regulated by pituitary hormones. Stress-induced changes in the secretion of pituitary hormones have been implicated in failed reproduction (Moberg, 1987; Rivier, 1995), altered metabolism (Elasser *et al.,* 2000), reduced immune competence (Blecha, 2000), and behavioral disturbance. Increases in the circulation of glucocorticosteroids (cortisol, corticosterone, and aldosterone in marine mammals; see Romano *et al.,* 2004) have been equated with stress for many years.

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and distress is the biotic cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose a risk to the animal's welfare. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other biotic functions, which impair those functions that experience the diversion. For example, when mounting a stress response diverts energy away from growth in young animals, those animals may experience stunted growth. When mounting a stress response diverts energy from a fetus, an animal's reproductive success and fitness will suffer. In these cases, the animals will have entered a pre-pathological or pathological state which is called ''distress'' (sensu Seyle, 1950) or ''allostatic loading'' (sensu McEwen and Wingfield, 2003). This pathological state will last until the animal replenishes its biotic reserves sufficient to restore normal function. Note that these examples involved a long-term (days or weeks) stress response due to exposure to stimuli.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses have also been documented fairly well through controlled experiment; because this physiology exists in every vertebrate that has been studied, it is not surprising that stress responses and their costs have been documented in both laboratory and free-living animals (for examples see, Holberton *et al.,* 1996; Hood *et al.,* 1998; Jessop *et al.,* 2003; Krausman *et al.,* 2004; Lankford *et al.,* 2005; Reneerkens *et al.,* 2002; Thompson and Hamer, 2000). Although no information has been collected on the physiological responses of marine mammals to anthropogenic sound exposure, studies of other marine animals and terrestrial animals would lead us to expect some marine mammals to experience physiological stress responses and, perhaps, physiological responses that would be classified as ''distress'' upon exposure to anthropogenic sounds.

For example, Jansen (1998) reported on the relationship between acoustic exposures and physiological responses that are indicative of stress responses in humans (*e.g.,* elevated respiration and increased heart rates). Jones (1998) reported on reductions in human performance when faced with acute, repetitive exposures to acoustic disturbance. Trimper *et al.* (1998) reported on the physiological stress responses of osprey to low-level aircraft noise while Krausman *et al.* (2004) reported on the auditory and physiology stress responses of endangered Sonoran pronghorn to military overflights. Smith *et al.* (2004a, 2004b) identified noise-induced physiological transient stress responses in hearing-specialist fish (*i.e.,* goldfish) that accompanied short- and long-term hearing losses. Welch and Welch (1970) reported physiological and behavioral stress responses that accompanied damage to the inner ears of fish and several mammals.

Hearing is one of the primary senses marine mammals use to gather information about their environment and communicate with conspecifics. Although empirical information on the effects of sensory impairment (TTS, PTS, and acoustic masking) on marine mammals remains limited, we assume that reducing a marine mammal's ability to gather information about its environment and communicate with other members of its species would induce stress, based on data that terrestrial animals exhibit those responses under similar conditions (NRC, 2003) and because marine mammals use hearing as their primary sensory mechanism. Therefore, we assume that acoustic exposures sufficient to trigger onset PTS or TTS would be accompanied by physiological stress responses. However, marine mammals also might experience stress responses at received levels lower than those necessary to trigger onset TTS. Based on empirical studies of the time required to recover from stress responses (Moberg, 2000), NMFS also assumes that stress responses could persist beyond the time interval required for animals to recover from TTS and might result in pathological and pre-pathological states that would be as significant as behavioral responses to TTS. Resonance effects (Gentry, 2002) and direct noise-induced bubble formations (Crum *et al.,* 2005) are implausible in the case of exposure to an impulsive broadband source like an airgun array. If seismic surveys disrupt diving patterns of deep-diving species, this might result in bubble formation and a form of the bends, as speculated to occur in beaked whales exposed to sonar. However, there is no specific evidence of this upon exposure to airgun pulses. Additionally, no beaked whale species occur in the proposed seismic survey area.

In general, very little is known about the potential for strong, anthropogenic underwater sounds to cause non-auditory physical effects in marine mammals. Such effects, if they occur at all, would presumably be limited to short distances and to activities that extend over a prolonged period. The available data do not allow identification of a specific exposure level above which non-auditory effects can be expected (Southall *et al.,* 2007) or any meaningful quantitative predictions of the numbers (if any) of marine mammals that might be affected in those ways. There is no definitive evidence that any of these effects occur

even for marine mammals in close proximity to large arrays of airguns. In addition, marine mammals that show behavioral avoidance of seismic vessels, including belugas and some pinnipeds, are especially unlikely to incur non-auditory impairment or other physical effects. Therefore, it is unlikely that such effects would occur during Apache's proposed surveys given the brief duration of exposure and the planned monitoring and mitigation measures described later in this document.

Stranding and Mortality: Marine mammals close to underwater detonations of high explosive can be killed or severely injured, and the auditory organs are especially susceptible to injury (Ketten *et al.* 1993; Ketten 1995). Airgun pulses are less energetic and their peak amplitudes have slower rise times. To date, there is no evidence that serious injury, death, or stranding by marine mammals can occur from exposure to air gun pulses, even in the case of large air gun arrays.

However, in numerous past IHA notices for seismic surveys, commenters have referenced two stranding events allegedly associated with seismic activities, one off Baja California and a second off Brazil. NMFS has addressed this concern several times, including in the **Federal Register** notice announcing the IHA for Apache's first seismic survey in 2012. Without new information, NMFS does not believe that this issue warrants further discussion. For information relevant to strandings of marine mammals, readers are encouraged to review NMFS's response to comments on this matter found in 69 FR 74905 (December 14, 2004), 71 FR 43112 (July 31, 2006), 71 FR 50027 (August 24, 2006), 71 FR 49418 (August 23, 2006), and 77 FR 27720 (May 11, 2012).

It should be noted that strandings related to sound exposure have not been recorded for marine mammal species in Cook Inlet. Beluga whale strandings in Cook Inlet are not uncommon; however, these events often coincide with extreme tidal fluctuations (''spring tides'') or killer whale sightings (Shelden *et al.,* 2003). For example, in August 2012, a group of Cook Inlet beluga whales stranded in the mud flats of Turnagain Arm during low tide and were able to swim free with the flood tide. No strandings or marine mammals in distress were observed during the 2D test survey conducted by Apache in March 2011, and none were reported by Cook Inlet inhabitants. Furthermore, no strandings were reported during seismic survey operations conducted under the April 2012 IHA. As a result, NMFS does not expect any marine mammals will incur serious injury or mortality in Cook Inlet or strand as a result of the proposed seismic survey.

2. Potential Effects From Pingers on Marine Mammals

Active acoustic sources other than the airguns have been proposed for Apache's 5-year oil and gas exploration seismic survey program in Cook Inlet. The specifications for the pingers (source levels and frequency ranges) were provided earlier in this document. In general, pingers are known to cause behavioral disturbance and are commonly used to deter marine mammals from commercial fishing gear or fish farms. Due to the potential to change marine mammal behavior, shut downs described for airguns will also be applied to pinger use.

3. Potential Effects From Aircraft Noise on Marine Mammals

Apache plans to utilize aircraft to conduct aerial surveys near river mouths in order to identify locations or congregations of beluga whales and other marine mammals prior to the commencement of operations. The aircraft will not be used every day but will be used for surveys near river mouths. Aerial surveys will fly at an altitude of 305 m (1,000 ft) when practicable and weather conditions permit. In the event of a marine mammal sighting, aircraft will try to maintain a radial distance of 457 m (1,500 ft) from the marine mammal(s). Aircraft will avoid approaching marine mammals from head-on, flying over or passing the shadow of the aircraft over the marine mammals.

Studies on the reactions of cetaceans to aircraft show little negative response (Richardson *et al.,* 1995). In general, reactions range from sudden dives and turns and are typically found to decrease if the animals are engaged in feeding or social behavior. Whales with calves or in confined waters may show more of a response. Generally there has been little or no evidence of marine mammals responding to aircraft overflights when altitudes are at or above 305 m (1,000 ft), based on three decades of flying experience in the Arctic (NMFS, unpublished data). Based on long-term studies that have been conducted on beluga whales in Cook Inlet since 1993, NMFS expect that there will be no effects of this activity on beluga whales or other cetaceans. No change in beluga swim directions or other noticeable reactions have been observed during the Cook Inlet aerial surveys flown from 183 to 244 m (600 to 800 ft) (*e.g.,* Rugh *et al.,* 2000). By applying the operational requirements discussed above, sound levels underwater are not expected to rise to the level of take.

The majority of observations of pinnipeds reacting to aircraft noise are associated with animals hauled out on land or ice. There are few data describing the reactions of pinnipeds in water to aircraft (Richardson *et al.,* 1995). In the presence of aircraft, pinnipeds hauled out for pupping or molting generally became alert and then rushed or slipped (when on ice) into the water. Stampedes often result from this response and may increase pup mortality due to crushing or an increase rate of pup abandonment. The greatest reactions from hauled out pinnipeds were observed when low flying aircraft passed directly above the animal(s) (Richardson *et al.,* 1995). Although noise associated with aircraft activity could cause hauled out pinnipeds to rush into the water, there are no known haul out sites in the vicinity of the survey site. Therefore, the operation of aircraft during the seismic survey is not expected to result in the harassment of pinnipeds. To minimize the noise generated by aircraft, Apache will follow NMFS's Marine Mammal Viewing Guidelines and Regulations found on the Internet at: *http://www.alaskafisheries.noaa.gov/protectedresources/mmv/guide.htm.*

Vessel Impacts

Vessel activity and noise associated with vessel activity will temporarily increase in the action area during Apache's seismic survey as a result of the operation of nine vessels. To minimize the effects of vessels and noise associated with vessel activity, Apache will follow NMFS's Marine Mammal Viewing Guidelines and Regulations and will alter heading or speed if a marine mammal gets too close to a vessel. In addition, vessels will be operating at slow speed (2–4 knots) when conducting surveys and in a purposeful manner to and from work sites in as direct a route as possible. Marine mammal monitoring observers and passive acoustic devices will alert vessel captains as animals are detected to ensure safe and effective measures are applied to avoid coming into direct contact with marine mammals. Therefore, NMFS neither anticipates nor authorizes takes of marine mammals from ship strikes.

Odontocetes, such as beluga whales, killer whales, and harbor porpoises, often show tolerance to vessel activity; however, they may react at long distances if they are confined by ice, shallow water, or were previously

harassed by vessels (Richardson *et al.,* 1995). Beluga whale response to vessel noise varies greatly from tolerance to extreme sensitivity depending on the activity of the whale and previous experience with vessels (Richardson *et al.,* 1995). Reactions to vessels depend on whale activities and experience, habitat, boat type, and boat behavior (Richardson *et al.,* 1995) and may include behavioral responses, such as altered headings or avoidance (Blane and Jaakson, 1994; Erbe and Farmer, 2000); fast swimming; changes in vocalizations (Lesage *et al.,* 1999; Scheifele *et al.,* 2005); and changes in dive, surfacing, and respiration patterns.

There are few data published on pinniped responses to vessel activity, and most of the information is anecdotal (Richardson *et al.,* 1995). Generally, sea lions in water show tolerance to close and frequently approaching vessels and sometimes show interest in fishing vessels. They are less tolerant when hauled out on land; however, they rarely react unless the vessel approaches within 100–200 m (330–660 ft; reviewed in Richardson *et al.,* 1995).

Entanglement

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

Anticipated Effects on Marine Mammal Habitat

The primary potential impacts to marine mammal habitat and other marine species are associated with elevated sound levels produced by airguns and other active acoustic sources. However, other potential impacts to the surrounding habitat from physical disturbance are also possible. This section describes the potential impacts to marine mammal habitat from the specified activity. Because the marine mammals in the area feed on fish and/or invertebrates there is also information on the species typically preyed upon by the marine mammals in the area. As noted earlier, upper Cook Inlet is an important feeding and calving area for the Cook Inlet beluga whale, and critical habitat has been designated for this species in the proposed seismic survey area.

Common Marine Mammal Prey in the Project Area

Fish are the primary prey species for marine mammals in upper Cook Inlet. Beluga whales feed on a variety of fish, shrimp, squid, and octopus (Burns and Seaman, 1986). Common prey species in Knik Arm include salmon, eulachon and cod. Harbor seals feed on fish such as pollock, cod, capelin, eulachon, Pacific herring, and salmon, as well as a variety of benthic species, including crabs, shrimp, and cephalopods. Harbor seals are also opportunistic feeders with their diet varying with season and location. The preferred diet of the harbor seal in the Gulf of Alaska consists of pollock, octopus, capelin, eulachon, and Pacific herring (Calkins, 1989). Other prey species include cod, flat fishes, shrimp, salmon, and squid (Hoover, 1988). Harbor porpoises feed primarily on Pacific herring, cod, whiting (hake), pollock, squid, and octopus (Leatherwood *et al.,* 1982). In the upper Cook Inlet area, harbor porpoise feed on squid and a variety of small schooling fish, which would likely include Pacific herring and eulachon (Bowen and Siniff, 1999; NMFS, unpublished data). Killer whales feed on either fish or other marine mammals depending on genetic type (resident versus transient respectively). Killer whales in Knik Arm are typically the transient type (Shelden *et al.,* 2003) and feed on beluga whales and other marine mammals, such as harbor seal and harbor porpoise. The Steller sea lion diet consists of a variety of fishes (capelin, cod, herring, mackerel, pollock, rockfish, salmon, sand lance, etc.), bivalves, squid, octopus, and gastropods.

