



# MARINE MAMMAL COMMISSION

29 September 2014

Mr. Craig Perham  
U.S. Fish and Wildlife Service  
Office of Marine Mammals Management  
1011 East Tudor Road  
Anchorage, Alaska 99503

Dear Mr. Perham:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the applications and other supporting documents submitted to the Fish and Wildlife Service (FWS) by Apache Alaska Corporation (Apache), SAExploration, Inc., LLC (SAE), and BlueCrest Energy, Inc. (BlueCrest; formerly Buccaneer Alaska Operations, LLC), seeking authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA) to take small numbers of northern sea otters by harassment incidental to oil and gas exploration activities in Cook Inlet, Alaska. The Commission also has reviewed FWS's 29 August 2014 notice (79 Fed. Reg. 51584) announcing receipt of the applications and proposing to issue the authorizations, subject to certain conditions. The Commission provided comments on similar applications from Apache in 2011, 2013, and 2014 and from Buccaneer in 2014 to take marine mammals under the jurisdiction of the National Marine Fisheries Service (NMFS) incidental to proposed oil and gas exploration activities in Cook Inlet. Those applicants have not previously considered the incidental taking of sea otters.

## **BACKGROUND**

### **Apache seismic surveys**

Apache proposes to conduct three-dimensional (3D) ocean-bottom node seismic activities in Cook Inlet during open-water periods from mid-October 2014 through April 2015. Apache's total project area encompasses approximately 4,882 square-km. Seismic activities proposed under this authorization are in state waters on the eastern side of lower Cook Inlet, in an area east of Kalgin Island, south of Nikiski, and north of Ninilchik (Fig. 1-1 of Apache's application). Apache has designated this area as the South Kenai Offshore Area; however, the size of the area to be surveyed in 2014 and 2015 was not specified. As with its past applications, Apache has requested that the incidental harassment authorization cover a larger area of operation than it actually intends to survey in 2014 and 2015 to allow for operational flexibility. The South Kenai Offshore Area includes onshore, intertidal, and offshore areas.

Apache would use two seismic vessels, each equipped with a 2,400-cubic inch airgun array and operated using a ping/pong shooting technique. Apache has indicated that although the vessels would use the 2,400-cubic inch airgun configuration most frequently, a 1,200-cubic inch airgun configuration would be used by the vessels when possible. Other survey equipment would include a 440-cubic inch airgun array, a 10-cubic inch airgun, a 33- to 55-kHz ultra-short baseline transceiver,

and a 35- to 50-kHz lightweight release ultra-short baseline transponder. In addition, Apache plans to detonate 4 kg of Orica OSX pentolite explosives onshore to acquire additional data. Apache would use bottom-mounted hydrophones (i.e., nodes) to collect all seismic data. It is unclear from the *Federal Register* notice or Apache's application how many actual days of seismic activities would occur.

### **SAE seismic surveys**

SAE also proposes to conduct 3D ocean-bottom node seismic activities in Cook Inlet beginning in December 2014. SAE's total project area includes both upper and lower Cook Inlet, but this authorization would apply only to activities conducted in a 1,808 square-km area in state and federal waters on the eastern side of lower Cook Inlet from east of Kalgin Island to Anchor Point (Figure 2 of SAE's application). SAE would use two survey vessels, each equipped with a 1,760-cubic inch airgun array and operated using a ping/pong shooting technique; whereas a 440- or 880-cubic inch airgun array may be used in shallow waters. Other survey equipment would include a 35- to 55-kHz ultra-short baseline transceiver and a 35- to 55-kHz lightweight release ultra-short baseline transponder. SAE would use bottom-mounted hydrophones to collect all seismic data. SAE would conduct the seismic activities for a total of 60 to 80 days.

