UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

November 7, 2018

Ted A. Murphy, Acting State Director
Bureau of Land Management
Alaska State Office
222 West Seventh Avenue, #13
Anchorage, Alaska 99513-7504

Re: SAExploration, Inc. (SAE) Arctic National Wildlife Refuge Coastal Plain Marsh Creek Vibroseis Project Letter of Concurrence, NMFS #AKR-2018-9821

Dear Mr. Murphy:

The National Marine Fisheries Service (NMFS) has completed informal consultation under section 7(a)(2) of the Endangered Species Act (ESA) regarding the Bureau of Land Management's (BLM) proposed authorization of SAE's Vibroseis Project located in Arctic National Wildlife Refuge (ANWR) Coastal Plain Marsh Creek 1002 Area near Kaktovik, Alaska (Figure 1). The BLM requested written concurrence that the proposed action may affect, but is not likely to adversely affect, the threatened Arctic subspecies of ringed seal (*Phoca hispida hispida*).

While the project may overlap with the ranges of both the endangered bowhead whale (*Balaena mysticetus*) and threatened Beringia distinct population segment bearded seal (*Erignathus barbatus nauticus*), the project will be conducted during the in-ice season of January through May when these species are not anticipated to be in the area. During winter and spring, bowhead whales are closely associated with pack ice or polynas and are anticipated to be in the northern Bering and Chukchi Sea. Although bearded seal vocalizations (produced by adult males) have been recorded nearly year-round in the Beaufort Sea (MacIntyre et al. 2013, MacIntyre et al. 2015), most bearded seals overwinter in the Bering Sea. In addition, during late winter and early spring, the Beaufort Sea is covered with shorefast ice and the nearest lead systems are at least several kilometers away, making the area unsuitable habitat for bearded seals (BOEM 2017). Therefore, bearded seals are not expected to be encountered in or near the action area when the project occurs. BLM determined that this project will have no effect on bowhead whale or bearded seal due to project timing. Therefore, bowhead whale and bearded seal will not be discussed further in this consultation.

Based on our analysis of the information you provided to us, and additional literature cited below, NMFS concurs with your determination.

This letter underwent pre-dissemination review in compliance with applicable Data Quality Act guidelines. A complete administrative record of this consultation is on file in this office.