Potential Impacts on Prey Species

With regard to fish as a prey source for cetaceans and pinnipeds, fish are known to hear and react to sounds and to use sound to communicate (Tavolga *et al.,* 1981) and possibly avoid predators (Wilson and Dill, 2002). Experiments have shown that fish can sense both the strength and direction of sound (Hawkins, 1981). Primary factors determining whether a fish can sense a sound signal, and potentially react to it, are the frequency of the signal and the strength of the signal in relation to the natural background sound level.

Fishes produce sounds that are associated with behaviors that include territoriality, mate search, courtship, and aggression. It has also been speculated that sound production may provide the means for long distance communication and communication under poor underwater visibility conditions (Zelick *et al.,* 1999), although the fact that fish communicate at low-frequency sound levels where the masking effects of ambient noise are naturally highest suggests that very long distance communication would rarely be possible. Fishes have evolved a diversity of sound generating organs and acoustic signals of various temporal and spectral contents. Fish sounds vary in structure, depending on the mechanism used to produce them (Hawkins, 1993). Generally, fish sounds are predominantly composed of low frequencies (less than 3 kHz).

Since objects in the water scatter sound, fish are able to detect these objects through monitoring the ambient noise. Therefore, fish are probably able to detect prey, predators, conspecifics, and physical features by listening to environmental sounds (Hawkins, 1981). There are two sensory systems that enable fish to monitor the vibration-based information of their surroundings. The two sensory systems, the inner ear and the lateral line, constitute the acoustico-lateralis system.

Although the hearing sensitivities of very few fish species have been studied to date, it is becoming obvious that the intra- and inter-specific variability is considerable (Coombs, 1981). Nedwell *et al.* (2004) compiled and published available fish audiogram information. A noninvasive electrophysiological recording method known as auditory brainstem response is now commonly used in the production of fish audiograms (Yan, 2004). Popper and Carlson (1998) and the Navy (2001) found that fish generally perceive underwater sounds in the frequency range of 50–2,000 Hz, with peak sensitivities below 800 Hz. Even though some fish are able to detect sounds in the ultrasonic frequency range, the thresholds at these higher frequencies tend to be considerably higher than those at the lower end of the auditory frequency range.

Fish are sensitive to underwater impulsive sounds due to swim bladder resonance. As the pressure wave passes through a fish, the swim bladder is rapidly squeezed as the high pressure wave, and then the under pressure component of the wave, passes through the fish. The swim bladder may repeatedly expand and contract at the high sound pressure levels, creating pressure on the internal organs surrounding the swim bladder.

Literature relating to the impacts of sound on marine fish species can be divided into the following categories: (1) Pathological effects; (2) physiological effects; and (3) behavioral effects. Pathological effects include lethal and sub-lethal physical damage to fish; physiological effects include primary and secondary stress responses; and behavioral effects include changes in exhibited behaviors of fish. Behavioral

changes might be a direct reaction to a detected sound or a result of the anthropogenic sound masking natural sounds that the fish normally detect and to which they respond. The three types of effects are often interrelated in complex ways. For example, some physiological and behavioral effects could potentially lead to the ultimate pathological effect of mortality. Hastings and Popper (2005) reviewed what is known about the effects of sound on fishes and identified studies needed to address areas of uncertainty relative to measurement of sound and the responses of fishes. Popper *et al.* (2003/2004) also published a paper that reviews the effects of anthropogenic sound on the behavior and physiology of fishes.

The level of sound at which a fish will react or alter its behavior is usually well above the detection level. Fish have been found to react to sounds when the sound level increased to about 20 dB above the detection level of 120 dB (Ona, 1988); however, the response threshold can depend on the time of year and the fish's physiological condition (Engas *et al.,* 1993). In general, fish react more strongly to pulses of sound rather than a continuous signal (Blaxter *et al.,* 1981), and a quicker alarm response is elicited when the sound signal intensity rises rapidly compared to sound rising more slowly to the same level.

Investigations of fish behavior in relation to vessel noise (Olsen *et al.,* 1983; Ona, 1988; Ona and Godo, 1990) have shown that fish react when the sound from the engines and propeller exceeds a certain level. Avoidance reactions have been observed in fish such as cod and herring when vessels approached close enough that received sound levels are 110 dB to 130 dB (Nakken, 1992; Olsen, 1979; Ona and Godo, 1990; Ona and Toresen, 1988). However, other researchers have found that fish such as polar cod, herring, and capelin are often attracted to vessels (apparently by the noise) and swim toward the vessel (Rostad *et al.,* 2006). Typical sound source levels of vessel noise in the audible range for fish are 150 dB to 170 dB (Richardson *et al.,* 1995).

Carlson (1994), in a review of 40 years of studies concerning the use of underwater sound to deter salmonids from hazardous areas at hydroelectric dams and other facilities, concluded that salmonids were able to respond to low-frequency sound and to react to sound sources within a few feet of the source. He speculated that the reason that underwater sound had no effect on salmonids at distances greater than a few feet is because they react to water particle motion/acceleration, not sound pressures. Detectable particle motion is produced within very short distances of a sound source, although sound pressure waves travel farther.

Potential Impacts to the Benthic Environment

Apache's seismic survey requires the deployment of a submersible recording system in the inter-tidal and marine zones. An autonomous ''nodal'' (*i.e.,* no cables) system would be placed on the seafloor by specific vessels in lines parallel to each other with a node line spacing of 402 m (0.25 mi). Each nodal ''patch'' would have six to eight node lines parallel to each other. The lines generally run perpendicular to the shoreline. An entire patch would be placed on the seafloor prior to airgun activity. As the patches are surveyed, the node lines would be moved either side to side or inline to the next location. Placement and retrieval of the nodes may cause temporary and localized increases in turbidity on the seafloor. The substrate of Cook Inlet consists of glacial silt, clay, cobbles, pebbles, and sand (Sharma and Burrell, 1970). Sediments like sand and cobble dissipate quickly when suspended, but finer materials like clay and silt can create thicker plumes that may harm fish; however, the turbidity created by placing and removing nodes on the seafloor would settle to background levels within minutes after the cessation of activity.

In addition, seismic noise will radiate throughout the water column from airguns and pingers until it dissipates to background levels. No studies have demonstrated that seismic noise affects the life stages, condition, or amount of food resources (fish, invertebrates, eggs) used by marine mammals, except when exposed to sound levels within a few meters of the seismic source or in few very isolated cases. Where fish or invertebrates did respond to seismic noise, the effects were temporary and of short duration. Consequently, disturbance to fish species due to the activities associated with the seismic survey (*i.e,* placement and retrieval of nodes and noise from sound sources) would be short term and fish would be expected to return to their pre-disturbance behavior once seismic survey activities cease.

Based on the preceding discussion, the proposed activity is not expected to have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or their populations.

Proposed Mitigation

In order to issue an incidental take authorization (ITA) under section 101(a)(5)(A) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses (where relevant).

Mitigation Measures Proposed by Apache

For the proposed mitigation measures, Apache listed the following protocols to be implemented during its seismic survey program in Cook Inlet.

1. Operation of Mitigation Airgun at Night

Apache proposes to conduct both daytime and nighttime operations. Nighttime operations would be initiated only if a ''mitigation airgun'' (typically the 10 in^3) has been continuously operational from the time that PSO monitoring has ceased for the day. Seismic activity would not ramp up from an extended shut-down (*i.e.,* when the airgun has been down with no activity for at least 10 minutes) during nighttime operations, and survey activities would be suspended until the following day. At night, the vessel captain and crew would maintain lookout for marine mammals and would order the airgun(s) to be shut down if marine mammals are observed in or about to enter the established exclusion zones.

2. Exclusion and Disturbance Zones

Apache proposes to establish exclusion zones to avoid Level A harassment (''injury exclusion zone'') of all marine mammals and to avoid Level B harassment (''disturbance exclusion zone'') for groups of five or more killer whales or harbor porpoises detected within the designated zones. The injury exclusion zone will correspond to the area around the source within which received levels equal or exceed 180 dB re 1 μPa [rms] for cetaceans and 190 dB re 1 μPa [rms] for pinnipeds and Apache will shut down or power down operations if any marine mammals are seen approaching or entering this zone (more detail below). The disturbance exclusion zone will correspond to the area around the source within which received levels equal or exceed 160 dB re 1 μPa [rms] and Apache will implement power down and/or shutdown measures, as appropriate, if

any beluga whales or group of five or more killer whales or harbor porpoises are seen entering or approaching the disturbance exclusion zone.

3. Power Down and Shutdown Procedures

A power down is the immediate reduction in the number of operating energy sources from a full array firing to a mitigation airgun. A shutdown is the immediate cessation of firing of all energy sources. The arrays will be immediately powered down whenever a marine mammal is sighted approaching close to or within the applicable exclusion zone of the full arrays but is outside the applicable exclusion zone of the single source. If a marine mammal is sighted within the applicable exclusion zone of the single energy source, the entire array will be shutdown (*i.e.,* no sources firing). Following a power down or a shutdown, airgun activity will not resume until the marine mammal has clearly left the applicable injury or disturbance exclusion zone. The animal will be considered to have cleared the zone if it: (1) Is visually observed to have left the zone; (2) has not been seen within the zone for 15 minutes in the case of pinnipeds and small odontocetes; or (3) has not been seen within the zone for 30 minutes in the case of large odontocetes, including killer whales and belugas.

4. Ramp-Up Procedures

A ramp-up of an airgun array provides a gradual increase in sound levels, and involves a step-wise increase in the number and total volume of air guns firing until the full volume is achieved. The purpose of a ramp-up (or ''soft start'') is to ''warn'' cetaceans and pinnipeds in the vicinity of the airguns and to provide the time for them to leave the area and thus avoid any potential injury or impairment of their hearing abilities.

During the proposed seismic survey, the seismic operator will ramp up the airgun array slowly. NMFS proposes that the rate of ramp-up to be no more than 6 dB per 5-minute period. Ramp-up is used at the start of airgun operations, after a power- or shut-down, and after any period of greater than 10 minutes in duration without airgun operations (*i.e.,* extended shutdown).

A full ramp-up after a shutdown will not begin until there has been a minimum of 30 minutes of observation of the applicable exclusion zone by PSOs to assure that no marine mammals are present. The entire exclusion zone must be visible during the 30-minute lead-in to a full ramp up. If the entire exclusion zone is not visible, then ramp-up from a cold start cannot begin. If a marine mammal(s) is sighted within the injury exclusion zone during the 30-minute watch prior to ramp-up, ramp-up will be delayed until the marine mammal(s) is sighted outside of the zone or the animal(s) is not sighted for at least 15–30 minutes: 15 minutes for small odontocetes and pinnipeds (*e.g.* harbor porpoises, harbor seals, and Steller sea lions), or 30 minutes for large odontocetes (*e.g.,* killer whales and beluga whales).

5. Speed or Course Alteration

If a marine mammal is detected outside the Level A injury exclusion zone and, based on its position and the relative motion, is likely to enter that zone, the vessel's speed and/or direct course may, when practical and safe, be changed to also minimize the effect on the seismic program. This can be used in coordination with a power down procedure. The marine mammal activities and movements relative to the seismic and support vessels will be closely monitored to ensure that the marine mammal does not approach within the applicable exclusion radius. If the mammal appears likely to enter the exclusion radius, further mitigative actions will be taken, *i.e.,* either further course alterations, power down, or shut down of the airgun(s).

6. Measures for Beluga Whales and Groups of Killer Whales and Harbor Porpoises

The following additional protective measures for beluga whales and groups of five or more killer whales and harbor porpoises are proposed. Specifically, a 160-dB vessel monitoring zone would be established and monitored in Cook Inlet during all seismic surveys. If a beluga whale or groups of five or more killer whales and/or harbor porpoises are visually sighted approaching or within the 160-dB disturbance zone, survey activity would not commence until the animals are no longer present within the 160-dB disturbance zone. Whenever beluga whales or groups of five or more killer whales and/or harbor porpoises are detected approaching or within the 160-dB disturbance zone, the airguns may be powered down before the animal is within the 160-dB disturbance zone, as an alternative to a complete shutdown. If a power down is not sufficient, the sound source(s) shall be shut-down until the animals are no longer present within the 160-dB zone.

Additional Mitigation Measures Proposed by NMFS

In addition to the mitigation measures proposed by Apache, NMFS proposes implementation of the following mitigation measures.

Apache must not operate airguns within 10 miles (16 km) of the mean higher high water (MHHW) line of the Susitna Delta (Beluga River to the Little Susitna River) between April 15 and October 15. The purpose of this mitigation measure is to protect beluga whales in the designated critical habitat in this area that is important for beluga whale feeding and calving during the spring and fall months. The range of the setback required by NMFS was designated to protect this important habitat area and also to create an effective buffer where sound does not encroach on this habitat. This seasonal exclusion is proposed to be in effect from April 15–October 15. Activities can occur within this area from October 16–April 14.