### **BlueCrest exploratory drilling**

BlueCrest proposes to conduct exploratory and delineation drilling at two well sites in Cook Inlet from November 2014 through October 2015. The two well sites, Cosmopolitan State #1 and #2, are located within state waters off Cape Starichkof, just north of Anchor Point on the eastern side of lower Cook Inlet. The Cosmopolitan State #1 well site is 4.8 km from shore in 24 m of water and the Cosmopolitan State #2 well site is 3.2 km from shore in 16.5 m of water. BlueCrest would use a tug to tow the jack-up drill rig from the winter mooring site in Port Graham to each of the well sites and then to a site in upper Cook Inlet, for a total of three towing events. Prior to drilling, a 76.2 cm (30-inch) conductor pipe would be installed at each of the well sites using an impact hammer. Each pipe would take one to three days to install. Drilling would occur for approximately 30 to 75 days at each well, and testing would occur for another 7 to 15 days. Drilling would involve the use of submersed deep-well pumps that generate sound levels in excess of 120 dB re 1  $\mu$ Pa. BlueCrest would use an airgun array with maximum volume of 880 cubic inches to conduct vertical seismic profiling (VSP) activities for up to two days following completion of drilling each well.

FWS preliminarily has determined that the proposed activities could temporarily modify the behavior of small numbers of northern sea otters from the southcentral stock but that the total taking would have a negligible impact on the stock. FWS does not anticipate any take of sea otters by death or serious injury. It believes that the potential for temporary or permanent hearing impairment will be at the least practicable level because of the applicants' proposed mitigation and monitoring measures, as well as additional measures proposed by FWS, which include—

- (1) using observers to monitor the exclusion zone (based on a Level A harassment threshold of 190 dB re 1  $\mu$ Pa) and disturbance zone (based on a Level B harassment threshold of 160 dB re 1  $\mu$ Pa) during all daylight hours when airguns are operating and for a minimum of 30 minutes prior to ramp-up of the airguns;
- (2) using ramp-up, power-down, and shut-down procedures for all seismic activities;

- (3) prohibiting ramp-up of airguns at night or when observers cannot visually monitor the entire disturbance zone and during nighttime operations or during low-light hours after an extended shut-down (i.e., when airguns have not been operating for at least 10 minutes);
- (4) implementing emergency shut-down procedures if one or more sea otters are within the area of seismic activities and are indicating acute distress;
- (5) deploying observers on all operational and support vessels to alert crew of presence of sea otters and initiating adaptive mitigation responses;
- (6) avoiding vessel and aircraft interactions with sea otters and subsistence hunting through operational and speed reduction procedures, as appropriate;
- (7) reporting observations of sea otters within the disturbance zone and all injured or dead sea otters to FWS within 24 hours; and
- (8) submitting weekly monitoring reports and an after-action monitoring report to FWS.

## RECOMMENDATIONS AND RATIONALE

### Estimating takes of sea otters

To determine takes of sea otters incidental to seismic activities, FWS estimated that Apache would conduct 19.25 percent of its seismic activities within the probable range of sea otters in Cook Inlet. Similarly, FWS estimated that SAE would conduct 31.6 percent of its activities within the sea otter range. For Apache, FWS based its estimate on the portion of the project area south of Clam Gulch and within 9.5 km of the coast, stating that sea otters would most likely be found and be affected by the seismic survey within that smaller area. For SAE, FWS used an area within 4.75 km of the coast to determine what portion of its activities would occur within the range of sea otters. Those distances appear to correspond to the size of each applicant's proposed disturbance zone rather than the actual range of sea otters within each project area.

In a 4 March 2014 letter to Apache, FWS indicated that sea otters are not likely to be found in waters north of Clam Gulch and greater than 100 m deep. The Commission agrees that areas north of Clam Gulch are not likely to be used by sea otters<sup>1</sup>, and therefore should be excluded from the portion of the project area used by FWS in estimating sea otter takes. However, the National Oceanic and Atmospheric Administration's (NOAA) nautical chart for lower Cook Inlet<sup>2</sup> indicates that all of Apache's proposed project area south of Clam Gulch and all of SAE's proposed project area would be conducted in waters less than 100 m in depth. Further, sightings reports from aerial surveys confirm that sea otters occur throughout lower Cook Inlet south of Clam Gulch (Shelden et al. 2013). The Commission therefore recommends that FWS recalculate take estimates associated with Apache's and SAE's seismic activities in Cook Inlet based on sea otters occurring throughout Apache's proposed project area south of Clam Gulch and throughout all of SAE's proposed project area.