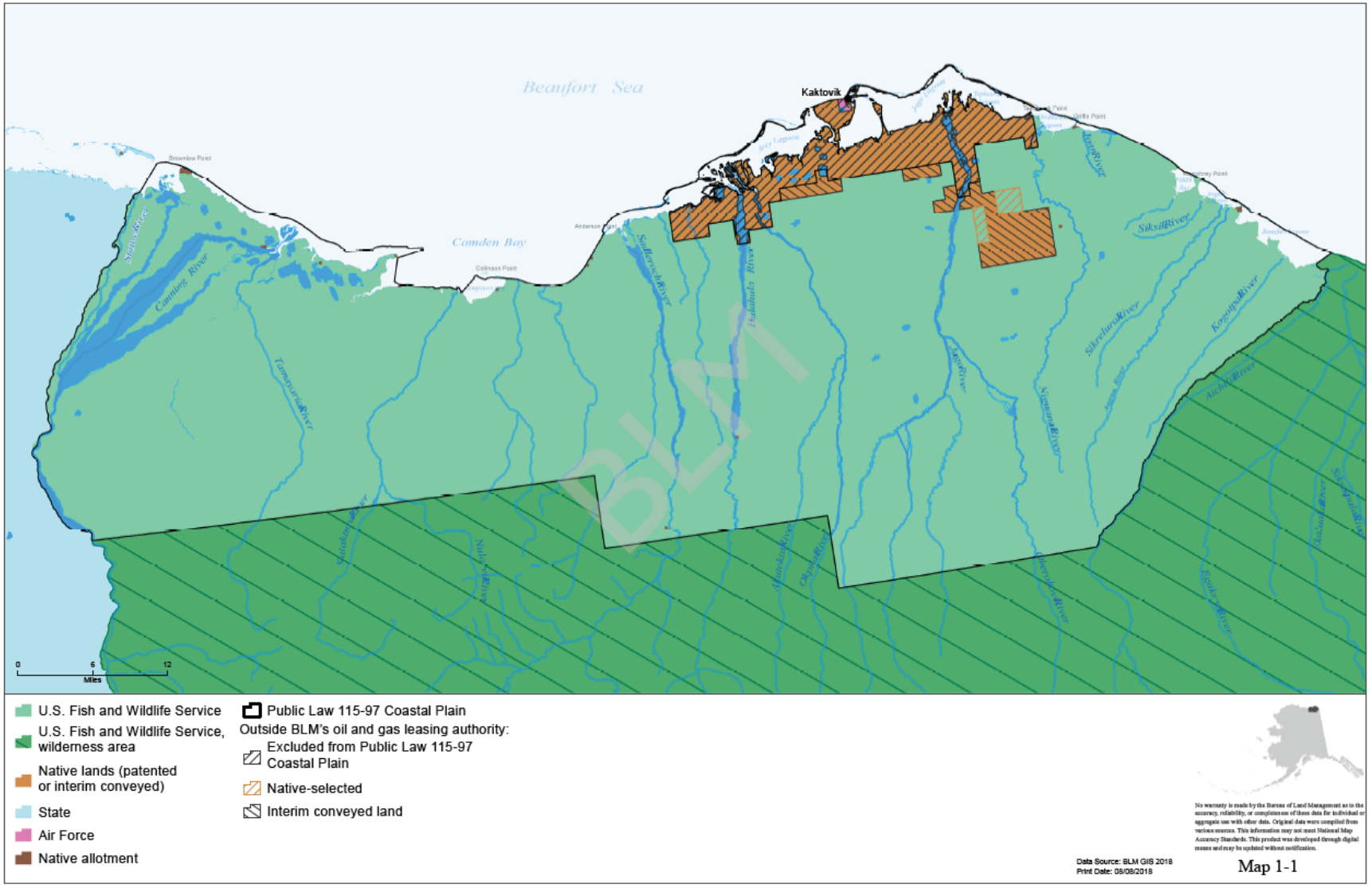

Figure 1. Proposed project location is area 1002 of ANWR in all marine area less than 10 feet (within black line) (BLM 2018).

Consultation History

NMFS received your request for informal consultation on October 10, 2018, and initiated consultation the same day.

Description of Proposed Action

BLM is proposing to issue a geophysical exploration permit to SAE to conduct vibroseis seismic surveys within the 1002 Area of the ANWR beginning during the winter season (January through May) of 2018-2019 and concluding during the winter season of 2019-2020. The survey permit area encompasses approximately 2,602 square miles (see Figure 2) (SAE 2018). SAE anticipates staging equipment at existing facilities in Deadhorse, Alaska. Equipment will be trucked via road to a point of access to the tundra or sea ice.

Each seismic operation would be conducted utilizing 12-15 rubber tracked vibroseis vehicles (vehicles would be switched to oversize wheels for sea ice operations) and 20,000 to 25,000 wireless autonomous recording devices (nodes/geophones). With two crews working, there could be 24-30 vibroseis vehicles and 40,000-50,000 recording devices used at any one time. Receiver points (20,000-25,000) occupied with recording devices would be laid out along lines that are perpendicular to source lines (routes driven by the vibrators). There could be up to 48 recording devices along each line, placed on the ground at a time with approximately 32 lines being active at any given time. Although there may only be 32 lines required to be recorded for any given source point, all wireless recording devices on the ground would record 24 hours per day. Vibroseis vehicles would be positioned between 41.25 and 200 feet from adjacent recording devices on a given line. In a typical square mile there would be 4 linear miles of recording devices and 8 linear miles of source. For normal operations, receivers would be transported to and from each location with a low ground pressure Tucker tracked vehicle that could carry up to 220 recording devices and would be manned by 3 personnel. Recording operations would run 24 hours per day utilizing two 12-hour shifts.

In order to maintain data quality, lines should not be moved more than 30 percent of the cross line distance; however, in areas that require avoidance due to wildlife or terrain, some points would not be used. Any movement of source or receiver or exclusion of source/receiver would result in a reduction or loss of data or quality of data.

The energy source for the seismic wave is from the vibroseis vehicle which would exert 64,000 pounds of peak force on the ground. Each source point is occupied by a single vibroseis vehicle which generates frequencies during a "sweep" of approximately 1.5 to 96 Hz and is designed to penetrate the ground. The duration of each sweep is anticipated to be 16 to 24 seconds per source point. Multiple vibroseis vehicles, spaced at least 1,320 feet apart, would collect data at the same time. This methodology allows for only a single vibroseis vehicle to travel down any source line. Vibroseis vehicles would only operate on snow covered tundra or grounded ice. Recording devices would be laid out beyond grounded ice but not further than the 10-foot bathymetry mark in lagoons. At no time would any vehicles travel on waters beyond the 10-foot bathymetry mark within lagoons and near shore areas.