The mitigation airgun will be operated at approximately one shot per minute, only during daylight and when there is good visibility, and will not be operated for longer than 3 hours in duration. In cases when the next start-up after the turn is expected to be during lowlight or low visibility, use of the mitigation airgun may be initiated 30 minutes before darkness or low visibility conditions occur and may be operated until the start of the next seismic acquisition line. The mitigation gun must still be operated at approximately one shot per minute.

NMFS proposes that Apache must suspend seismic operations if a live marine mammal stranding is reported in Cook Inlet coincident to, or within 72 hours of, seismic survey activities involving the use of airguns (regardless of any suspected cause of the stranding). The shutdown must occur if the animal is within a distance two times that of the 160 dB isopleth of the largest airgun array configuration in use. This distance was chosen to create an additional buffer beyond the distance at which animals would typically be considered harassed, as animals involved in a live stranding event are likely compromised, with potentially increased susceptibility to stressors, and the goal is to decrease the likelihood that they are further disturbed or impacted by the seismic survey, regardless of what the original cause of the stranding event was. Shutdown procedures will remain in effect until NMFS determines and advises Apache that all live animals involved in the stranding have left the

area (either of their own volition or following herding by responders).

Finally, NMFS proposes that if any marine mammal species are encountered, during seismic activities for which take is not authorized, that are likely to be exposed to sound pressure levels (SPLs) greater than or equal to 160 dB re 1 μPa (rms), then Apache must alter speed or course, power down or shut-down the sound source to avoid take of those species.

Mitigation Conclusions

NMFS has carefully evaluated Apache's proposed mitigation measures and considered a range of other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable adverse impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

- The manner in which, and the degree to which, the successful implementation of the measures are expected to minimize adverse impacts to marine mammals;
- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- The practicability of the measure for applicant implementation.

Any mitigation measure(s) prescribed by NMFS should be able to accomplish, have a reasonable likelihood of accomplishing (based on current science), or contribute to the accomplishment of one or more of the general goals listed below:

1. Avoidance or minimization of injury or death of marine mammals wherever possible (goals 2, 3, and 4 may contribute to this goal).

2. A reduction in the numbers of marine mammals (total number or number at biologically important time or location) exposed to received levels of seismic airguns, or other activities expected to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

3. A reduction in the number of times (total number or number at biologically important time or location) individuals would be exposed to received levels of seismic airguns or other activities expected to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

4. A reduction in the intensity of exposures (either total number or number at biologically important time or location) to received levels of seismic airguns or other activities expected to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing the severity of harassment takes only).

5. Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base, activities that block or limit passage to or from biologically important areas, permanent destruction of habitat, or temporary destruction/disturbance of habitat during a biologically important time.

6. For monitoring directly related to mitigation—an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable adverse impact on marine mammals species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed Monitoring and Reporting

In order to issue an ITA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth ''requirements pertaining to the monitoring and reporting of such taking''. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for ITAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area. Apache submitted information regarding marine mammal monitoring to be conducted during seismic operations as part of the proposed rule application. That information can be found in Sections 12 and 14 of the application. The monitoring measures may be modified or supplemented based on comments or new information received from the public during the public comment period.

Monitoring measures proposed by the applicant or prescribed by NMFS should contribute to or accomplish one or more of the following top-level goals:

1. An increase in our understanding of the likely occurrence of marine mammal species in the vicinity of the action, *i.e.,* presence, abundance, distribution, and/or density of species.

2. An increase in our understanding of the nature, scope, or context of the likely exposure of marine mammal species to any of the potential stressor(s) associated with the action (*e.g.* sound or visual stimuli), through better understanding of one or more of the following: the action itself and its environment (*e.g.* sound source characterization, propagation, and ambient noise levels); the affected species (*e.g.* life history or dive pattern); the likely co-occurrence of marine mammal species with the action (in whole or part) associated with specific adverse effects; and/or the likely biological or behavioral context of exposure to the stressor for the marine mammal (*e.g.* age class of exposed animals or known pupping, calving or feeding areas).

3. An increase in our understanding of how individual marine mammals respond (behaviorally or physiologically) to the specific stressors associated with the action (in specific contexts, where possible, *e.g.,* at what distance or received level).

4. An increase in our understanding of how anticipated individual responses, to individual stressors or anticipated combinations of stressors, may impact either: the long-term fitness and survival of an individual; or the population, species, or stock (*e.g.,* through effects on annual rates of recruitment or survival).

5. An increase in our understanding of how the activity affects marine mammal habitat, such as through effects on prey sources or acoustic habitat (*e.g.,* through characterization of longer-term contributions of multiple sound sources to rising ambient noise levels and assessment of the potential chronic effects on marine mammals).

6. An increase in understanding of the impacts of the activity on marine mammals in combination with the impacts of other anthropogenic activities or natural factors occurring in the region.

7. An increase in our understanding of the effectiveness of mitigation and monitoring measures.

8. An increase in the probability of detecting marine mammals (through improved technology or methodology), both specifically within the safety zone (thus allowing for more effective implementation of the mitigation) and in general, to better achieve the above goals.

Monitoring Results From Previously Authorized Activities

As noted earlier in this document, NMFS has issued three IHAs to Apache for this same proposed activity. No

seismic surveys were conducted under the IHA issued in February 2013 (became effective March 1, 2013). Apache conducted seismic operations under the first IHA issued in April 2012. Below is a summary of the results from the monitoring conducted in accordance with the April 2012 IHA.

Marine mammal monitoring was conducted in central Cook Inlet between May 6 and September 30, 2012, which resulted in a total of 6,912 hours of observations. Monitoring was conducted from the two seismic survey vessels, a mitigation/monitoring vessel, four land platforms, and an aerial platform (either a helicopter or small fixed wing aircraft). PSOs monitored from the seismic vessels, mitigation/monitoring vessel, and land platforms during all daytime seismic operations. Aerial overflights were conducted 1–2 times daily over the survey area and surrounding coastline, including the major river mouths, to monitor for larger concentrations of marine mammals in and around the survey site. Passive acoustic monitoring (PAM) took place from the mitigation/monitoring vessel during all nighttime seismic survey operations and most daytime seismic survey operations. During the entire 2012 survey season, Apache's PAM equipment yielded only six confirmed marine mammal detections, one of which was a Cook Inlet beluga whale.

Six identified species and three unidentified species of marine mammals were observed from the vessel, land, and aerial platforms between May 6 and September 30, 2012. The species observed included Cook Inlet beluga whales, harbor seals, harbor porpoises, Steller sea lions, gray whales, and California sea lions. PSOs also observed unidentified species, including a large cetacean, pinniped, and marine mammal. The gray whale and California sea lion were not included in the 2012 IHA, so mitigation measures were implemented for these species to prevent unauthorized takes. There were a total of 882 sightings and an estimated 5,232 individuals (the number of individuals is typically higher than the number of sightings because a single sighting may consist of multiple individuals). Harbor seals were the most frequently observed marine mammal at 563 sightings of approximately 3,471 individuals, followed by beluga whales with 151 sightings of approximately 1,463 individuals, harbor porpoises with 137 sightings of approximately 190 individuals, and gray whales with 9 sightings of 9 individuals. Steller sea lions were observed on three separate occasions (4 individuals), and two California sea lions were observed once. No killer whales were observed during seismic survey operations conducted under the 2012 IHA.

A total of 88 exclusion zone clearing delays, 154 shutdowns, 7 power downs, 23 shutdowns following a power down, and one speed and course alteration were implemented under the 2012 IHA. Exclusion zone clearing delays, shutdowns, and shutdowns following a power down occurred most frequently during harbor seal sightings (n=61, n=110, n=14, respectively), followed by harbor porpoise sightings (n=18, n=28, n=6, respectively), and then beluga whale sightings (n=5, n=6, n=3, respectively). Power downs occurred most frequently with harbor seal (n=3) and harbor porpoise (n=3) sightings. One speed and course alteration occurred in response to a beluga whale sighting.

Based on the information from the 2012 monitoring report, NMFS has determined that Apache complied with the conditions of the 2012 IHA, and we conclude that these results support our original findings that the mitigation measures set forth in the 2012 Authorization effected the least practicable impact on the species or stocks.

Although Apache did not conduct any seismic survey operations under the 2013 IHA, they still conducted marine mammal monitoring surveys between May and August 2013. During those aerial surveys, Apache detected a total of three marine mammal species: beluga whale; harbor porpoise; and harbor seal. A total of 718 individual belugas, three harbor porpoises, and 919 harbor seals were sighted. Of the 718 observed belugas, 61 were calves. All of the calf sightings occurred in the Susitna Delta area, with the exception of a couple south of the Beluga River and a couple in Turnagain Arm. More than 60 percent of the beluga calf sightings occurred in June (n=39).

Proposed Monitoring Measures

1. Visual Vessel-Based Monitoring

Vessel-based monitoring for marine mammals would be done by experienced PSOs throughout the period of marine survey activities. PSOs would monitor the occurrence and behavior of marine mammals near the survey vessel during all daylight periods (nautical dawn to nautical dusk) during operation and during most daylight periods when airgun operations are not occurring. PSO duties would include watching for and identifying marine mammals, recording their numbers, distances, and reactions to the survey operations, and documenting ''take by harassment'' as defined by NMFS.

A minimum number of six PSOs (two per source vessel and two per support vessel) would be required onboard the survey vessel to meet the following criteria: (1) 100 percent monitoring coverage during all periods of survey operations in daylight (nautical twilight-dawn to nautical twilight-dusk; (2) maximum of 4 consecutive hours on watch per PSO; and (3) maximum of 12 hours of watch time per day per PSO.

PSO teams would consist of NMFS-approved field biologists. An experienced field crew leader would supervise the PSO team onboard the survey vessel. Apache currently plans to have PSOs aboard three vessels: the two source vessels (*M/V Peregrine Falcon* and *M/V Arctic Wolf*) and one support vessel (*M/V Dreamcatcher*). Two PSOs would be on the source vessels, and two PSOs would be on the support vessel to observe and implement the exclusion, power down, and shut down areas. When marine mammals are about to enter or are sighted within designated harassment and exclusion zones, airgun or pinger operations would be powered down (when applicable) or shut down immediately. The vessel-based observers would watch for marine mammals during all periods when sound sources are in operation and for a minimum of 30 minutes prior to the start of airgun or pinger operations after an extended shut down.

Crew leaders and most other biologists serving as observers would be individuals with experience as observers during seismic surveys in Alaska or other areas in recent years.

The observer(s) would watch for marine mammals from the best available vantage point on the source and support vessels, typically the flying bridge. The observer(s) would scan systematically with the unaided eye and 7×50 reticle binoculars. Laser range finders would be available to assist with estimating distance on the two source vessels. Personnel on the bridge would assist the observer(s) in watching for marine mammals.

All observations would be recorded in a standardized format. Data would be entered into a custom database using a notebook computer. The accuracy of the data would be verified by computerized validity data checks as the data are entered and by subsequent manual checks of the database. These procedures would allow for initial summaries of the data to be prepared during and shortly after the completion of the field program, and would facilitate transfer of the data to statistical, geographical, or other

programs for future processing and achieving. When a mammal sighting is made, the following information about the sighting would be recorded:

- Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from the PSO, apparent reaction to activities (*e.g.,* none, avoidance, approach, paralleling, etc.), closest point of approach, and behavioral pace;
- Time, location, speed, activity of the vessel (*e.g.,* seismic airguns off, pingers on, etc.), sea state, ice cover, visibility, and sun glare; and
- The positions of other vessel(s) in the vicinity of the PSO location.

The ship's position, speed of support vessels, and water temperature, water depth, sea state, ice cover, visibility, and sun glare would also be recorded at the start and end of each observation watch, every 30 minutes during a watch, and whenever there is a change in any of those variables.

2. Visual Shore-Based Monitoring

In addition to the vessel-based PSOs, Apache proposes to utilize a shore-based station daily, to visually monitor for marine mammals. The location of the shore-based station would need to be sufficiently high to observe marine mammals; the PSOs would be equipped with pedestal mounted ''big eye'' (20x110) binoculars. The shore-based PSOs would scan the area prior to, during, and after the airgun operations and would be in contact with the vessel-based PSOs via radio to communicate sightings of marine mammals approaching or within the project area. This communication will allow the vessel-based observers to go on a ''heightened'' state of alert regarding occurrence of marine mammals in the area and aid in timely implementation of mitigation measures.

3. Aerial-Based Monitoring

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

Weather and safety permitting, aerial surveys would fly at an altitude of 305 m (1,000 ft). In the event of a marine mammal sighting, aircraft would attempt to maintain a radial distance of 457 m (1,500 ft) from the marine mammal(s). Aircraft would avoid approaching marine mammals from head-on, flying over or passing the shadow of the aircraft over the marine mammal(s). By following these operational requirements, aerial surveys are not expected to harass marine mammals (Richardson *et al.,* 1995; Blackwell *et al.,* 2002).

Based on data collected from Apache during its survey operations conducted under the April 2012 and March 2014 IHAs, NMFS determined that the foregoing monitoring measures will allow Apache to identify animals nearing or entering the Level B disturbance exclusion zone with a reasonably high degree of accuracy.

Reporting Measures

Immediate reports will be submitted to NMFS if 25 belugas are detected in the Level B disturbance exclusion zone to evaluate and make necessary adjustments to monitoring and mitigation. If the number of detected takes for any marine mammal species is met or exceeded, Apache will immediately cease survey operations involving the use of active sound sources (*e.g.,* airguns and pingers) and notify NMFS.