For take estimates associated with BlueCrest's drilling program, FWS adjusted the number of sea otters expected to be exposed to drilling based on sea otter rafting behavior. Specifically, FWS multiplied the number of sea otters exposed to drilling-associated in-water sound on a daily basis by

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<sup>1</sup> Of 944 sightings of one or more sea otters in Cook Inlet from 1993 to 2012 (May and June aerial surveys), only four of those sightings occurred north of Clam Gulch (60.23° N latitude; Shelden et al. 2013).

<sup>2</sup> <http://www.charts.noaa.gov/OnLineViewer/16640.shtml>

30 percent to account for observations that sea otters generally spend approximately 70 percent of their time during the day on the surface, rafting with their heads out of the water. However, this adjustment in take estimates is not appropriate because even though sea otters may spend a large portion of the day at the surface, any time during the day that otters dive underwater to forage or for other purposes would expose otters to drilling-associated in-water sound. Because takes are estimated on a daily basis, if an otter is exposed to sound levels exceeding the Level B harassment threshold at any time during the day, that exposure event should be considered a take.

In addition, BlueCrest noted that each pipe would take one to three days to install and that VSP activities would occur for up to two days per well. However, in its take estimate calculation, FWS used only three activity days for pipe driving and three activity days for VSP activities (Table 3 of the *Federal Register* notice). FWS should have used a total of six days for pipe driving and four days for VSP activities. The Commission therefore recommends that FWS recalculate the take estimates associated with drilling activities by (1) removing the adjustment for time sea otters spend at the surface and (2) using a total of six days for conductor pipe driving and four days for VSP activities.

## **Mitigation and monitoring measures**

### *Distances to the harassment thresholds*

Table 1 of the *Federal Register* notice referred to a series of modeled distances to the 190- and 160-dB re 1  $\mu$ Pa harassment thresholds for Apache's proposed 2014 seismic activities, as estimated by Warren et al. (2011; Table 5.1 and Appendix C of Apache's application). However, the actual 190- and 160-dB re 1  $\mu$ Pa harassment thresholds that Apache proposed to use for its 2014 and 2015 seismic activities were based on in-situ sound source acoustic measurements conducted in 2012 by Austin and Warner (2012; Table 5.4 and Appendix B of Apache's application). Those distances were 380 m for the exclusion zone and 9.5 km for the disturbance zone. FWS proposed a slightly larger exclusion zone for Apache of 500 m. The reference to the Warren et al. (2011) modeled distances in Table 1 is not consistent with the harassment thresholds proposed by FWS and therefore should not have been included.

FWS stated in the *Federal Register* notice that the initial distances proposed (and monitored) for the 190- and 160-dB re 1  $\mu$ Pa harassment thresholds associated with VSP activities conducted by Buccaneer in 2013 were 100 m and 2.46 km, respectively. Those distances were based on the manufacturer's specifications for a 880-cubic inch array and Collins et al.'s (2007) transmission loss model for Cook Inlet. Subsequent in-situ sound measurements in 2013 of a smaller, 720-cubic inch seismic array resulted in distances of 75 m and 2.47 km for the 190- and 160-dB re 1  $\mu$ Pa harassment thresholds, respectively. Based on the in-situ measurements of the smaller 720-cubic inch array, BlueCrest requested, and FWS proposed, a smaller 75-m exclusion zone rather than the original 100-m exclusion zone based on the modeled distance associated with the 880-cubic inch array. Because in-situ measurements have not verified the size of the exclusion zone for the larger 880-cubic inch array and authorization is requested for use of that array, the Commission recommends that FWS require BlueCrest to use 100 m for the exclusion zone based on the 190-dB re 1  $\mu$ Pa harassment threshold rather than 75 m based on a smaller 720-cubic inch array.