Vibroseis source pressure waveforms are typically frequency sweeps below 100 Hz, though strong harmonics may exist to 1.5 kHz, and with signal durations of 5 to 20 seconds. They are categorized as continuous noise source (Beaten 1989, Richardson *et al.* 1995). The measurement of on-ice vibroseis source levels in shallow water is complicated by interference from bottom and surface reflections, and as a consequence there is considerable variability in the published source levels. Maximum in-water source levels have been recorded at 210 dB re 1 re 1µPa at 1 m (Richardson et al. 1995). Holliday et al. (1983) estimated that in-water vibroseis sounds would diminish to the ambient noise level at distances of 3.5-5 km. The in-air source levels is anticipated to be 117 dB re 20µPa at 10 m and may be expected to decline to 100 dB re 20 µ within 12 m (BLM 2018).

Action Area

The action area is defined in the ESA regulations (50 CFR 402.02) as the area within which all direct and indirect effects of the project will occur. The action area is distinct from and larger than the project footprint because some elements of the project may affect listed species some distance from the project footprint. The action area, therefore, extends out to a point where no measurable effects from the project are expected to occur.

The action area for this project will include: (1) marine and coastal sites (located in 10 feet of water or less) proposed for vibroseis operations in area 1002 of ANWR (Figure 2); (2) sound propagation buffer around vibroseis locations; and (3) transportation routes.

The loudest sound source associated with the proposed action would result from vibroseis operations. In-water received sound levels associated with vibroseis are anticipated to decline to ambient noise levels within 5 km of the source (i.e., the point where no measureable effect from the project would occur) (Holliday et al. 1983). The in-air source levels are anticipated to be 117 dB re 20µPa at 10 m and may be expected to decline to 100 dB re 20 µPa within 12 m (BLM 2018).

Transit is anticipated to occur from Deadhorse to and from marine vibroseis locations in the 1002 area of ANWR.