1. Weekly Reports

Apache would submit a weekly field report to NMFS Headquarters as well as the Alaska Regional Office, no later than close of business each Thursday during the weeks when in-water seismic survey activities take place. The weekly field reports would summarize species detected (number, location, distance from seismic vessel, behavior), in-water activity occurring at the time of the sighting (discharge volume of array at time of sighting, seismic activity at time of sighting, visual plots of sightings, and number of power downs and shutdowns), behavioral reactions to in-water activities, and the number of marine mammals exposed.

2. Monthly Reports

Monthly reports will be submitted to NMFS for all months during which in-water seismic activities take place. The monthly report will contain and summarize the following information:

- 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.
- Species, number, location, distance from the vessel, and behavior of any sighted marine mammals, as well as associated seismic activity (number of power-downs and shutdowns), observed throughout all monitoring activities.
- An estimate of the number (by species) of: (i) Pinnipeds that have been exposed to the seismic activity (based on visual observation) at received levels greater than or equal to 160 dB re 1 µPa (rms) and/or 190 dB re 1 µPa (rms) with a discussion of any specific behaviors those individuals exhibited; and (ii) cetaceans that have been exposed to the seismic activity (based on visual observation) at received levels greater than or equal to 160 dB re 1 µPa (rms) and/or 180 dB re 1 µPa (rms) with a discussion of any specific behaviors those individuals exhibited.
- A description of the implementation and effectiveness of the: (i) terms and conditions of the Biological Opinion's Incidental Take Statement (ITS); and (ii) mitigation measures of the LOA. For the Biological Opinion, the report shall confirm the implementation of each Term and Condition, as well as any conservation recommendations, and describe their effectiveness for minimizing the adverse effects of the action on ESA-listed marine mammals.

3. Annual Reports

Apache would submit an annual report to NMFS's Permits and Conservation Division within 90 days after the end of every operating season but no later than 60 days before the expiration of each annual LOA during the five-year period. The annual report would include:

- Summaries of monitoring effort (*e.g.,* total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals).
- Analyses of the effects of various factors influencing detectability of marine mammals (*e.g.,* sea state, number of observers, and fog/glare).
- Species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover.
- Analyses of the effects of survey operations.
- Sighting rates of marine mammals during periods with and without

seismic survey activities (and other variables that could affect detectability), such as: (i) Initial sighting distances versus survey activity state; (ii) closest point of approach versus survey activity state; (iii) observed behaviors and types of movements versus survey activity state; (iv) numbers of sightings/individuals seen versus survey activity state; (v) distribution around the source vessels versus survey activity state; and (vi) numbers of animals detected in the 160 dB harassment (disturbance exclusion) zone.

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

4. Notification of Injured or Dead Marine Mammals

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

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

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

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

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

Estimated Take by Incidental Harassment

Except with respect to certain activities not pertinent here, the MMPA defines ''harassment'' as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) 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]. Only take by Level B behavioral harassment is anticipated as a result of the proposed seismic survey program with proposed mitigation. Anticipated impacts to marine mammals are associated with noise propagation from the sound sources (*e.g.,* airguns and pingers) used in the seismic survey; no take is expected to result from the detonation of explosives onshore, as supported by the SSV study, from vessel strikes because of the slow speed of the vessels (2–4 knots), or from aircraft overflights, as surveys will be flown at a minimum altitude of 305 m (1,000 ft) and at 457 m (1,500 ft) when marine mammals are detected.

Apache requests authorization to take six marine mammal species by Level B harassment. These six marine mammal species are: Cook Inlet beluga whale; killer whale; harbor porpoise; gray whale; harbor seal; and Steller sea lion.

For impulse sounds, such as those produced by airgun(s) used in the seismic survey, NMFS uses the 160 dB re 1 μPa (rms) isopleth to indicate the onset of Level B harassment. The current Level A (injury) harassment threshold is 180 dB (rms) for cetaceans and 190 dB (rms) for pinnipeds. The NMFS annual aerial survey data provided in Table 5 of Apache's application was used to derive density estimates for each species (number of individuals/km^2).

Applicable Zones for Estimating ''Take by Harassment''

To estimate potential takes by Level B harassment for this proposed rule, as well as for mitigation radii to be implemented by PSOs, ranges to the 160 dB (rms) isopleths were estimated at three different water depths (5 m, 25 m, and 45 m) for nearshore surveys and at 80 m for channel surveys. The distances to this threshold for the nearshore survey locations are provided in Table 2 in Apache's application and correspond to the three transects modeled at each site in the onshore, nearshore, and parallel to shore directions. To estimate take by Level B harassment, Apache used the largest value from each category. The distances to the thresholds for the channel survey locations are provided in Table 4 in Apache's application and correspond to the broadside and endfire directions. The areas ensonified to the 160 dB isopleth for the nearshore survey are provided in Table 3 in Apache's application. The area ensonified to the 160 dB isopleth for the channel survey is 517 km^2.

Compared to the airguns, the relevant isopleths for the positioning pinger is quite small. The distances to the 190, 180, and 160 dB (rms) isopleths are 1 m, 3 m, and 25 m (3.3, 10, and 82 ft), respectively.

Estimates of Marine Mammal Density

Apache used one method to estimate densities for Cook Inlet beluga whales and another method for the other marine mammals in the area expected to be taken by harassment. Both methods are described in this document.

1. Beluga Whale Density Estimates

In consultation with staff from NMFS's National Marine Mammal Laboratory (NMML) during development of the second IHA in early 2013, Apache used a habitat-based model developed by Goetz *et al.* (2012a). Information from that model has once again been used to estimate densities of beluga whales in Cook Inlet and we consider it to be the best available information on beluga density. A summary of the model is provided here, and additional detail can be found in Goetz *et al.* (2012a). To develop NMML's estimated densities of belugas, Goetz et al. (2012a) developed a model based on aerial survey data, depth soundings, coastal substrate type, environmental sensitivity index, anthropogenic disturbance, and anadromous fish streams to predict beluga densities throughout Cook Inlet. The result of this work is a beluga density map of Cook Inlet, which easily sums the belugas predicted within a given geographic area. NMML developed its predictive habitat model from the distribution and group size of beluga whales observed between 1994 and 2008. A 2-part ''hurdle'' model (a hurdle model in which there are two processes, one generating the zeroes and one generating the positive values) was applied to describe the physical and anthropogenic factors that influence (1) beluga presence (mixed model logistic regression) and (2) beluga count data (mixed model Poisson regression). Beluga presence was negatively associated with sources of anthropogenic disturbance and positively associated with fish availability and access to tidal flats and sandy substrates. Beluga group size was positively associated with tidal flats and proxies for seasonally available fish. Using this analysis, Goetz *et al.* (2012) produced habitat maps for beluga presence, group size, and the expected number of belugas in each 1 km^2 cell of Cook Inlet. The habitat-based model developed by NMML uses a Geographic Information System (GIS). A GIS is a computer system capable of capturing, storing, analyzing, and displaying geographically referenced information; that is, data identified according to location. However, the Goetz *et al.* (2012) model does not incorporate seasonality into the density estimates. Rather, Apache factors in seasonal considerations of beluga density into the design of the survey tracklines and locations (as discussion in more detail later in this document) in addition to other factors such as weather, ice conditions, and seismic needs.

2. Non-beluga Whale Species Density Estimates

Densities of other marine mammals in the proposed project area were estimated from the annual aerial surveys conducted by NMFS for Cook Inlet beluga whale between 2000 and 2012 in June (Rugh *et al.,* 2000, 2001, 2002, 2003, 2004b, 2005b, 2006, 2007; Shelden *et al.,* 2008, 2009, 2010, 2012; Hobbs *et al.,* 2011). These surveys were flown in June to collect abundance data of beluga whales, but sightings of other marine mammals were also reported. Although these data were only collected in one month each year, these surveys provide the best available relatively long term data set for sighting information in the proposed project area. The general trend in marine mammal sighting is that beluga whales and harbor seals are seen most frequently in upper Cook Inlet, with higher concentrations of harbor seals near haul out sites on Kalgin Island and of beluga whales near river mouths, particularly the Susitna River. The other marine mammals of interest for this rule (killer whales, gray whales, harbor porpoises, Steller sea lions) are observed infrequently in upper Cook Inlet and more commonly in lower Cook Inlet. In addition, these densities are calculated based on a relatively large area that was surveyed, much larger than the proposed area for a given year of seismic data acquisition. Furthermore, these annual aerial surveys are conducted only in June (numbers from August surveys were not used because the area surveyed was not provided), so it does not account for seasonal variations in distribution or habitat use of each species.

Table 5 in Apache's application provides a summary of the results of each annual NMFS aerial survey conducted in June from 2000 to 2012. The total number of individuals sighted for each survey by year is reported, as well as total hours for the entire survey and total area surveyed. To estimate density of marine mammals, total number of individuals (other species) observed for the entire survey area by year (surveys usually last several days) was divided by the approximate total area surveyed for each year (density = individuals/km^2). As noted previously, the total number of animals observed for the entire survey includes both lower and upper Cook Inlet, so the total number reported and used to calculate density is higher than the number of marine mammals anticipated to be observed in the project area. In particular, the total number of harbor seals observed on several surveys is very high due to several large haul outs in lower and middle Cook Inlet. The table below (Table 2) provides average density estimates for gray whales, harbor seals, harbor porpoises, killer whales, and Steller sea lions over the 2000–2012 period.

TABLE 2—ANIMAL DENSITIES IN COOK INLET

Species	Average density (animals/km^2)
Gray whale	5.33E–05
Harbor seal	0.24931
Harbor porpoise	0.003895
Killer whale	0.000748
Steller sea lion	0.008281

Calculation of Takes by Harassment

1. Beluga Whales

As a result of discussions with NMFS, Apache has used the NMML model (Goetz et al., 2012a) for the estimate of takes in this proposed rule. Apache has established two zones (Zone 1 and Zone 2) and proposes to conduct seismic surveys within all, or part of these zones; to be determined as weather, ice, and priorities dictate.

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Figure 2: A map of Apache survey area divided into Zone 1 and Zone 2

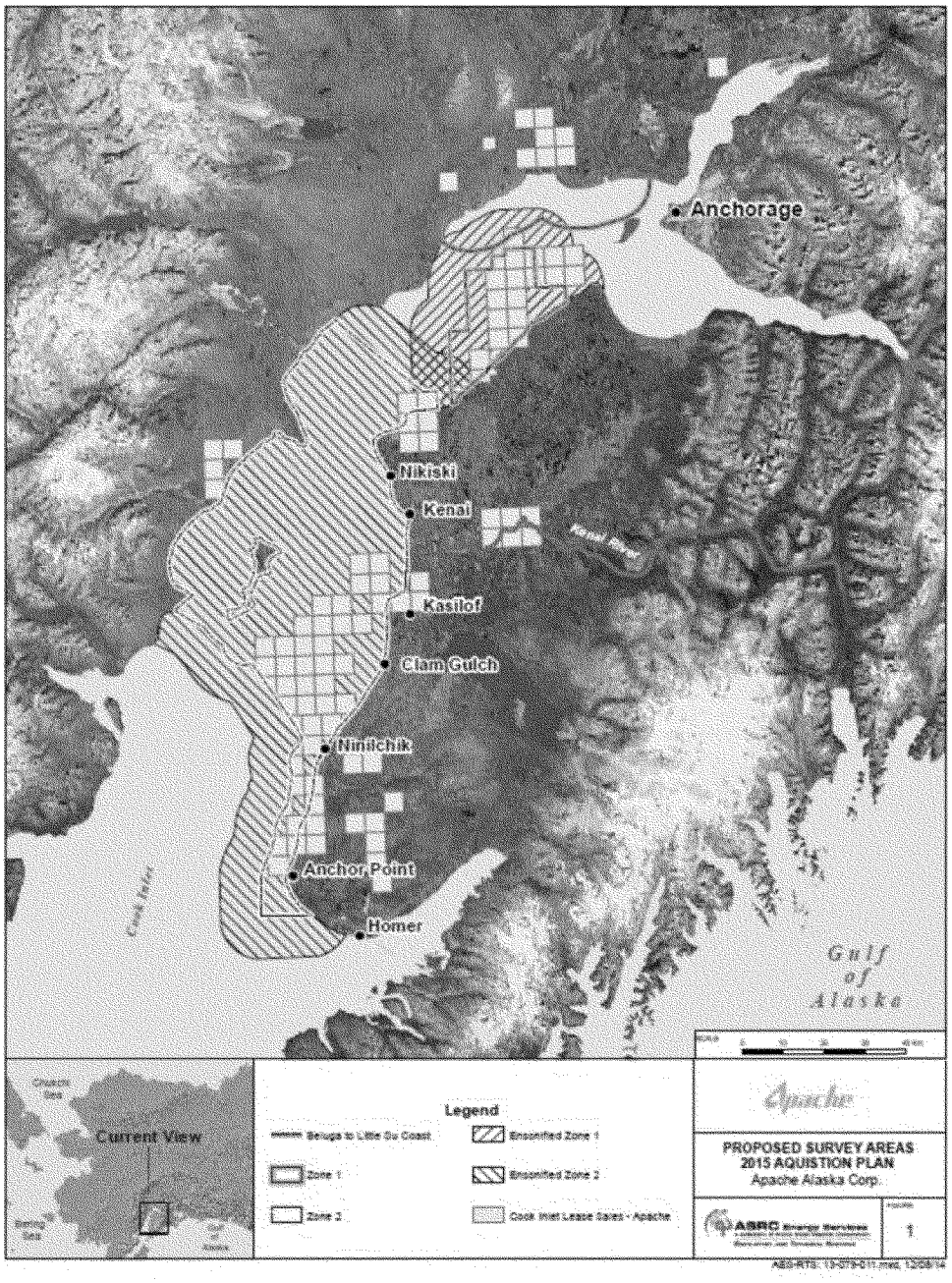

Figure 2: A map of Apache survey area divided into Zone 1 and Zone 2

Based on information using Goetz *et al.* model (2012a), Apache derived one density estimate for beluga whales in Upper Cook Inlet (*i.e.,* north of the Forelands) and another density estimate for beluga whales in Lower Cook Inlet (*i.e.,* south of the Forelands). The density estimate for Upper Cook Inlet is 0.0212 and is 0.0056 for Lower Cook Inlet. Apache's annual seismic operational area would be determined as weather, ice, and priorities dictate. Apache has requested a maximum allowed take for Cook Inlet beluga whales of 30 individuals. During each annual LOA (if issued), Apache would operate in a portion of the total seismic operation area of 5,684 km^2 (2,195 mi^2), such that when one multiplies the anticipated beluga whale density based on the seismic survey operational area times the area to be ensonified to the 160-dB isopleth of 9.5 km (5.9 mi), estimated takes will not exceed 30 beluga whales in a given year

In order to estimate when that level is reached, Apache has developed a formula based on the total area of each seismic survey project zone (including the 160 dB buffer) and the average density of beluga whales for each zone.