Additionally, because in-situ sound measurements associated with the smaller 720-cubic inch array resulted in the same distance to the 160-dB re 1  $\mu$ Pa harassment threshold as that modeled for

the larger 880-cubic inch array, the Commission is concerned that the proposed distances to both the 190- and 160-dB re 1  $\mu$ Pa harassment thresholds may be insufficient. Therefore, the Commission recommends that FWS require BlueCrest to conduct in-situ sound measurements to more accurately estimate the distances to the 190- and 160-dB re 1  $\mu$ Pa harassment thresholds associated with the proposed 880-cubic inch array for VSP activities.

In the past, the Commission has recommended a rapid analysis of the in-situ sound source verification data to ensure that exclusion zones are the appropriate size. However, in at least one instance, rapid turnaround has resulted in errors, as occurred with ION's measurements of source levels during its 2012 in-ice seismic survey in the Arctic (Beland et al. 2013). In that case, the size of the exclusion zone was decreased from the modeled zone using erroneous field-report results. The error was not discovered until the end of the field season when it was determined that the in-season adjustments resulted in unauthorized Level A harassment takes of bowhead whales. Since the purpose of verification is to ensure protection of marine mammals, one way to reduce risk to marine mammals until all sound measurements can be verified would be to allow only for in-season increases, but not decreases, of the exclusion and/or disturbance zones after in-situ measurements are collected and briefly analyzed. Therefore, the Commission recommends that FWS only authorize in-season adjustments in the size of the exclusion and/or disturbance zones if the size(s) of the estimated (modeled) zones are determined to be too small.

Finally, for clarity, the Commission recommends that FWS specify in the final incidental harassment authorizations the distances to the 190- and 160-dB re 1  $\mu$ Pa harassment thresholds that each applicant will be required to establish for mitigation and monitoring purposes (see Table 1 below). Those distances are provided in various places throughout the *Federal Register* notice and in some cases<sup>3</sup> the cited distances were incorrect.

Table 1. Distances to the 190- and 160-dB re 1  $\mu$ Pa harassment thresholds for each of the proposed activities.

Applicant	Type of activity	Distance to harassment thresholds	
		190 dB re 1 $\mu$ Pa	160 dB re 1 $\mu$ Pa
Apache	2,400 cubic inch seismic array	500 m	9.5 km
SAE	1,760 cubic inch seismic array	315 m	4.75 km
BlueCrest (conductor pipe driving)	Impact hammer	60 m	1.9 km
BlueCrest (VSP activities)	880 cubic inch seismic array <sup>a</sup>	100 m	2.46 km

<sup>a</sup> These distances are based on the modeled estimates for an 880-cubic inch array rather than BlueCrest's proposed distances based on in-situ measurements of a smaller, 720-cubic inch array (see text for more explanation).

<sup>3</sup> See reference to incorrect distances to harassment thresholds indicated in Table 1 of the *Federal Register* notice indicated above. Also on page 51592 of the *Federal Register* notice, FWS stated that the distance to the disturbance zone threshold for BlueCrest's proposed vertical seismic profiling was 0.75 km instead of the above-referenced 2.46 km. See list of other errors noted by the Commission and included as an appendix to this letter.

*Adequate number of observers for monitoring purposes*

In its proposed authorization, FWS would require applicants to deploy trained and qualified observers to monitor an acoustically-verified disturbance zone for all offshore exploration activities expected to result in underwater sound levels of 160 dB re 1  $\mu$ Pa or greater. For activities in which the Level B harassment zone is of considerable size (i.e., during seismic activities, VSP activities, and conductor pipe driving), at least two observers should be deployed on the source vessel or drilling rig to increase the probability of detecting sea otters approaching or within the disturbance zone. Additional observers also could assist in the collection of data on activities, behavior, and movements of sea otters in the disturbance zone. Behavioral response information is critical for understanding the effect of acoustic activities on various marine mammal species, including sea otters for which there is a dearth of relevant data. Therefore, the Commission recommends that FWS require all applicants to deploy a minimum of two protected species observers on the source vessel or drilling rig, as appropriate, to 1) increase the probability of detecting all sea otters in or approaching the Level B harassment zone and 2) assist in the collection of data on activities, behaviors, and movements of sea otters within the disturbance zone.

