

Seismic Survey Activities in the Arctic

Arctic National Wildlife Refuge (ANWR)

Environmental stewardship is a seismic industry priority. The seismic industry is committed to conducting its operations in an environmentally responsible manner and incorporates mitigation measures to further reduce any potential impacts to wildlife and the environment. The industry also employs continuous and iterative risk assessment and management as early in the project lifecycle as possible to ensure continual reduction of disturbance risk during land and marine surveys.

This is of particular focus for the permit applicant when operating in areas such as the Arctic and Alaska which are home to abundant and diverse wildlife, as well as cultural and ecological sensitivities. In the Arctic and Alaska, the permit applicant's environmental stewardship includes additional protective measures to ensure there are negligible to no impacts to the polar bear, its habitat and the tundra biome. More specifically, surveys are carefully timed and conducted to avoid or minimize wildlife impacts and avoid interfering with subsistence hunting and fishing.

ENVIRONMENT

While trails of seismic surveys from the 70's and 80's may still be seen on the landscape, more than 90% of the trails recovered within 10 years, and industry practices have evolved tremendously since that time. This means today's surveys leave little to no observable impacts. Opponents of Arctic exploration fail to recognize or acknowledge that the regulations, vehicles, and industry practices used have changed drastically since surveys were conducted decades ago specifically to prevent such effects.



Today, primary trails are groomed and seismic survey vehicles operate when the tundra is frozen. Vehicles have strict guidelines regarding slopes on which they can operate and terrain they can access. Seismic trail locations are primarily governed by terrain, morphology and vehicle safety. Significant efforts with various remote sensing (RS) data are undertaken as a precursor to field operations. RS technology has evolved extensively in the past twenty years, contributing to enhanced and advanced operational plans and techniques. This applies to all off-road vehicles, and only vehicles approved by the

appropriate regulator for winter use are utilized.

Winter Tundra Travel: Winter survey activities mitigate or reduce a great deal of potential environmental impacts because snow and frost provide a protective cover for the tundra and minimize visible signs of survey activities. For example, the North Slope Borough (NSB) Land Management Administrator authorizes winter on-tundra travel when six inches of snow cover or six inches of ice cover and 12 inches of frost depth conditions exist for the activities intended. In areas of tussock tundra, nine inches of snow cover and 12 inches of frost depth is required, consistent with the more stringent State of Alaska Department of Natural Resources protection standard for sensitive tussock tundra. Where it is possible that tussock tundra may exceed heights of nine inches and extend above the snow level, tundra travel must avoid all tussock tundra that can be seen above the snow cover.

The 12 inches of frost depth must be measured by a thermistor installed 12 inches below the ground. The thermistor must read a ground temperature of at least -5°C (23°F) or colder, consistent with the State of Alaska Department of Natural Resources requirement. Pre-packing is authorized; however, ice road/tundra travel is not authorized until tundra travel is opened in the area (North Slope Borough Municipal Code §§ 19.50.030(J), and 19.60.040(O)).

Trails from seismic surveys one to two years ago are barely visible when compared with results from 40 or 50 years ago.

POLAR BEARS

Polar bears reside primarily on sea ice and occasionally on land with the exception of pregnant denning females, seasonally. In the long history of land and marine seismic survey activity in the Arctic, there have been no reported impacts to the polar bear population resulting from sound produced by operations, including behavioral impacts. Land based seismic sound and vibration levels do not appear to cause disturbance or pose risk to denning polar bears, cubs or their dens. A 1991 study (Blix & Lentfer, 1992) concluded that disturbance and other impacts from sound and vibration levels resulting from seismic surveying seem unlikely because “the dry wind-beaten arctic snow muffles both sound and vibrations extremely well...”



Nevertheless, to further ensure that potential risks of interaction are minimized, the permit applicant practices additional mitigation measures to protect polar bears no matter where they may be found. Potential effects of interaction are mitigated through 1) development of activity-specific human-bear interaction plans (to avoid disturbance); 2) safety and deterrence training for permit applicant staff; 3) bear monitoring and reporting requirements; and 4) implementation of project-specific protection measures around den sites.

Before seismic survey activities are initiated, the permit applicant works closely with U.S. Fish & Wildlife Service (USFWS) to develop a plan for working in polar bear habitat and identify any known bear dens. Survey operations must avoid known polar bear dens by one mile. If a polar bear den is encountered that has not been previously identified, it must be reported to the USFWS, and an at least one-mile buffer must be immediately implemented. If a polar bear should den within an existing development area, off-site activities shall be restricted to minimize disturbance and a den-specific permit applicant management plan developed in coordination with USFWS.

The specific stipulations for seismic survey activity within polar bear habitat areas include implementation of a Polar Bear Protection and Interaction Plan to minimize interaction with and potential impacts to polar bears. This process includes consultation with subsistence users to ensure that there are no unmitigable impacts to the subsistence resource.