TABLE 3—EXPECTED BELUGA WHALE TAKES, TOTAL AREA OF ZONE, AND AVERAGE BELUGA WHALE DENSITY ESTIMATES

	Expected Beluga takes from NMML model (including the 160 dB buffer)	Total area of zone (km^2) (including the 160 dB buffer)	Average take density (dx)
Zone 1	28	1319	d1 = 0.0212
Zone 2	29	5160	d2 = 0.0056

Apache will limit surveying in the proposed seismic survey area (Zones 1 and 2 presented in Figure 2 of Apache's application) to ensure a maximum of 30 beluga takes during each open water season. In order to ensure that Apache does not exceed 30 beluga whale takes, Apache developed the following equation:

$$\text{Equation 1: } d_1A_1 + d_2A_2 \leq 30 \text{ Beluga Takes}$$

$$* \ d_x = \frac{\text{Expected Beluga Takes from the NMML model in Zone X}}{\text{Total Area of Zone X including 160 dB buffer}}$$

$$* \ A_x = \text{Actual Area Surveyed } (km^2) \text{ including 160 dB buffer in Zone X}$$

This formula also allows Apache to have flexibility to prioritize survey locations in response to local weather, ice, and operational constraints. Apache may choose to survey portions of a zone or a zone in its entirety, and the analysis in this proposed rule takes this into account. For the 2015 season, Apache is proposing to survey the same area that was authorized in 2014, which uses the same delineation of Zone 1 and Zone 2 as the previous IHA. Using this formula, if Apache surveys the entire area of Zone 1 (1,319 km^2), then essentially none of Zone 2 will be surveyed because the input in the calculation denoted by d_2A_2 would essentially need to be zero to ensure that the total allotted proposed take of beluga whales is not exceeded. The use of this formula will ensure that Apache's proposed seismic program, including the 160 dB buffer, will not exceed 30 calculated beluga takes.

Apache proposes to initially limit actual survey areas, including 160 dB buffer zones, to satisfy the formula denoted here. Operations are required to cease once Apache has conducted seismic data acquisition in an area where multiplying the applicable density by the total ensonified area out to the 160-dB isopleth equaled 30 beluga whales, using the equation provided above.

2. Other Marine Mammal Species

The estimated number of other Cook Inlet marine mammals that may be potentially harassed during the seismic surveys was calculated by multiplying the average density estimates (presented in Table 2 in this document) by the area ensonified by levels ≥160 dB re μPa rms (see Appendix C and Appendix D in Apache's application for more information).

Apache anticipates that a crew will collect seismic data for 8–12 hours per day over approximately 160 days over the course of 8 to 9 months each year. It is assumed that over the course of these 160 days, 100 days would be working in the offshore region and 60 days in the shallow, intermediate, and deep nearshore region. Of those 60 days in the nearshore region, 20 days would be in each depth. It is important to note that environmental conditions (such as ice, wind, fog) will play a significant role in the actual operating days; therefore, these estimates are conservative in order to provide a basis for probability of encountering these marine mammal species in the project area.

NMFS calculated the number of potential exposure instances for each non-beluga species using the density information derived from NMFS aerial surveys conducted from 2000–2012. These animal densities were multiplied by the number of days in each water depth (shallow, intermediate, deep, or offshore) as well as the estimated ensonified area per day for each water depth. This method is likely an overestimation of take as it represents every possible instance of take, without allowing for repeated take of individuals, which is possible with resident species.

The number of estimated takes by harassment was calculated using the total ensonified area of 7,096km^2 for the proposed survey area. This area was multiplied by a contingency factor of 25% to account for any necessary repeats of tracklines.

Total ensonified project area (7,096km^2) + 25% of total area = 8,870km^2

This total area was multiplied by the average density that was calculated for each species in the area (Table 2 in this document). As this estimation method does not account for any new animals transiting in and out of the project area, the calculated value was then multiplied by a turnover factor. The turnover factor is a value assigned by species that accounts for movement of new animals into the survey area. The assigned turnover estimates are based on estimates derived by Wood et al. 2012 in a density estimation for a 3D seismic survey environmental impact report. The turnover estimates range from 1 to 2.5, with a turnover factor of 1 assigned to residential species and 2.5 assigned to transitory species.

Table 3 below outlines the calculation of encounter probabilities for non-beluga species and how they were calculated.

TABLE 4—ENCOUNTER PROBABILITY OF NON-BELUGA SPECIES PER SEASON

Species	Density estimate (individuals/ km2)	Exposure instances	Ensonified area (km^2)	Ensonified area with contingency factor (km^2)	Turnover factor	Exposure estimate (individuals)
Gray whale	5.33E–05	4.6	7096	8870	2.5	1.2
Harbor seal	0.24931	21,435.7	7096	8870	1	2211.4
Harbor porpoise	0.003895	334.9	7096	8870	1	34.5
Killer whale	0.000748	64.3	7096	8870	1.25	8.3
Steller sea lion	0.008281	712.0	7096	8870	1	73.5

Summary of Proposed Level B Harassment Takes

Table 4 here outlines the density estimates used to estimate Level B harassment takes, the requested Level B harassment take levels, the abundance of each species in Cook Inlet, the percentage of each species or stock estimated to be taken, and current population trends.

TABLE 5—DENSITY ESTIMATES, PROPOSED LEVEL B HARASSMENT TAKE LEVELS, SPECIES OR STOCK ABUNDANCE, PERCENTAGE OF POPULATION PROPOSED TO BE TAKEN, AND SPECIES TREND STATUS

Species	Average density (#individuals/ km^2)	Proposed level B take	Abundance	Percentage of population	Trend
Beluga Whale	Upper = 0.0212 Lower = 0.0056	30	312	9.6	Decreasing
Harbor Seal	0.24931	2,211	22,900	9.7	Stable
Harbor Porpoise	0.003895	35	31,046	0.11	No reliable information
Killer Whale	0.000748	8	1,123 (resident)	0.71	Resident stock possibly increasing
			345 (transient)	2.31	Transient stock stable
Steller Sea Lion	0.008281	73	79,300	0.09	Decreasing but with regional variability (some stable or increasing)
Gray Whale	5.33E–05	1	19,126	0.005	Stable/increasing

The following table applies the proposed Level B harassment take levels from Table 4 and expands them to a 5 year timeline, spanning the entire duration of the proposed rule.

TABLE 6—PROPOSED LEVEL B HARASSMENT TAKE LEVELS FOR 5 YEAR PERIOD

Species	Annual proposed level B take	Project total (5 Year) level B take
Beluga Whale	30	150
Harbor Seal	2,211	11,055
Harbor Porpoise	35	175
Killer Whale	8	40
Steller Sea Lion	73	365
Gray Whale	1	5

Analysis and Preliminary Determinations

Negligible Impact

Negligible impact is ''an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival'' (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.,* population-level effects). An estimate of the number of Level B harassment takes, alone, is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be ''taken'' through behavioral harassment, NMFS must consider other factors, such as the likely nature of any responses (their intensity, duration, etc.), the context of any responses (critical reproductive time or location, feeding, migration, etc.), as well as the number and nature of estimated Level A harassment takes, the number of estimated mortalities, effects on habitat, and the status of the species.

Given the proposed mitigation and related monitoring, no injuries or

mortalities are anticipated to occur as a result of Apache's proposed seismic survey in Cook Inlet, and none are proposed to be authorized. Additionally, animals in the area are not expected to incur hearing impairment (*i.e.,* TTS or PTS) or non-auditory physiological effects. The number of takes that are anticipated and proposed to be authorized are expected to be limited to short-term Level B behavioral harassment. The seismic airguns do not operate continuously over a 24-hour period. Rather airguns are operational for a few hours at a time totaling about 12 hours a day.

Both Cook Inlet beluga whales and the western stock of Steller sea lions are listed as endangered under the ESA. Both stocks are also considered depleted under the MMPA. The estimated annual rate of decline for Cook Inlet beluga whales was 0.6 percent between 2002 and 2012. Steller sea lion trends for the western stock are variable throughout the region with some decreasing and others remaining stable or even indicating slight increases. The other four species that may be taken by harassment during Apache's proposed seismic survey program are not listed as threatened or endangered under the ESA nor as depleted under the MMPA.

Odontocete (including Cook Inlet beluga whales, killer whales, and harbor porpoises) reactions to seismic energy pulses are usually assumed to be limited to shorter distances from the airgun(s) than are those of mysticetes, in part because odontocete low-frequency hearing is assumed to be less sensitive than that of mysticetes. When in the Canadian Beaufort Sea in summer, belugas appear to be fairly responsive to seismic energy, with few being sighted within 10–20 km (6–12 mi) of seismic vessels during aerial surveys (Miller *et al.,* 2005). However, as noted above, Cook Inlet belugas are more accustomed to anthropogenic sound than beluga whales in the Beaufort Sea. Therefore, the results from the Beaufort Sea surveys do not directly relate to potential reactions of Cook Inlet beluga whales. Also, due to the dispersed distribution of beluga whales in Cook Inlet during winter and the concentration of beluga whales in upper Cook Inlet from late April through early fall, belugas would likely occur in small numbers in the majority of Apache's proposed survey area during the majority of Apache's annual operational timeframe of March through December. For the same reason, it is unlikely that animals would be exposed to received levels capable of causing injury.

Taking into account the mitigation measures that are planned, effects on cetaceans are generally expected to be restricted to avoidance of a limited area around the survey operation and short-term changes in behavior, falling within the MMPA definition of ''Level B harassment''. Animals are not expected to permanently abandon any area that is surveyed, and any behaviors that are interrupted during the activity are expected to resume once the activity ceases. Only a small portion of marine mammal habitat will be affected at any time, and other areas within Cook Inlet will be available for necessary biological functions. In addition, NMFS proposes to seasonally restrict seismic survey operations in locations known to be important for beluga whale feeding, calving, or nursing. The primary location for these biological life functions occur in the Susitna Delta region of upper Cook Inlet. NMFS proposes to implement a 16 km (10 mi) seasonal exclusion from seismic survey operations in this region from April 15-October 15. The highest concentrations of belugas are typically found in this area from early May through September each year. NMFS has incorporated a 2-week buffer on each end of this seasonal use timeframe to account for any anomalies in distribution and marine mammal usage.

Mitigation measures such as controlled vessel speed, dedicated marine mammal observers, non-pursuit, and shutdowns or power downs when marine mammals are seen within defined ranges designed both to avoid injury and disturbance will further reduce short-term reactions and minimize any effects on hearing sensitivity. In all cases, the effects of the seismic survey are expected to be short-term, with no lasting biological consequence. Therefore, the exposure of cetaceans to sounds produced by Apache's proposed seismic survey operation is not anticipated to have an effect on annual rates of recruitment or survival of the affected species or stocks.

Some individual pinnipeds may be exposed to sound from the proposed seismic surveys more than once during the timeframe of the project. Taking into account the mitigation measures that are planned, effects on pinnipeds are generally expected to be restricted to avoidance of a limited area around the survey operation and short-term changes in behavior, falling within the MMPA definition of ''Level B harassment''. Animals are not expected to permanently abandon any area that is surveyed, and any behaviors that are interrupted during the activity are expected to resume once the activity ceases. Only a small portion of pinniped habitat will be affected at any time, and other areas within Cook Inlet will be available for necessary biological functions. In addition, the area where the survey will take place is not known to be an important location where pinnipeds haul out. The closest known haul-out site is located on Kalgin Island, which is about 22 km from the McArther River. More recently, some large congregations of harbor seals have been observed hauling out in upper Cook Inlet. However, mitigation measures and restrictions will be implemented to help reduce impacts to the animals. Therefore, the exposure of pinnipeds to sounds produced by this phase of Apache's proposed seismic survey is not anticipated to have an effect on annual rates of recruitment or survival on those species or stocks.