*Pre- and post-activity monitoring*

FWS proposed that applicants conducting seismic activities monitor the disturbance zone and adjacent waters for sea otters for at least 30 minutes before initiating ramp-up procedures. Pre-activity monitoring for marine mammals is typically required only for the exclusion zone (in this case the 190-dB re 1  $\mu$ Pa threshold). Although not specified, this pre-activity monitoring requirement also should apply also to pile driving activities before initiating soft-start procedures<sup>4</sup>. In addition, FWS should specify how long ramp-up (for seismic activities) and soft-start (for pile driving) procedures should be delayed if a sea otter is detected within the exclusion zone. Typically, if a marine mammal(s) is sighted in the exclusion zone during the 30-minute period prior to ramp up (for seismic activities) or soft start (for pile-driving activities), those activities would be delayed until the marine mammal(s) is sighted outside of the exclusion zone or the animal(s) is not sighted for at least 15 minutes<sup>5</sup>. Therefore, the Commission recommends that FWS (1) require that BlueCrest implement soft-start procedures for pile-driving activities and (2) require that, if a sea otter(s) is observed approaching or within the exclusion zone, all applicants delay ramp-up/soft-start procedures until the sea otter(s) is sighted outside of the exclusion zone or the otter(s) is not sighted for at least 15 minutes.

In addition, FWS did not propose post-activity monitoring for any activities. Post-activity monitoring is necessary to ensure that sea otters are not taken in unexpected or unauthorized ways or in unanticipated numbers. Some types of taking (e.g., taking by death or serious injury) may not be observed until after activities have ceased. Post-activity monitoring is the best way, and in some situations may be the only reliable way, to detect certain impacts. Accordingly, the Commission

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<sup>4</sup> Soft-start procedures for pile driving are typically required at the beginning of each day and when pile driving has stopped for more than 30 minutes. The procedures involve initiating a set of three strikes from the impact hammer at reduced percent energy with a 1-minute waiting period between subsequent three-strike sets. This procedure is repeated at least two additional times before full energy is reached.

<sup>5</sup> A 15-minute delay is typically required for species with relatively short dive times, such as sea otters, pinnipeds, and small odontocetes.

recommends that FWS require all applicants to monitor the disturbance zone for at least 15 minutes after all proposed activities have ended.

*Emergency shut-down procedures*

FWS has proposed implementing emergency shut-down procedures if one or more sea otters are within the area of seismic activities and are indicating acute distress. Those procedures should apply not just to seismic activities but instead to all authorized activities that have the potential to harass or disturb sea otters. The Commission recommends that FWS require BlueCrest to implement emergency shut-down procedures if a sea otter(s) is within the area of exploratory drilling activities and is exhibiting acute distress.

**Reducing the potential for duplicative seismic surveys**

FWS has proposed to authorize the incidental taking of sea otters for two applicants that could conduct seismic surveys in Cook Inlet in 2014 and 2015. Although the map provided in the *Federal Register* notice (Figure 1) shows that the proposed seismic activities are adjacent, the map of SAE's project area in its application (Figure 2) indicated that that area was actually much larger and overlapped considerably with Apache's project area. If overlap is expected for proposed or future authorizations, the applicants should be encouraged to collaborate on proposed seismic activities so that sea otters are not subject to unnecessary, avoidable risks. Section 101(a)(5)(D)(ii)(I) of the MMPA directs FWS to structure incidental harassment authorizations so that they prescribe "other means of effecting the least practicable impact on such species or stock and its habitat." Allowing multiple operators to obtain separate authorizations to conduct surveys in the same area during the same timeframe would be inconsistent with that mandate. The Commission recommends that, if two or more applicants are proposing to conduct seismic surveys in the same areas, FWS encourage those companies to collaborate on the proposed surveys to minimize harassment of sea otters.

I trust these comments will be helpful. Please let me know if you or your staff has questions with regard to the Commission's recommendations.