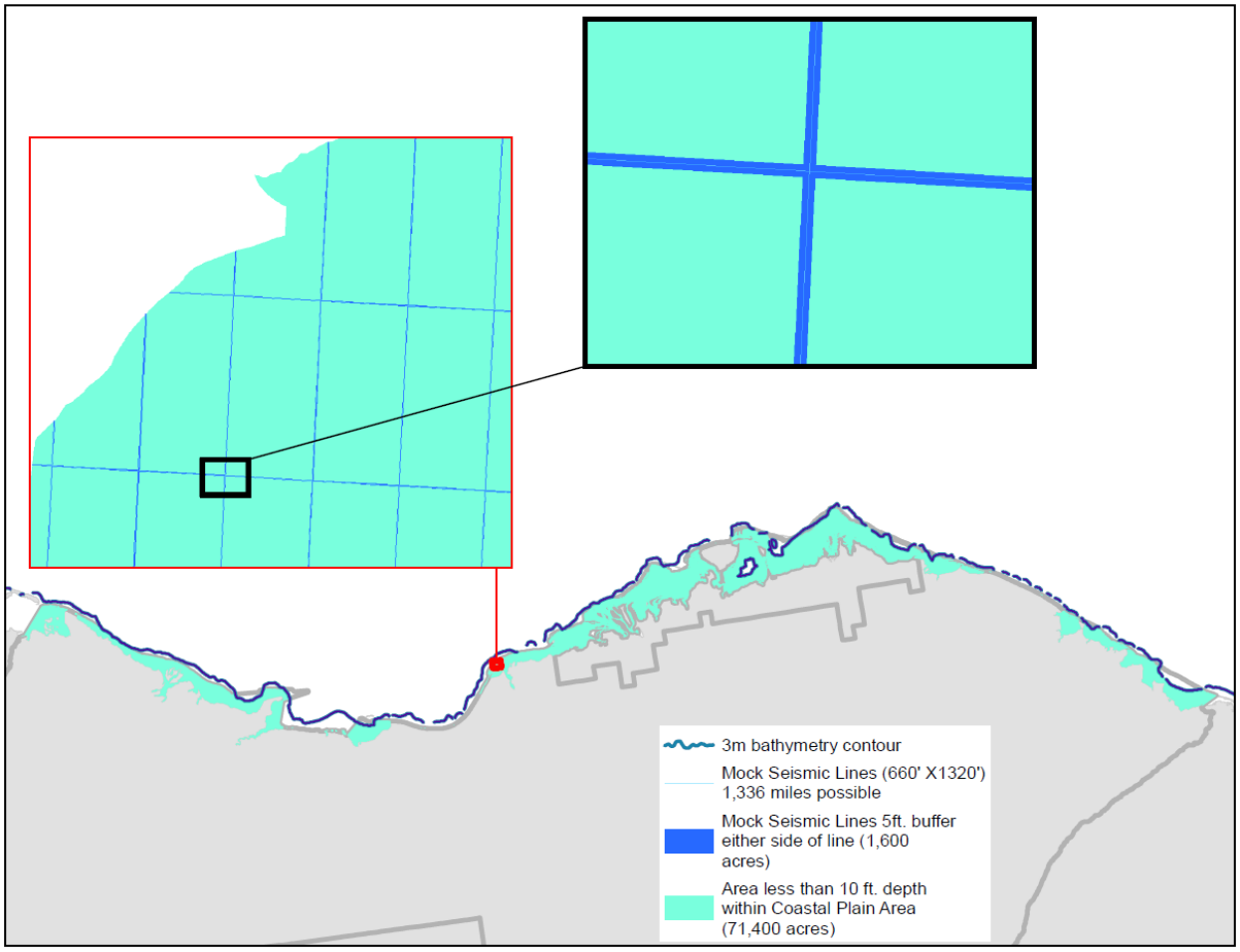

Figure 2. Potential seismic operations within waters less than 10 feet covering approximately 2,602 square miles (BLM 2018).

Mitigation Measures

The BLM informed NMFS via letter received October 10, 2018, that the project would incorporate the following required mitigation measures to avoid impacts to ringed seals. Revisions to mitigations measures were provided November 11, 2018.

1. Aircraft used along the coast and shore fast ice zone will maintain minimum altitude of 3,000 feet when within 1 mile from seals, unless doing so would endanger human life or violate safe flying practices.
2. Prior to the start of vibroseis operations, the operator would conduct a sound source verification (SSV) test to measure the distance to attenuate vibroseis sound levels through grounded ice to the 120dB re 1 µPa threshold in open water and water within ungrounded ice. Once the distance to the 120 dB threshold has been determined, it will be shared with the BLM Authorized Officer (AO) and NMFS. All subsequent vibroseis operations will be conducted at a minimum of this measured distance to the 120 dB isopleth away from open water and ungrounded ice to buffer noise propagation and reduce the potential

for ringed seals to be exposed at noise levels that may cause harassment. The operator will draft a formal study proposal for vibroseis SSV that will be submitted to the BLM and the NMFS for review and approval six weeks before operations begin.

3. Maintain airborne sound levels of equipment below 100 dB re 20 µPa at 20 meters. If different equipment would be used than was originally proposed, SAE must inform the AO and share sound source level and air and water attenuation information for the new equipment.
4. Operations after May 1 will employ a full-time protected species observer (PSO) on all vibroseis vehicles to ensure all basking seals will be avoided by vehicles with a buffer of at least 500 feet. Any sightings of basking seals will require a 500-foot buffer be placed around the location, and the location will be reported to the AO using a NMFS-approved observation form. A draft form will be provided to NMFS for review and approval six weeks before operations begin.
5. All work is restricted to areas with the 10 foot bathymetric line. All vehicle operations on sea ice will take place on grounded ice, with the exception of snow machines to set and retrieve recorders. On ungrounded ice, snow machine ice paths must not be greater than 3 feet wide. No driving for all vehicles beyond the edges of the ice path or off of planned routes will be allowed unless necessary to avoid ungrounded ice or for other human or marine mammal safety reasons.
6. No unnecessary equipment or operations (e.g. camps) will be located on ungrounded sea ice or within the 120 dB isopleth specified in mitigation measure 2. In addition, no equipment will be operated within 500 feet of basking seals as identified in measure 4.
7. A NMFS and BLM approved training session for all staff will be held prior to workers entering the field. The training will cover seal identification, biology, and status; seal lair descriptions; snow/ice/topographical factors that lead to birthing lair development; minimizing driving over such areas; and all applicable mitigation measures.

Arctic Ringed Seal

The only listed species anticipated to occur within the action area during the time of operations is the Arctic subspecies of ringed seal. No critical habitat has been designated for this species.

The Alaska stock of ringed seals is the only stock that occurs in U.S. waters and within the proposed action area. This stock is part of the Arctic ringed seal subspecies. Arctic ringed seals have a circumpolar distribution, occur in all seas of the Arctic Ocean, and range seasonally into adjacent seas, including the Bering Sea. Arctic ringed seals are year-round residents in the Chukchi and Beaufort Seas. They are the most common seal species present in ANWR (BLM 2018).