The addition of nine vessels, and noise due to vessel operations associated with the seismic survey, would not be outside the present experience of marine mammals in Cook Inlet, although levels may increase locally. Given the large number of vessels in Cook Inlet and the apparent habituation to vessels by Cook Inlet beluga whales and the other marine mammals that may occur in the area, vessel activity and noise is not expected to have effects that could cause significant or long-term consequences for individual marine mammals or their populations.

Potential impacts to marine mammal habitat were discussed previously in this document (see the ''Anticipated Effects on Habitat'' section). Although some disturbance is possible to food sources of marine mammals, the impacts are anticipated to be minor enough as to not affect annual rates of recruitment or survival of marine mammals in the area. Based on the size of Cook Inlet where feeding by marine mammals occurs versus the localized area of the marine survey activities, any missed feeding opportunities in the direct project area would be minor based on the fact that other feeding areas exist elsewhere. Additionally, seismic survey operations will not occur in the primary beluga feeding and calving habitat during times of high use by those animals.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total annual marine mammal take from Apache's proposed seismic survey will have a negligible impact on

the affected marine mammal species or stocks.

Small Numbers

The requested takes proposed to be authorized annually represent 9.6 percent of the Cook Inlet beluga whale population of approximately 312 animals (Allen and Angliss, 2014), 0.71 percent of the Alaska resident stock and 2.31 percent of the Gulf of Alaska, Aleutian Island and Bering Sea stock of killer whales (1,123 residents and 345 transients), 0.11 percent of the Gulf of Alaska stock of approximately 31,046 harbor porpoises, and 0.005 percent of the eastern North Pacific stock of approximately 19,126 gray whales. The take requests presented for harbor seals represent 9.7 percent of the Cook Inlet/Shelikof stock of approximately 22,900 animals. The requested takes proposed for Steller sea lions represent 0.09 percent of the western stock of approximately 79,300 animals. These take estimates represent the percentage of each species or stock that could be taken by Level B behavioral harassment.

NMFS finds that any incidental take reasonably likely to result annually from the effects of the proposed activities, as proposed to be mitigated through this rulemaking and LOA process, will be limited to small numbers of the affected species or stock. In addition to the quantitative methods used to estimate take, NMFS also considered qualitative factors that further support the ''small numbers'' determination, including: (1) The seasonal distribution and habitat use patterns of Cook Inlet beluga whales, which suggest that for much of the time only a small portion of the population would be accessible to impacts from Apache's activity, as most animals are found in the Susitna Delta region of Upper Cook Inlet from early May through September; (2) other cetacean species and Steller sea lions are not common in the seismic survey area; (3) the proposed mitigation requirements, which provide spatio-temporal limitations that avoid impacts to large numbers of belugas feeding and calving in the Susitna Delta and limit exposures to sound levels associated with Level B harassment; (4) the proposed monitoring requirements and mitigation measures described earlier in this document for all marine mammal species that will further reduce impacts and the amount of takes; and (5) monitoring results from previous activities that indicated low numbers of beluga whale sightings within the Level B disturbance exclusion zone and low levels of Level B harassment takes of other marine mammals. Therefore, NMFS determined that the numbers of animals likely to be taken is small.

Impact on Availability of Affected Species for Taking for Subsistence Uses

Relevant Subsistence Uses

The subsistence harvest of marine mammals transcends the nutritional and economic values attributed to the animal and is an integral part of the cultural identity of the region's Alaska Native communities. Inedible parts of the whale provide Native artisans with materials for cultural handicrafts, and the hunting itself perpetuates Native traditions by transmitting traditional skills and knowledge to younger generations (NOAA, 2007).

The Cook Inlet beluga whale has traditionally been hunted by Alaska Natives for subsistence purposes. For several decades prior to the 1980s, the Native Village of Tyonek residents were the primary subsistence hunters of Cook Inlet beluga whales. During the 1980s and 1990s, Alaska Natives from villages in the western, northwestern, and North Slope regions of Alaska either moved to or visited the south central region and participated in the yearly subsistence harvest (Stanek, 1994). From 1994 to 1998, NMFS estimated 65 whales per year (range 21–123) were taken in this harvest, including those successfully taken for food and those struck and lost. NMFS has concluded that this number is high enough to account for the estimated 14 percent annual decline in the population during this time (Hobbs *et al.,* 2008). Actual mortality may have been higher, given the difficulty of estimating the number of whales struck and lost during the hunts. In 1999, a moratorium was enacted (Public Law 106–31) prohibiting the subsistence take of Cook Inlet beluga whales except through a cooperative agreement between NMFS and the affected Alaska Native organizations. Since the Cook Inlet beluga whale harvest was regulated in 1999 requiring cooperative agreements, five beluga whales have been struck and harvested. Those beluga whales were harvested in 2001 (one animal), 2002 (one animal), 2003 (one animal), and 2005 (two animals). The Native Village of Tyonek agreed not to hunt or request a hunt in 2007, when no co-management agreement was to be signed (NMFS, 2008a).

On October 15, 2008, NMFS published a final rule that established long-term harvest limits on the Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibits harvest for a 5-year period (2008–2012), if the average abundance for the Cook Inlet beluga whales from the prior five years (2003–2007) is below 350 whales. The next 5-year period that could allow for a harvest (2013–2017), would require the previous five-year average (2008–2012) to be above 350 whales. The 2008 Cook Inlet Beluga Whale Subsistence Harvest Final Supplemental Environmental Impact Statement (NMFS, 2008a) authorizes how many beluga whales can be taken during a 5-year interval based on the 5-year population estimates and 10-year measure of the population growth rate. Based on the 2008–2012 5-year abundance estimates, no hunt occurred between 2008 and 2012 (NMFS, 2008a). The Cook Inlet Marine Mammal Council, which managed the Alaska Native Subsistence fishery with NMFS, was disbanded by a unanimous vote of the Tribes' representatives on June 20, 2012. At this time, no harvest is expected in 2015 or, likely, in 2016. Residents of the Native Village of Tyonek are the primary subsistence users in the Knik Arm area.

Data on the harvest of other marine mammals in Cook Inlet are lacking. Some data are available on the subsistence harvest of harbor seals, harbor porpoises, and killer whales in Alaska in the marine mammal stock assessments. However, these numbers are for the Gulf of Alaska including Cook Inlet, and they are not indicative of the harvest in Cook Inlet.

There is a low level of subsistence hunting for harbor seals in Cook Inlet. Seal hunting occurs opportunistically among Alaska Natives who may be fishing or travelling in the upper Inlet near the mouths of the Susitna River, Beluga River, and Little Susitna River. Some data are available on the subsistence harvest of harbor seals, harbor porpoises, and killer whales in Alaska in the marine mammal stock assessments. However, these numbers are for the Gulf of Alaska including Cook Inlet, and they are not indicative of the harvest in Cook Inlet. Some detailed information on the subsistence harvest of harbor seals is available from past studies conducted by the Alaska Department of Fish & Game (Wolfe *et al.,* 2009). In 2008, 33 harbor seals were taken for harvest in the Upper Kenai-Cook Inlet area. In the same study, reports from hunters stated that harbor seal populations in the area were increasing (28.6%) or remaining stable (71.4%). The specific hunting regions identified were Anchorage, Homer, Kenai, and Tyonek, and hunting generally peaks in March, September, and November (Wolfe *et al.,* 2009).

Potential Impacts to Subsistence Uses

Section 101(a)(5)(A) also requires NMFS to determine that the taking will not have an unmitigable adverse effect on the availability of marine mammal species or stocks for subsistence use. NMFS has defined ''unmitigable adverse impact'' in 50 CFR 216.103 as an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) That cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

The primary concern is the disturbance of marine mammals through the introduction of anthropogenic sound into the marine environment during the proposed seismic survey. Marine mammals could be behaviorally harassed and either become more difficult to hunt or temporarily abandon traditional hunting grounds. However, the proposed seismic survey should not have any impacts to beluga harvests as none currently occur in Cook Inlet. Additionally, subsistence harvests of other marine mammal species are limited in Cook Inlet.

Plan of Cooperation or Measures To Minimize Impacts to Subsistence Hunts

Regulations at 50 CFR 216.104(a)(12) require LOA applicants for activities that take place in Arctic waters to provide a Plan of Cooperation or information that identifies what measures have been taken and/or will be taken to minimize adverse effects on the availability of marine mammals for subsistence purposes. NMFS regulations define Arctic waters as waters above 60° N. latitude.

Since November 2010, Apache has met and continues to meet with many of the villages and traditional councils throughout the Cook Inlet region. During these meetings, no concerns have been raised regarding potential conflict with subsistence harvest. Past meetings have been held with Alexander Creek, Knikatnu, Native Village of Tyonek, Salamatof, Tyonek Native Corporation, Ninilchik Traditional Council, Ninilchik Native Association, Village of Eklutna, Kenaitze Indian Tribe, and Cook Inlet Region, Inc.

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

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

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

- In-water seismic activities will follow mitigation procedures to minimize effects on the behavior of marine mammals and, therefore, opportunities for harvest by Alaska Native communities; and
- Regional subsistence representatives may support recording marine mammal observations along with marine mammal biologists during the monitoring programs and will be provided with annual reports.

Apache and NMFS recognize the importance of ensuring that ANOs and federally recognized tribes are informed, engaged, and involved during the permitting process and will continue to work with the ANOs and tribes to discuss operations and activities. On February 6, 2012, in response to requests for government-to-government consultations by the CIMMC and Native Village of Eklutna, NMFS met with representatives of these two groups and a representative from the Ninilchik. We engaged in a discussion about the proposed IHA for phase 1 of Apache's seismic program, the MMPA process for issuing an IHA, concerns regarding Cook Inlet beluga whales, and how to achieve greater coordination with NMFS on issues that impact tribal concerns. NMFS contacted the local Native Villages to inform them of our receipt of an application from Apache to promulgate regulations and issue subsequent annual LOAs in August 2014.

Unmitigable Adverse Impact Analysis and Preliminary Determination

The project will not have any effect on beluga whale harvests because no beluga harvest will take place in 2015, nor is one likely to occur in the other years that would be covered by the 5-year regulations and associated LOAs. Additionally, the proposed seismic survey area is not an important native subsistence site for other subsistence species of marine mammals. Also, because of the relatively small proportion of marine mammals utilizing Cook Inlet, the number harvested is expected to be extremely low. Therefore, because the proposed program would result in only temporary disturbances, the seismic program would not impact the availability of these other marine mammal species for subsistence uses.

The timing and location of subsistence harvest of Cook Inlet harbor seals may coincide with Apache's project, but because this subsistence hunt is conducted opportunistically and at such a low level (NMFS, 2013c), Apache's program is not expected to have an impact on the subsistence use of harbor seals.

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

Endangered Species Act (ESA)

There are two marine mammal species listed as endangered under the

ESA with confirmed or possible occurrence in the proposed project area: The Cook Inlet beluga whale and the western DPS of Steller sea lion. In addition, the proposed action would occur within designated critical habitat for the Cook Inlet beluga whale. NMFS's Permits and Conservation Division has initiated consultation with NMFS' Alaska Region Protected Resources Division under section 7 of the ESA on the promulgation of 5-year regulations and the subsequent issuance of annual LOAs to Apache under section 101(a)(5)(A) of the MMPA. This consultation will be concluded prior to issuing any final rule.

National Environmental Policy Act (NEPA)

NMFS has prepared a Draft Environmental Assessment (EA) for the issuance of regulations and associated LOAs to Apache for the proposed oil and gas exploration seismic survey program in Cook Inlet. The Draft EA has been made available for public comment concurrently with this proposed rule (see **ADDRESSES**). NMFS will either finalize the EA and prepare a FONSI or prepare an Environmental Impact Statement prior to issuance of the final rule (if issued).

Classification

The Office of Management and Budget has determined that this proposed rule is not significant for purposes of Executive Order 12866.

Pursuant to section 605(b) of the Regulatory Flexibility Act (RFA), the Chief Counsel for Regulation of the Department of Commerce has certified to the Chief Counsel for Advocacy of the Small Business Administration that this proposed rule, if adopted, would not have a significant economic impact on a substantial number of small entities. Apache Alaska Corporation is the only entity that would be subject to the requirements in these proposed regulations. Apache Alaska Corporation is a part of Apache Corporation, which has operations and locations in the United States, Canada, Australia, Egypt, and the United Kingdom (North Sea), employs thousands of people worldwide, and has a market value in the billions of dollars. Therefore, Apache is not a small governmental jurisdiction, small organization, or small business, as defined by the RFA. Because of this certification, a regulatory flexibility analysis is not required and none has been prepared.

Notwithstanding any other provision of law, no person is required to respond to nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act (PRA) unless that collection of information displays a currently valid OMB control number. This proposed rule contains collection-of-information requirements subject to the provisions of the PRA. These requirements have been approved by OMB under control number 0648–0151 and include applications for regulations, subsequent LOAs, and reports. Send comments regarding any aspect of this data collection, including suggestions for reducing the burden, to NMFS and the OMB Desk Officer (see **ADDRESSES**).