These plans also include requirements to minimize the use of items that attract bears to the project area through proper storage and disposal of food, food waste, and fuels/chemicals. Projects must also record and report sightings of any bears spotted within the project area, and have a communication and safety plan for workers when a bear is observed near the project



The permit applicant takes additional precautions to protect denning females, such as pre-work surveys to enable accurate detection of active polar bear dens through the use of infrared camera imagery from fixed-wing aircraft, helicopters, and hand-held or vehicle mounted sources. The infrared imaging can be coupled with trained dogs, to locate or verify occupied polar bear dens. The industry has also supported non-invasive techniques to detect dens such as unmanned aerial vehicles (UAVs) and research evaluating transmission of sound and vibration through the ground, snow, ice, and air and the received levels of sound and vibration in polar bear dens.

Furthermore, as part of the Letter of Authorization (LOA) request for seismic surveys during denning season, the permit applicant provides proposed seismic survey routes and camp locations. To minimize the likelihood of disturbance to denning females, the routes and camps rarely overlap the type of topographical features that bears require for denning. Further, the USFWS evaluates these routes along with information about known polar bear dens, historic denning sites, and delineated denning habitat.

Polar Bears in the Open-Water Marine Environment

Even in the marine environment, sound from winter on-ice and open-water seismic surveys has been determined to pose no more than a minor disturbance to polar bears, similar to the effects from other marine vessels. According to the U.S. Department of the Interior, USFWS' 2013 *Biological Opinion for Polar Bears (Ursus maritimus) and Conference Opinion for Pacific Walrus (Odobenus rosmarus divergens) on the Chukchi Sea Incidental Take Regulations*, because, "polar bears normally swim with their heads above the surface, where underwater noises are weak or undetectable (Greene and Richardson 1988, Richardson et al. 1995), it is unlikely these noises [from marine seismic surveys] would cause auditory impairment or other physical effects; no evidence exists to support the idea that airgun pulses, such as those used during seismic surveys, cause serious injury or death, even from large airgun arrays..." The report states that, coupled with mitigation measures, it is unlikely that the surveys present a potential for any significant impacts.



The permit applicant implements the use of trained third-party Protected Species Observers on vessels who ensure vessels remain at least a half mile from observed polar bears and retain the authority to trigger mitigation measures. They also provide observational data to the Service. Additional mitigation measures required include: minimum spacing of seismic surveys, exclusion zones, monitoring of exclusion zones, shut downs/power downs, ramp ups, field verifications, monitoring of the seismic survey area,

temporal/spatial/operational restrictions and strict reporting requirements. These measures also apply to seismic support vessels.

KEY MESSAGES

- In the Arctic and Alaska, the industry's environmental stewardship includes taking additional protective measures to ensure there are negligible to no impacts to the polar bear, its habitat, and the tundra biome. More specifically, surveys are carefully timed and conducted to avoid or minimize wildlife impacts and avoid interfering with subsistence hunting and fishing.
- Current permit applicant practices have been adapted to help protect the tundra, minimize impacts and expedite the recovery time of the Arctic terrain.
- Whether on land or in the marine environment, it is unlikely that seismic exploration activities would result in more than temporary behavioral disturbance to polar bears.
- Implementation of mitigation measures further reduces the possibility of polar bear disturbance from seismic survey activities. The permit applicant also implements additional mitigation measures to minimize disturbance to denning females.
- Polar bear monitoring, data collection and reporting during seismic survey operations has been used to improve the knowledge base of polar bears' denning habits.

As operators explore for energy, the use of geophysical technologies reduces risk regarding cost, safety and impacts to the environment. Today, advancements in geophysical technology have helped locate, develop and produce oil and natural gas with the least risk and the least possible impact to animals and the environments in which they live.

References:

1. Blix, A.S., and J.W. Lentfer. "Noise and Vibration Levels in Artificial Polar Bear Dens as Related to Selected Petroleum Exploration and Developmental Activities." *Arctic*, vol. 45, no. 1, 1992, doi:10.14430/arctic1369.
2. U.S. Fish and Wildlife Service. "Biological Opinion for Polar Bears (*Ursus maritimus*) and Conference Opinion for Pacific Walrus (*Odobenus rosmarus divergens*) on the Chukchi Sea Incidental Take Regulations." www.fws.gov/alaska/fisheries/endangered/pdf/chukchi_sea_its_2013.pdf.
3. U.S. Fish and Wildlife Service. "Beaufort Sea, AK; oil and gas industry exploration, development, and production operations; polar bears and Pacific walrus." <https://www.fws.gov/policy/library/2006/06-6626.pdf>.
4. North Slope Borough, Department of Planning and Community Services, Oil & Gas, Mining, and Other Industrial Development and Land Uses. "North Slope Borough Oil and Gas Technical Report: Planning for Oil & Gas Activities in the National Petroleum Reserve – Alaska," Appendix G: North Slope Borough Standard Permit Stipulations. www.northslope.org/assets/images/uploads/NorthSlope_OG_Technical_report_APPENDIXG.pdf.