NMFS listed Arctic ringed seals as threatened under the ESA on December 28, 2012 (77 FR 76706), primarily due to anticipated loss of sea ice through the end of the 21st century due to ongoing climate change (Kelly et al. 2010b).

Arctic ringed seals are thought to number over 1 million, while the Alaska stock is estimated to number at least 300,000 seals (Kelly et al. 2010b, Muto et al. 2018). A reliable estimate of the trend in abundance of the Alaska stock of ringed seals is not currently available (Muto et al. 2018).

Arctic ringed seals remain in contact with sea ice most of the year and use it as a platform for pupping and nursing in late winter and early spring, molting from late spring to early summer, and resting throughout the year (Figure 3). Female ringed seals give birth to one pup between late March and mid-April in subnivean lairs excavated in the snow drifts that accumulate upwind and downwind of ice ridges (Smith and Stirling 1975, Furgal et al. 1996), or in cavities occurring between ice chunks in pressure ridges (McLaren 1958, Kelly 1988b). They are also known to construct lairs in ice formations caused by industry activities, such as ice road construction (Williams et al. 2006). Snow depths of at least 20 to 26 inches are required for functional birth lairs, and such depths typically are found only where 8 to 12 inches or more of snow has accumulated on flat ice and then drifted along pressure ridges or ice hummocks. Ringed seals are well-adapted to occupying shorefast and pack ice and rarely observed onshore (Kelly et al. 2010a, Kelly et al. 2010b). The seasonality of ice cover strongly influences ringed seal movements, foraging, reproductive behavior, and vulnerability to predation. Few seals inhabit ice-covered waters shallower than 10 feet due to water freezing to the ocean floor and/or poor prey availability caused by the limited amount of ice-free water.

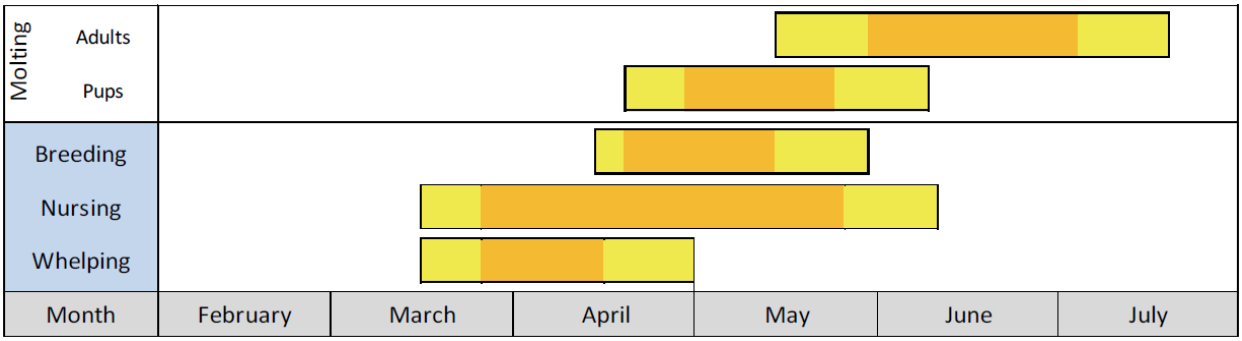

Figure 3. Approximate annual timing of Arctic ringed seal reproduction and molting. Yellow bars indicate the "normal" rnage over which each event is reported to occur, and orange bars indicate the "peak" timing of each event (Kelly et al. 2010b).

Ringed seal densities historically have been substantially lower in the western than the eastern part of the Beaufort Sea (Burns et al. 1982, Kelly 1988a). The lower densities to the west appear to be related to very shallow water depths in much of the area between the shore and barrier islands. Surveys flown from 1996-1999 indicate that the highest density of seals along the central Beaufort Sea coast in Alaska occurred from approximately Kaktovik west to Brownlow Point (Frost et al. 2004) within the action area. This may be due to the fact that relative productivity, as measured by zooplankton biomass, is approximately four times greater there than the average biomass in other areas of the eastern Beaufort Sea (Frost et al. 2004). Frost et al. (2004) reported slightly higher ringed seal densities in the pack ice (0.92-1.33 seals/km^2 [0.4 mi^2]) than in the shorefast ice (0.57-1.14 seals/km^2 [0.4 mi^2]) in the central Beaufort Sea, during late May and early June of 1996-1999; when seals are most commonly hauled out on the ice. During summer, high densities of ringed seals are closely associated with the offshore pack ice and ice remnants,

and are much lower in open-water environments (Burns et al. 1980; Smith 1987; Kelly et al. 2010). Within the action area during the period of the proposed action, ringed seal density is unknown, but it is estimated to be low due to the shallow (primarily less than 10 feet in water depth) nature of the nearshore lagoon areas, which contain partially grounded ice in the winter (BLM 2018).