List of Subjects in 50 CFR Part 217

Exports, Fish, Imports, Indians, Labeling, Marine mammals, Penalties, Reporting and recordkeeping requirements, Seafood, Transportation.

Dated: February 9, 2015.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For reasons set forth in the preamble, 50 CFR part 217 is proposed to be amended as follows:

PART 217—REGULATIONS GOVERNING THE TAKE OF MARINE MAMMALS INCIDENTAL TO SPECIFIED ACTIVITIES

■ 1. The authority citation for part 217 continues to read as follows:

Authority: 16 U.S.C. 1361 *et seq.,* unless otherwise noted.

■ 2. Subpart N is added to part 217 to read as follows:

Subpart N—Taking Marine Mammals Incidental to Seismic Surveys in Cook Inlet, Alaska

Sec.

Subpart N—Taking Marine Mammals Incidental to Seismic Surveys in Cook Inlet, Alaska

§ 217.130 Specified activity and specified geographical region.

(a) Regulations in this subpart apply only to Apache Alaska Corporation (Apache) and those persons it authorizes to conduct activities on its behalf for the taking of marine mammals that occurs in the area outlined in paragraph (b) of this section and that occurs incidental to oil and gas exploration seismic survey program operations.

(b) The taking of marine mammals by Apache may be authorized in a Letter of Authorization (LOA) only if it occurs within the intertidal transition zone and marine environment of Cook Inlet, Alaska.

§ 217.131 Effective dates.

[Reserved]

§ 217.132 Permissible methods of taking.

(a) Under LOAs issued pursuant to § 216.106 of this chapter and § 217.136, the Holder of the LOA (hereinafter ''Apache'') may incidentally, but not intentionally, take marine mammals within the area described in § 217.130(b), provided the activity is in compliance with all terms, conditions, and requirements of the regulations in this subpart and the appropriate LOA.

(b) The incidental take of marine mammals under the activities identified in § 217.130(a) is limited to the indicated number of takes on an annual basis of the following species and is limited to Level B harassment:

(1) Cetaceans:

(i) Beluga whale (Delphinapterus leucas)—30;

(ii) Harbor porpoise (Phocoena phocoena)—35;

(iii) Killer whale (Orcinus orca)—10;

(iv) Gray whale (Eschrichtius robustus)—2;

(2) Pinnipeds:

(i) Harbor seal (Phoca vitulina)—2,211; and

(ii) Steller sea lion (Eumetopias jubatus)—75.

§ 217.133 Prohibitions.

Notwithstanding takings contemplated in § 217.130 and authorized by a LOA issued under § 216.106 of this chapter and § 217.136, no person in connection with the activities described in § 217.130 of this chapter may:

(a) Take any marine mammal not specified in § 217.132(b);

(b) Take any marine mammal specified in § 217.132(b) other than by incidental Level B harassment;

(c) Take a marine mammal specified in § 217.132(b) if the National Marine Fisheries Service (NMFS) determines such taking results in more than a negligible impact on the species or stocks of such marine mammal;

(d) Take a marine mammal specified in § 217.132(b) if NMFS determines such taking results in an unmitigable adverse impact on the species or stock

of such marine mammal for taking for subsistence uses; or

(e) Violate, or fail to comply with, the terms, conditions, and requirements of this subpart or an LOA issued under § 216.106 of this chapter and § 217.136.

§ 217.134 Mitigation requirements.

When conducting the activities identified in § 217.130(a), the mitigation measures contained in any LOA issued under § 216.106 of this chapter and § 217.136 must be implemented. These mitigation measures include but are not limited to:

(a) *General conditions:* (1) If any marine mammal species not listed in § 217.132(b) are observed during conduct of the activities identified in § 217.130(a) and are likely to be exposed to sound pressure levels (SPLs) greater than or equal to 160 dB re 1 μPa (rms), Apache must avoid such exposure (*e.g.,* by altering speed or course or by power down or shutdown of the sound source).

(2) If the allowable number of takes on an annual basis listed for any marine mammal species in § 217.132(b) is exceeded, or if any marine mammal species not listed in § 217.132(b) is exposed to SPLs greater than or equal to 160 dB re 1 μPa (rms), Apache shall immediately cease survey operations involving the use of active sound sources (*e.g.,* airguns and pingers), record the observation, and notify NMFS Office of Protected Resources.

(3) Apache must notify the Office of Protected Resources, NMFS at least 48 hours prior to the start of seismic survey activities each year.

(4) Apache shall conduct briefings as necessary between vessel crews, marine mammal monitoring team, and other relevant personnel prior to the start of all survey activity, and when new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

(b) *Visual monitoring:* (1) Apache shall establish zones corresponding to the area around the source within which SPLs are expected to equal or exceed relevant acoustic criteria. These zones shall be established as exclusion zones (shutdown zones) to avoid Level A harassment of any marine mammal, Level B harassment of beluga whales, or Level B harassment of aggregations of five or more killer whales or harbor porpoises. For all marine mammals other than beluga whales or aggregations of five or more harbor porpoises or killer whales, the Level B harassment zone shall be established as a disturbance zone and monitored as described in § 217.135(a)(1). These zones shall be defined as follows:

(i) For the full-power airgun array (2,400 in3), the Level B harassment zone (160 dB re 1 μPa [rms]) shall be of 9,500 m radial distance, the Level A harassment zone for cetaceans (180 dB re 1 μPa [rms]) shall be of 1,400 m radial distance; and the Level A harassment for pinnipeds (190 dB re 1 μPa [rms]) shall be of 380 m radial distance.

(ii) For the shallow-water source (440 in3), the Level B harassment zone (160 dB re 1 μPa [rms]) shall be of 2,500 m radial distance, the Level A harassment zone for cetaceans (180 dB re 1 μPa [rms]) shall be of 310 m radial distance; and the Level A harassment for pinnipeds (190 dB re 1 μPa [rms]) shall be of 100 m radial distance.

(iii) For the mitigation gun (10 in3), the Level B harassment zone (160 dB re 1 μPa [rms]) shall be of 280 m radial distance and a single Level A harassment zone of 10 m radial distance shall be established.

(iv) During use of pingers, Apache shall establish a Level B harassment zone (160 dB re 1 μPa [rms]) of 25 m radial distance.

(2) Vessel-based monitoring for marine mammals must be conducted before, during, and after all activity identified in § 217.130(a) that is conducted during daylight hours (defined as nautical twilight-dawn to nautical twilight-dusk), and shall begin not less than thirty minutes prior to the beginning of survey activity, continue throughout all survey activity that occurs during daylight hours, and conclude not less than thirty minutes following the cessation of survey activity. Apache shall use a sufficient number of qualified protected species observers (PSO) to ensure one hundred percent visual observation coverage during all periods of daylight survey operations with maximum limits of four consecutive hours on watch and twelve hours of watch time per day per PSO. One PSO must be a supervisory field crew leader. A minimum of two qualified PSOs shall be on watch at all times during daylight hours on each source and support vessel (except during brief meal and restroom breaks, when at least one PSO shall be on watch).

(i) A qualified PSO is a third-party trained biologist, with prior experience as a PSO during seismic surveys and the following minimum qualifications:

(A) Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target;

(B) Advanced education in biological science or related field (undergraduate degree or higher required);

(C) Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience);

(D) Experience or training in the field identification of marine mammals, including the identification of behaviors;

(E) Sufficient training, orientation, or experience with the survey operation to provide for personal safety during observations;

(F) Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when survey activities were conducted; dates and times when survey activities were suspended to avoid exposure of marine mammals to sound within defined exclusion zones; and marine mammal behavior; and

(G) Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary.

(ii) PSOs must have access to binoculars (7×50 with reticle rangefinder; Fujinon or equivalent quality), laser rangefinder, and bigeye binoculars (25×150) and shall scan the surrounding waters from the best available suitable vantage point with the naked eye and binoculars. At least one PSO shall scan the surrounding waters during all daylight hours using bigeye binoculars.

(iii) PSOs shall also conduct visual monitoring

(A) While the airgun array and nodes are being deployed or recovered from the water and

(B) During periods of good visibility when the sound sources are not operating for comparison of animal abundance and behavior.

(iv) PSOs shall be on watch at all times during daylight hours when survey operations are being conducted, unless conditions (*e.g.,* fog, rain, darkness) make observations impossible. The lead PSO on duty shall make this determination. If conditions deteriorate during daylight hours such that the sea surface observations are halted, visual observations must resume as soon as conditions permit.

(3) Survey activity must begin during periods of good visibility, which is defined as daylight hours when weather (*e.g.,* fog, rain) does not obscure the relevant exclusion zones within maximum line-of-sight. In order to begin survey activity, the relevant exclusion zones must be clear of marine mammals

for not less than thirty minutes. If marine mammals are present within or are observed approaching the relevant exclusion zone during this thirty-minute pre-clearance period, the start of survey activity shall be delayed until the animals are observed leaving the zone of their own volition and/or outside the zone or until fifteen minutes (for pinnipeds and harbor porpoises) or thirty minutes (for beluga whales, killer whales, and gray whales) have elapsed without observing the animal. While activities will be permitted to continue during low-visibility conditions, they must have been initiated following proper clearance of the exclusion zone under acceptable observation conditions and must be restarted, if shut down for greater than ten minutes for any reason, using the appropriate exclusion zone clearance procedures.

(c) *Ramp-up and shutdown:* (1) Survey activity involving the full-power airgun array or shallow-water source must be initiated, following appropriate clearance of the exclusion zone, using accepted ramp-up procedures. Ramp-up is required at the start of survey activity and at any time following a shutdown of ten minutes or greater. Ramp-up shall be implemented by starting the smallest single gun available and increasing the operational array volume in a defined sequence such that the source level of the array shall increase in steps not exceeding approximately 6 dB per five-minute period. PSOs shall continue monitoring the relevant exclusion zones throughout the ramp-up process and, if marine mammals are observed within or approaching the zones, a power down or shutdown shall be implemented and ramp-up restarted following appropriate exclusion zone clearance procedures as described in paragraph (b)(3) of this section.

(2) Apache must shut down or power down the source, as appropriate, immediately upon detection of any marine mammal approaching or within the relevant Level A exclusion zone or upon detection of any beluga whale or aggregation of five or more harbor porpoises or killer whales approaching or within the relevant Level B exclusion zone. Power down is defined as reduction of total airgun array volume from either the full-power airgun array (2,400 in3) or the shallow-water source (440 in3) to a single mitigation gun (maximum 10 in3). Power down must be followed by shutdown in the event that the animal(s) approach the exclusion zones defined for the mitigation gun. Detection of any marine mammal within an exclusion zone shall be recorded and reported weekly, as described in § 217.135(c)(2), to NMFS Office of Protected Resources.

(i) When a requirement for power down or shutdown is triggered, the call for implementation shall be made by the lead PSO on duty and Apache shall comply. Any disagreement with a determination made by the lead PSO on duty shall be discussed after implementation of power down or shutdown, as appropriate.

(ii) Following a power down or shutdown not exceeding ten minutes, Apache shall follow the ramp-up procedure described in paragraph (c)(1) of this section to return to full-power operation.

(iii) Following a shutdown exceeding ten minutes, Apache shall follow the exclusion zone clearance, described in paragraph (b)(3) of this section, and ramp-up procedures, described in paragraph (c)(1) of this section, before returning to full-power operation.

(3) Survey operations may be conducted during low-visibility conditions (*e.g.,* darkness, fog, rain) only when such activity was initiated following proper clearance of the exclusion zone under acceptable observation conditions, as described in paragraph (b)(3) of this section, and there has not been a shutdown exceeding ten minutes. Following a shutdown exceeding ten minutes during low-visibility conditions, survey operations must be suspended until the return of good visibility. During low-visibility conditions, vessel bridge crew must implement shutdown procedures if marine mammals are observed.

(d) *Additional mitigation:* (1) The mitigation airgun must be operated at approximately one shot per minute, and use of the gun may not exceed three consecutive hours. Ramp-up may not be used to circumvent the three-hour limitation on mitigation gun usage. Usage of the mitigation gun shall be limited by when feasible, employing a turn protocol of complete shutdown followed by pre-clearance and ramp-up such that full power is reached prior to returning to trackline (rather than using the mitigation gun throughout the turn) and turning on mitigation gun at least thirty minutes prior to nautical-twilight dusk when nighttime ramp-up is anticipated.

(2) Apache may alter speed or course during seismic operations if a marine mammal, based on its position and relative motion, appears likely to enter the relevant exclusion zone and such alteration may result in the animal not entering the zone. If speed or course alteration is not safe or practicable, or if after alteration the marine mammal still appears likely to enter the zone, power down or shutdown must be implemented.

(3) Apache shall not operate airguns within 16 km of the mean higher high water (MHHW) line of the Susitna Delta (Beluga River to the Little Susitna River) between April 15 and October 15.

(4) Apache must suspend survey operations if a live marine mammal stranding is reported within 19 km of the seismic source vessel coincident to or within 72 hours of survey activities involving the use of airguns, regardless of any suspected cause of the stranding. A live stranding event is defined as a marine mammal found on a beach or shore and unable to return to the water; on a beach or shore and able to return to the water but in apparent need of medical attention; or in the water but unable to return to its natural habitat under its own power or without assistance.

(i) Apache must immediately implement a shutdown of the airgun array upon becoming aware of the live stranding event.