Sincerely,

A handwritten signature in blue ink that reads "Rebecca J. Lent".

Rebecca J. Lent, Ph.D.  
Executive Director

cc: Jolie Harrison, National Marine Fisheries Service, Office of Protected Resources  
Jon Kurland, National Marine Fisheries Service, Alaska Regional Office

## References

- Austin, M.A., and G. Warner. 2012. Sound source acoustic measurements for Apache's 2012 Cook Inlet seismic survey: Version 2.0. Technical report for Fairweather LLC and Apache Corporation by JASCO Applied Sciences. 16 pages.
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- Collins, K., A. MacGillivray, and S. Turner. 2007. Underwater source level measurements of airgun sources from ConocoPhillips' 2007 Beluga 3D seismic survey, Cook Inlet, Alaska. Unpublished report prepared by JASCO Research Ltd. for Veritas DGC. 27 pages.
- Shelden, K.F.W., D. J. Rugh, K. T. Goetz, C. L. Sims, L. Vate Brattström, J. A. Mocklin, B. A. Mahoney, B. K. Smith, and R. C. Hobbs. 2013. Aerial surveys of beluga whales, *Delphinapterus leucas*, in Cook Inlet, Alaska, June 2005 to 2012. NOAA Technical Memorandum NMFS–AFSC–263. 122 pages.
- Warner, G., J. Wladichuk, and D.E. Hannay. 2011. Hydroacoustic modeling of airgun noise for Apache's Cook Inlet seismic program: 24-Hour harassment area calculations Version 1.0. Technical report for NES-LLC by JASCO Applied Sciences. 15 pages.

### **Appendix—Errors within the *Federal Register* notice**

- Page 51585 Table 1 should specify the distances to the 160- and 190-dB re 1  $\mu$ Pa harassment thresholds actually proposed by Apache, as indicated in Table 5.4 and Appendix B of Apache's application.
- Page 51585 (first column) stated that the area to be surveyed by Apache is identified in its application as *Area 2*. However, there is no reference to Area 2 in Apache's application, rather Apache referred to its proposed survey area as the *South Kenai Offshore Area*.
- Page 51585 (first column) and page 51587 (3rd column) stated that Apache plans to conduct the seismic surveys *south of Ninilchik*. However, Figure 1 of the notice and Figure 1-1 of Apache's application shows the project area as an area north of Ninilchik and south of Nikiski. The notice should instead have stated either *north of Ninilchik* or *south of Nikiski*.
- Page 51590 (first column) stated that "Exposure to unmitigated noise levels in the water greater than 160 dB re 1  $\mu$ Pa (rms) will be considered by the Service as potentially injurious *Level A* take; and levels above 190 dB re 1  $\mu$ Pa (rms) are defined as the Level A take threshold for sea otters." The notice should instead have stated that the exposure to sound levels greater than 160 dB re 1  $\mu$ Pa (rms) will be considered a *Level B* take.
- Page 51590 Table 2 should have specified that the safety zone radii referenced are for *SAE's* proposed seismic activities. It should also have included the distances to the 160-dB re 1  $\mu$ Pa harassment thresholds for each of the referenced airgun arrays (440-, 880-, and 1,760-cubic inch).
- Page 51592 (first column) stated that "Sea otters may be disturbed at noise levels between 160 dB to 190 dB, where disturbance can occur (Level B harassment) out to approximately *0.75 km (2.5 mi)*." The referenced distance to BlueCrest's 160-dB re 1  $\mu$ Pa harassment zone for VSP activities should have been *2.5 km*, as noted on page 51591 (second column).
- Page 51594 Table 4 needs to switch the row designations for BlueCrest and SAE to align with the correct "Numbers of takes" and "Numbers of sea otters taken" for each applicant.
- Page 51596 (second column) stated that "...an acoustically verified disturbance zone surrounding seismic source arrays where the received level will be  $\geq 180$  dB re 1  $\mu$ Pa..."; the referenced threshold should have been *160 dB re 1  $\mu$ Pa*. The same error in reference to the harassment threshold for the disturbance zone also occurs on page 51596 (third column).