Ringed seals eat a wide variety of prey in several trophic levels. They most commonly eat small fish (5-10 cm) and crustaceans (2-6 cm). Regional variation in diet is likely due to differences in prey availability and preference, oceanographic differences (e.g., water depth), and sea ice cover (Kelly et al. 2010b). Despite regional differences, gadid fishes tend to be the primary prey of ringed seals from late autumn to early spring, and Arctic cod (*Boreogadus saida*) is often reported to be the most common gadid in seal diets during ice covered months. Invertebrates appear to be an important diet component during open-water months, and large zooplankton are also a significant prey item seasonally (Kelly et al. 2010b).

Ringed seals vocalize underwater in association with territorial and mating behaviors. Underwater audiograms for phocids suggest that they have very little hearing sensitivity below 1 kHz, and make calls between 90 Hz and 16 kHz (Richardson et al. 1995). NMFS defines the function hearing range for phocids as 50 Hz to 86 kHz (NMFS 2018).

Effects of the Action

For purposes of the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is "not likely to adversely affect" listed species or critical habitat is that all of the effects of the action are expected to be insignificant, discountable, or completely beneficial. Insignificant effects relate to the size of the impact and are those that one would not be able to meaningfully measure, detect, or evaluate, and should never reach the scale where take occurs. Discountable effects are those that are extremely unlikely to occur. Beneficial effects are contemporaneous positive effects without any adverse effects to the species.

This consultation includes recent NMFS guidance on the term "harass," which means to: "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Wieting 2016).

The potential effects of the proposed action on listed species include: acoustic disturbance, physical harm or lair destruction, and visual disturbance.

<u>Acoustic Disturbance</u>
Since 1997 NMFS has used generic sound exposure thresholds to determine whether an activity produces underwater sounds that might result in impacts to marine mammals (70 FR 1871). NMFS recently developed comprehensive guidance on sound levels likely to cause injury to marine mammals through onset of permanent and temporary threshold shifts (PTS and TTS; Level A harassment) (83 FR 28824). NMFS is in the process of developing guidance for behavioral disruption (Level B harassment). However, until such guidance is available, NMFS

uses the following conservative thresholds of underwater sound pressure levels[1], expressed in root mean square[2] (rms), from broadband sounds that cause behavioral disturbance, and referred to as Level B harassment under section 3(18)(A)(ii) of the Marine Mammal Protection Act (MMPA):

- impulsive sound: 160 dB re 1 μPa_{rms}
- continuous sound: 120 dB re 1μPa_{rms}

Ringed seals are disturbed by received airborne sounds ≥ 100 dB re 20 µPa and from aquatic sounds ≥ 120 dB re 1 µPa. Thresholds for underwater sounds that cause injury (see Table 1), incorporate marine mammal hearing groups (Table 2) and auditory weighting functions, which are defined in the Technical Guidance (NMFS 2018).

Table 1. PTS Onset Acoustic Tresholds based on Hearing Group (NMFS 2018b).

Hearing Group	**PTS Onset Acoustic Thresholds*** **(Received Level)**	
	Impulsive	**Non-impulsive**
Low-Frequency (LF) Cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	$L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	$L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure (L_{pk}) has a reference value of 1 µPa, and cumulative sound exposure level (L_E) has a reference value of 1μPa^2s. The subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

[1] Sound pressure is the sound force per unit micropascals (µPa), where 1 pascal (Pa) is the pressure resulting from a force of one newton exerted over an area of one square meter. Sound pressure level is expressed as the ratio of a measured sound pressure and a reference level. The commonly used reference pressure level in acoustics is 1 µPa, and the units for underwater sound pressure levels are decibels (dB) re 1 µPa.

[2] Root mean square (rms) is the square root of the arithmetic average of the squared instantaneous pressure values.

Table 2. Underwater marine mammal hearing groups (NMFS 2018b).