(ii) Shutdown procedures shall remain in effect until NMFS determines that all live animals involved in the stranding have left the area (either of their own volition or following responder assistance).

(iii) Within 48 hours of the notification of the live stranding event, Apache must inform NMFS where and when they were operating airguns and at what discharge volumes.

(iv) Apache must appoint a contact who can be reached at any time for notification of live stranding events. Immediately upon notification of the live stranding event, this person must order the immediate shutdown of the survey operations.

§ 217.135 Requirements for monitoring and reporting.

(a) *Visual monitoring program:* (1) Disturbance zones shall be established as described in § 217.134(b)(1), and shall encompass the Level B harassment zones not defined as exclusion zones in § 217.134(b)(1). These zones shall be monitored to maximum line-of-sight distance from established vessel- and shore-based monitoring locations. If marine mammals other than beluga whales or aggregations of five or greater harbor porpoises or killer whales are observed within the disturbance zone, the observation shall be recorded and communicated as necessary to other PSOs responsible for implementing shutdown/power down requirements and any behaviors documented.

(2) Apache shall utilize a shore-based station to visually monitor for marine mammals. The shore-based station must

be staffed by PSOs under the same minimum requirements described in § 217.134(b)(2), must be located appropriately to monitor the area ensonified by that day's survey operations, must be of sufficient height to observe marine mammals within the ensonified area; and must be equipped with pedestal-mounted bigeye (25 × 150) binoculars. The shore-based PSOs shall scan the defined exclusion and disturbance zones prior to, during, and after survey operations, and shall be in contact with vessel-based PSOs via radio to communicate sightings of marine mammals approaching or within the defined zones.

(3) When weather conditions allow for safety, Apache shall utilize helicopter or fixed-wing aircraft to conduct daily aerial surveys of the project area prior to the commencement of operations in order to identify locations of beluga whale aggregations (five or more whales) or cow-calf pairs. Daily surveys shall be scheduled to occur at least thirty but no more than 120 minutes prior to any seismic survey-related activities (including but not limited to node laying/retrieval or airgun operations) and shall also occur on days when there may be no survey activities. Aerial surveys shall occur along and parallel to the shoreline throughout the project area as well as the eastern and western shores of central and northern Cook Inlet in the vicinity of the survey area.

(i) When weather conditions allow for safety, aerial surveys shall fly at an altitude of 305 m (1,000 ft). In the event of a marine mammal sighting, aircraft shall attempt to maintain a lateral distance of 457 m (1,500 ft) from the animal(s). Aircraft shall avoid approaching marine mammals head-on, flying over or passing the shadow of the aircraft over the animal(s).

(ii) [Reserved].

(4) PSOs must use NMFS-approved data forms and shall record the following information when a marine mammal is observed:

(i) Effort information, including vessel name; PSO name; survey type; date; time when survey (observing and activities) began and ended; vessel location (latitude/longitude) when survey (observing and activities) began and ended; vessel heading and speed (knots).

(ii) Environmental conditions while on visual survey, including wind speed and direction, Beaufort sea state, Beaufort wind force, swell height, weather conditions, ice cover (percent of surface, ice type, and distance to ice if applicable), cloud cover, sun glare, and overall visibility to the horizon (in distance).

(iii) Factors that may be contributing to impaired observations during each PSO shift change or as needed as environmental conditions change (*e.g.,* vessel traffic, equipment malfunctions).

(iv) Activity information, such as the number and volume of airguns operating in the array, tow depth of the array, and any other notes of significance (*e.g.,* pre-ramp-up survey, ramp-up, power down, shutdown, testing, shooting, ramp-up completion, end of operations, nodes).

(v) When a marine mammal is observed, the following information shall be recorded: Watch status (sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform, aerial, land); PSO who sighted the animal; time of sighting; vessel location at time of sighting; water depth; direction of vessel's travel (compass direction); direction of animal's travel relative to the vessel (drawing is preferred); pace of the animal; estimated distance to the animal and its heading relative to vessel at initial sighting; identification of the animal (genus/species/sub-species, lowest possible taxonomic level, or unidentified; also note the composition of the group if there is a mix of species); estimated number of animals (high/low/best); estimated number of animals by cohort (when possible; adults, yearlings, juveniles, calves, group composition, etc.); description (as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics); detailed behavioral observations (*e.g.,* number of blows, number of surfaces, breaching, spyhopping, diving, feeding, traveling; as explicit and detailed as possible; note any observed changes in behavior); animal's closest point of approach and/or closest distance from the center point of the airgun array; platform activity at time of sighting (*e.g.,* deploying, recovering, testing, shooting, data acquisition, other).

(vi) Description of any actions implemented in response to the sighting (*e.g.,* delays, power down, shutdown, ramp-up, speed or course alteration); time and location of the action should also be recorded.

(vii) If mitigation action was not implemented when required, description of circumstances.

(viii) Description of all use of mitigation gun.

(5) The data listed in § 217.135(a)(4)(i–ii) shall also be recorded at the start and end of each watch and during a watch whenever there is a change in one or more of the variables.

(b*) Onshore seismic effort:* (1) When conducting onshore seismic effort, in the event that a shot hole charge depth of 10 m is not consistently attainable due to loose sediments collapsing the bore hole, a sound source verification study must be conducted on the new land-based charge depths.

(2) [Reserved].

(c) Reporting:

(1) Apache must immediately report to NMFS at such time as 25 total beluga whales (cumulative total during period of validity of LOA) have been detected within the 160-dB re 1 μPa (rms) exclusion zone, regardless of shutdown or power down procedures implemented, during seismic survey operations.

(2) Apache must submit a weekly field report to NMFS Office of Protected Resources each Thursday during the weeks when in-water seismic survey activities take place. The weekly field reports shall summarize species detected (number, location, distance from seismic vessel, behavior), in-water activity occurring at the time of the sighting (discharge volume of array at time of sighting, seismic activity at time of sighting, visual plots of sightings, and number of power downs and shutdowns), behavioral reactions to in-water activities, and the number of marine mammals exposed to sound at or exceeding relevant thresholds.

(3) Apache must submit a monthly report, no later than the fifteenth of each month, to NMFS Office of Protected Resources for all months during which in-water seismic survey activities occur. These reports must summarize the information described in paragraph (a)(4) of this section and shall also include:

(i) An estimate of the number (by species) of:

(A) Pinnipeds that have been exposed to sound (based on visual observation) at received levels greater than or equal to 160 dB re 1 μPa (rms) and/or 190 dB re 1 μPa (rms) with a discussion of any specific behaviors those individuals exhibited; and

(B) Cetaceans that have been exposed to sound (based on visual observation) at received levels greater than or equal to 160 dB re 1 μPa (rms) and/or 180 dB re 1 μPa (rms) with a discussion of any specific behaviors those individuals exhibited.

(ii) A description of the implementation and effectiveness of the terms and conditions of the Biological Opinion's Incidental Take Statement and mitigation measures of the LOA.

For the Biological Opinion, the report shall confirm the implementation of each Term and Condition, as well as any conservation recommendations, and describe their effectiveness in minimizing the adverse effects of the action on Endangered Species Act-listed marine mammals.

(4) Apache shall submit an annual report to NMFS Office of Protected Resources covering a given calendar year within ninety days of the last day of airgun operation or at least sixty days before the requested date of any subsequent LOA, whichever comes first. The annual report shall include summaries of the information described in paragraph (a)(4) of this section and shall also include:

(i) Summaries of monitoring effort (*e.g.,* total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals);

(ii) Analyses of the effects of various factors influencing detectability of marine mammals (*e.g.,* sea state, number of observers, and fog/glare);

(iii) 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;

(iv) Analyses of the effects of survey operations; and

(v) Sighting rates of marine mammals during periods with and without seismic survey activities (and other variables that could affect detectability), such as:

(A) Initial sighting distances versus survey activity state;

(B) Closest point of approach versus survey activity state;

(C) Observed behaviors and types of movements versus survey activity state;

(D) Numbers of sightings/individuals seen versus survey activity state;

(E) Distribution around the source vessels versus survey activity state; and

(F) Numbers of marine mammals (by species) detected in the 160, 180, and 190 dB re 1 μPa (rms) zones.

(5) Apache shall submit a final annual report to the Office of Protected Resources, NMFS, within thirty days after receiving comments from NMFS on the draft report.

(d) *Notification of dead or injured marine mammals.* (1) 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, Apache shall immediately cease the specified activities and report the incident to the Office of Protected Resources, NMFS, and the Alaska Regional Stranding Coordinator, NMFS. The report must include the following information:

(i) Time, date, and location (latitude/longitude) of the incident;

(ii) Description of the incident;

(iii) Environmental conditions (*e.g.,* wind speed and direction, Beaufort sea state, cloud cover, and visibility);

(iv) Description of marine mammal observations in the 24 hours preceding the incident;

(v) Species identification or description of the animal(s) involved;

(vi) Status of all sound source use in the 24 hours preceding the incident;

(vii) Water depth;

(viii) Fate of the animal(s); and

(ix) Photographs or video footage of the animal(s). Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS shall work with Apache to determine what measures are necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. Apache may not resume their activities until notified by NMFS.

(2) 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 (*e.g.,* in less than a moderate state of decomposition), Apache shall immediately report the incident to the Office of Protected Resources, NMFS, and the Alaska Regional Stranding Coordinator, NMFS. The report must include the same information identified in § 217.135(d)(1). If the observed marine mammal is dead, activities may continue while NMFS reviews the circumstances of the incident. If the observed marine mammal is injured, measures described in § 217.134(d)(4) must be implemented. NMFS will work with Apache to determine whether additional mitigation measures or modifications to the activities are appropriate.

(3) 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 activities authorized in the LOA (*e.g.,* previously wounded animal, carcass with moderate to advanced decomposition, scavenger damage), Apache shall report the incident to the Office of Protected Resources, NMFS, and the Alaska Regional Stranding Coordinator, NMFS, within 24 hours of the discovery. Apache shall provide photographs or video footage or other documentation of the stranded animal sighting to NMFS. If the observed marine mammal is dead, activities may continue while NMFS reviews the circumstances of the incident. If the observed marine mammal is injured, measures described in § 217.134(d)(4) must be implemented. In this case, NMFS will notify Apache when activities may resume.

§ 217.136 Letters of Authorization.

(a) To incidentally take marine mammals pursuant to these regulations, Apache must apply for and obtain a LOA.

(b) An LOA, unless suspended or revoked, may be effective for a period of time not to exceed the expiration date of these regulations.

(c) If an LOA expires prior to the expiration date of these regulations, Apache may apply for and obtain a renewal of the Letter of Authorization.

(d) In the event of projected changes to the activity or to mitigation and monitoring measures required by an LOA, Apache must apply for and obtain a modification of the Letter of Authorization as described in § 217.137.

(e) The LOA shall set forth:

(1) Permissible methods of incidental taking;

(2) Means of effecting the least practicable adverse impact (*i.e.,* mitigation) on the species, its habitat, and on the availability of the species for subsistence uses; and

(3) Requirements for monitoring and reporting.

(f) Issuance of the LOA shall be based on a determination that the level of taking will be consistent with the findings made for the total taking allowable under these regulations.

(g) Notice of issuance or denial of a LOA shall be published in the **Federal Register** within thirty days of a determination.

§ 217.137 Renewals and modifications of Letters of Authorization.

(a) An LOA issued under § 216.106 of this chapter and § 217.136 for the activity identified in § 217.130(a) shall be renewed or modified upon request by the applicant, provided that:

(1) The proposed specified activity and mitigation, monitoring, and reporting measures, as well as the anticipated impacts, are the same as those described and analyzed for these regulations (excluding changes made pursuant to the adaptive management provision in § 217.137(c)(1)), and

(2) NMFS determines that the mitigation, monitoring, and reporting measures required by the previous LOA under these regulations were implemented.

(b) For a LOA modification or renewal requests by the applicant that include changes to the activity or the mitigation, monitoring, or reporting (excluding changes made pursuant to the adaptive management provision in § 217.137(c)(1)) that do not change the findings made for the regulations or result in no more than a minor change in the total estimated number of takes (or distribution by species or years), NMFS may publish a notice of proposed LOA in the **Federal Register**, including the associated analysis of the change, and solicit public comment before issuing the LOA.

(c) An LOA issued under § 216.106 of this chapter and § 217.136 for the activity identified in § 217.130(a) may be modified by NMFS under the following circumstances:

(1) *Adaptive management*—NMFS may modify (including augment) the existing mitigation, monitoring, or reporting measures (after consulting with Apache regarding the practicability of the modifications) if doing so creates a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring set forth in the preamble for these regulations.

(i) Possible sources of data that could contribute to the decision to modify the mitigation, monitoring, or reporting measures in an LOA:

(A) Results from Apache's monitoring from the previous year(s).

(B) Results from other marine mammal and/or sound research or studies.

(C) Any information that reveals marine mammals may have been taken in a manner, extent or number not authorized by these regulations or subsequent LOAs.

(ii) If, through adaptive management, the modifications to the mitigation, monitoring, or reporting measures are substantial, NMFS will publish a notice of proposed LOA in the **Federal Register** and solicit public comment.

(2) *Emergencies*—If NMFS determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in § 217.132(b), an LOA may be modified without prior notice or opportunity for public comment. Notice would be published in the **Federal Register** within thirty days of the action.

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