Hearing Group	ESA-listed Marine Mammals In the Project Area	Generalized Hearing Range[1]
Low-frequency (LF) cetaceans *(Baleen whales)*	Bowhead whales	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans *(dolphins, toothed whales, beaked whales)*	None	150 Hz to 160 kHz
High-frequency (HF) cetaceans *(true porpoises)*	None	275 Hz to 160 kHz
Phocid pinnipeds (PW) *(true seals)*	Ringed and bearded seals	50 Hz to 86 kHz
Otariid pinnipeds (OW) *(sea lions and fur seals)*	None	60 Hz to 39 kHz

[1]Respresents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species' hearing ranges are typically not a broad. Generalized hearing range chosen based on ~65 db threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall et al. 2007) and PW pinniped (approximation).

Vibroseis is considered the loudest noise source associated with the proposed action and will be the focus of the effects analysis. Vibroseis source pressure waveforms are typically frequency sweeps below 100 Hz, though strong harmonics may exist to 1.5 kHz, and with signal durations of 5 to 20 seconds. They are categorized as continuous noise source (Beaten 1989, Richardson *et al.* 1995). Maximum in-water source levels have been recorded at 210 dB re 1 re 1µPa at 1 m (Richardson et al. 1995). Holliday et al. (1983) estimated that in-water vibroseis sounds would diminish to the ambient noise level at distances of 3.5-5 km. The in-air source level is anticipated to be 117 dB re 20µPa at 10 m and may be expected to decline to 100 dB re 20 µ within 12 m (BLM 2018). We anticipate similar propagation distances associated with the proposed action. However, a sound source verification study will be performed to confirm distances to harassment zones, and adjustments will be made to vibroseis operations accordingly (e.g., moved back from the open water and unground ice edge).

We do not anticipate that this project will expose ringed seals to in-water sound pressure levels that reach Level B acoustic thresholds because: 1) we expect few ringed seals to be present in the 10 feet or less of water where vibroseis operations will be conducted, 2) the majority of vibroseis operations are anticipated to be below ringed seal hearing sensitivity,[3] and 3) SSV is being conducted to determine the 120 dB buffer distance from open water and ungrounded ice for subsequent vibroseis operations which minimizes the risk of exposure. We do not anticipate that ringed seals will be exposed to project-related noise, and if exposure were to occur, mitigation measures would make exposure to sound levels in excess of Level B MMPA take thresholds extremely unlikely. Therefore, we conclude such effects are discountable.

In addition, we do not anticipate any harassment from airborne noise because: 1) mitigation measures are in place to reduce airborne sound levels below the harassment threshold, and 2) during the majority of operations, ringed seals are anticipated to be within lairs which are good

[3] Vibroseis operations are anticipated to have a frequency sweep of approximately 1.5 to 96 Hz with harmonics up to 1.5 kHz. Ringed seals audiograms indicate they have very little hearing sensitivity below 1 kHz. Phocid functional hearing range is 50 Hz to 86 kHz (NMFS 2018).

insulators from airborne sound, further reducing exposure. For these reasons we do not anticipate ringed seals will be exposed to airborne noise, and if they were exposed it is assumed to be at low levels that would not result in take and responses would be too small to detect or measure. Thus, the effects are considered insignificant.

Noise generated from vibroseis can reduce the fitness and survival of fish used by foraging marine mammals; however, given the low anticipated exposure into the marine environment and the fact that any physical changes to this habitat would not measurably reduce the localized availability of fish (Fay and Popper 2012), it is unlikely that ringed seals would be affected. We consider potential impacts to prey resources to be insignificant.

Physical Harm or Lair Destruction

The impact of tracked vehicles traveling over seal structures has not been accurately measured or studied. Three events of seals being directly impacted by vehicles have been recorded by industry on Alaska's North Slope since 1998 (BLM 2018). On April 17, 1998, during a vibroseis on-ice seismic operation outside of the barrier islands east of Bullen Point in the eastern Beaufort Sea, a ringed seal pup was killed when its lair was destroyed by a Caterpillar tractor clearing a road. The lair was located on ice over water 9 m (29 ft) deep with an ice thickness of 1.3 m (4.3 ft). It was reported that an adult may have been present in the lair when it was destroyed (MacLean 1998). On April 24, 2018, a tucker traveling on a Northstar sea ice trail broke through a brine pocket. After moving the tucker, a seal pup climbed out of the hole in the ice, but no adult was seen in the area. The seal pup remained in the area for the next day and a half. This seal was seen in an area with an estimated water depth of 6 to 7 m (20 to 24 ft) (Hilcorp 2018). The third reported incident occurred April 28, 2018, when an ENI contractor performing routine maintenance activities to relocate metal plates beneath the surface of the ice road from Oliktok Point to Spy Island Drillsite spotted a ringed seal pup next to what may have been a disturbed lair site located adjacent to snow and ice that had been bladed off the crown of the road. No adult was seen in the area. The pup appeared to be acting normally and was seen going in/out of the opening several times (ENI 2018).

An exposure analysis associated with the proposed action was conducted to estimate the magnitude of take of ringed seals that may result from this action. At most decision points of this analysis, the most conservative estimates or calculations were used. This analysis indicated an estimated 7.33 ringed seal birthing lairs may be present within the action area. This was determined using Williams et al. (2001, 2002) data from a survey using trained search dogs for the Northstar project in a nearby area of the Beaufort Sea. Density of all types of lairs in areas less than 10 feet deep was one lair per 964 acres. According to Frost et al. (1989), only 18% of lairs are birthing lairs. Within the estimated 39,270 acres of ungrounded sea ice under 10 feet deep in the 1002 area of ANWR, we anticipate up to 41 lairs, of which approximately 7 may be birthing lairs (BLM 2018).

Lethal take from collapsing of birthing lairs is unlikely to occur in association with the proposed action. While the majority of the planned work would take place during March and April when seals are in birthing lairs, all heavy equipment and vehicles will be restricted to grounded ice where lairs do not normally occur. Of the 71,400 acres of sea ice potentially formed over waters less than 10 feet deep in the project area, approximately 55% (39,270 acres) would be

ungrounded and potentially capable of supporting ringed seal birthing lairs (SAE 2018). On this unground portion of the action area, only snow machines would be used, with 3-foot-wide paths 660 feet apart, with an assumed 25% increase in driving distances for avoidance of areas for human or marine mammal safety. This would result in snow machine travel on approximately 400 acres of ungrounded ice. An estimated 0.041 birthing lairs could be driven over by snow machines (for detailed calculations, see Attachment 2 of initiation package) (BLM 2018). The rate of collapse of birthing lairs from snow machine driving is unknown. However, snow machines exert an average pressure in pounds per square inch (PSI) of 0.3, compared to a PSI of 1.7 for a Tucker. The snow machines' low level of downward pressure on the snow is expected to greatly reduce potential impacts to over-driven seals in lairs relative to impacts on lairs due to Tucker.

Additional factors that would reduce the impacts of potential crushing of a lair, but which are not included in the numerical calculation due to lack of data, include the ability of an older pup to rapidly flush from a birthing lair (which they do commonly). Mitigation measures included as part of this project are expected to reduce the likelihood that such crushing events will occur.

As a result of our final analysis, we anticipate physical harm to ringed seals or lair destruction associated with the proposed action to be extremely unlikely to occur (0.041, or about a 1 in 25 chance of even a single animal being harassed). We consider this probability of take of ringed seals to be very small, and adverse effects from equipment harassing or harming animals or destroying the integrity of lairs are extremely unlikely to occur. Therefore, we conclude that the adverse effects from these on-ice activities on ringed seals are discountable.

Visual Disturbance

If vibroseis occurs during molting periods (mid-May to mid-July for adults, and mid-April to mid-June for pups) there is potential for more overlap and exposure of ringed seals to physical presence and visual disturbance, as animals tend to spend hours hauled out on the ice.

Seals present on the ice would be avoided. Mitigation measures are in place that require PSOs for any operations that occur after May 1st, and require a 500 ft avoidance buffer for any seal that is observed. If animals are disturbed due to visual disturbance, they may flush into the water, but this behavior is not anticipated to result in a significant disruption of behavior, and would not rise to the level of take.

The resulting impact of visual disturbance is very minor, and thus adverse effects to ringed seals will be immeasurably small. Therefore, we conclude that the adverse effects due to visual impact on ringed seals are insignificant.

Conclusion

Based on this analysis, NMFS concurs with your determination that the proposed action may affect, but is not likely to adversely affect, the Arctic subspecies of ringed seals**.** Reinitiation of consultation is required where discretionary federal involvement or control over the action has been retained or is authorized by law and if (1) take of listed species occurs, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an

extent not previously considered, (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter, or (4) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16).

Please direct any questions regarding this letter to Alicia Bishop at alicia.bishop@noaa.gov or 907-586-7224.

Sincerely,

Jonathan M. Kurland
Assistant Regional Administrator
for Protected Resources

cc: ctburns@blm.gov (BLM)
craig.perham@boem.gov (BOEM)

REFERENCES

BLM. 2018. Request to initiate informal Endangered Species Act (ESA) section 7 consultation on the proposed SAExploration, Inc. (SAE) Arctic National Wildlife Refuge Coastal Plain Marsh Creek Vibroseis Project.

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