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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

[Docket No. FWS–R7–ES–2020–0129; FXES111607MRG01–212–FF07CAMM00]

Marine Mammals; Incidental Take During Specified Activities; Proposed Incidental Harassment Authorization for Polar Bears in the Arctic National Wildlife Refuge, Alaska

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of receipt of application and proposed incidental harassment authorization; availability of draft environmental assessment; request for comments.

SUMMARY: We, the U.S. Fish and Wildlife Service, have received a request under the Marine Mammal Protection Act of 1972 from the Kaktovik Iñupiat Corporation (KIC), for authorization to take by harassment small numbers of polar bears incidental to seismic survey and associated activities scheduled to occur between January 21, 2021, and September 30, 2021. KIC has requested this authorization for incidental take of polar bears that may result from three-dimensional (3D) seismic surveys in the Marsh Creek East Program Area of the Arctic National Wildlife Refuge. The project will consist of activities such as over-flights for aerial infrared surveys in January 2021 and February 2021 to look for maternal polar bear dens; staging and mobilization of vehicles and equipment; small crew surveys for hazards, ice integrity, and snow depth assessment; seismic surveys via a sled camp with rubber-tracked vibrator trucks; camp setup and mobilization; aerial activities for crew and supply transport; digital elevation modeling for river-crossing slope analysis; and cleanup activities during the summer of 2021. We estimate that this project may result in the nonlethal incidental take of up to three polar

bears. This proposed authorization, if finalized, will be for take of three polar bears by Level B harassment only. No take by injury or death to polar bears is likely and therefore such take is not included in this proposed authorization.

DATES: Comments on this proposed Incidental Harassment Authorization and the accompanying draft environmental assessment must be received by **[INSERT DATE 30 DAYS AFTER THE DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

ADDRESSES: *Document availability:* You may view this proposed authorization, the application package, supporting information, draft environmental assessment, and the list of references cited herein at *http://www.regulations.gov* under Docket No. FWS–R7–ES–2020–0129, or these documents may be requested as described under **FOR FURTHER INFORMATION CONTACT**. You may submit comments on the proposed authorization by one of the following methods:

- U.S. mail: Public Comments Processing, Attn: Docket No. FWS–R7–ES–2020–0129, U.S. Fish and Wildlife Service, MS: PRB/3W, 5275 Leesburg Pike, Falls Church, VA 22041–3803.
- Electronic submission: Federal eRulemaking Portal at: *http://www.regulations.gov*. Follow the instructions for submitting comments to Docket No. FWS–R7–ES–2020–0129.

We will post all comments at *http://www.regulations.gov*. You may request that we withhold personal identifying information from public review; however, we cannot guarantee that we will be able to do so. See **Request for Public Comments** for more information.

FOR FURTHER INFORMATION CONTACT: Charles Hamilton, Marine Mammal Management, U.S. Fish and Wildlife Service, MS 341, 1011 East Tudor Road, Anchorage, Alaska 99503, by email at *R7mmmRegulatory@fws.gov* or by telephone at

1–800–362–5148. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service (FRS) at 1–800–877–8339, 24 hours a day, 7 days a week.

SUPPLEMENTARY INFORMATION:

Background

Section 101(a)(5)(D) of the Marine Mammal Protection Act of 1972 (MMPA; 16 U.S.C. 1361, et seq.) authorizes the Secretary of the Interior (Secretary) to allow, upon request, the incidental but not intentional harassment of small numbers of marine mammals of a species or population stock by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified region during a period of not more than 1 year. Incidental harassment may be authorized only if statutory and regulatory procedures are followed and the U.S. Fish and Wildlife Service (hereafter, "the Service" or "we") make the following findings: (i) take is of a small number of animals, (ii) take will have a negligible impact on the species or stock, and (iii) take will not have an unmitigable adverse impact on the availability of the species or stock for subsistence uses by coastal-dwelling Alaska Natives.

The term "take," as defined by the MMPA, means to harass, hunt, capture, or kill, or to attempt to harass, hunt, capture, or kill any marine mammal (16 U.S.C. 1362(13)). Harassment, as defined by the MMPA, means any act of pursuit, torment, or annoyance that (i) has the potential to injure a marine mammal or marine mammal stock in the wild (the MMPA calls this "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 (the MMPA calls this "Level B harassment").

The terms "negligible impact," "small numbers," and "unmitigable adverse impact" are defined in the Code of Federal Regulations at 50 CFR 18.27, the Service's regulations governing take of small numbers of marine mammals incidental to specified activities. "Negligible impact" is defined 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. "Small numbers" is defined as a portion of a marine mammal species or stock whose taking would have a negligible impact on that species or stock. However, we do not rely on that definition here, as it conflates the terms "small numbers" and "negligible impact," which we recognize as two separate and distinct requirements (see *Natural Res. Def. Council, Inc.* v. *Evans*, 232 F. Supp. 2d 1003, 1025 (N.D. Cal. 2003)). Instead, in our small numbers determination, we evaluate whether the number of marine mammals likely to be taken is small relative to the size of the overall population. "Unmitigable adverse impact" is defined 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.

If the requisite findings are made, we shall issue an Incidental Harassment Authorization (IHA), which may set forth the following: (i) permissible methods of taking; (ii) other means of effecting the least practicable impact on marine mammals and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of marine mammals for taking for subsistence uses by coastal-dwelling Alaska Natives; and (iii) requirements for monitoring and reporting take.

Summary of Request

In August 2020, the Kaktovik Iñupiat Corporation (hereafter referred to as "KIC" or "the applicant") submitted a request to the U.S. Fish and Wildlife Service's (hereafter referred to as "USFWS" or "the Service") Marine Mammal Management (MMM) office for authorization to take polar bears (*Ursus maritimus,* hereafter "polar bears"). After discussions with the Service about the scope and potential impacts to polar bears, as well as the feasibility of various mitigation measures and modifications of the project design, KIC submitted an updated request on October 24, 2020, and October 28, 2020. This proposed incidental harassment authorization is in response to KIC's October 28, 2020, request.

KIC expects that take by incidental harassment may occur during their planned three-dimensional (3D) seismic survey, and associated activities, of portions of the coastal plain area of the 1002 region (hereafter referred to as the "Coastal Plain") in the Arctic National Wildlife Refuge (ANWR; hereafter referred to as "the Refuge"). Specific work will occur within the Marsh Creek East Program Area (hereafter "Program Area"), to be accessed via a tundra access route within the Refuge measuring 78.23 km (48.61 mi). The area of this tundra access route (inclusive of a 100-m [328-ft] buffer on each side) is 15.64 km^2 (6.04 mi^2). All work is expected to occur during a period of 8 months and 10 days, commencing January 21, 2021, and concluding by September 30, 2021.

Equipment will be initially staged at Deadhorse, Alaska (located at 70.2002° N, 148.4597° W), and then transported to Kaktovik (located 113 mi [214 km] to the east at 70.1319° N, 143.6239° W) via the access route. The timing of mobilization is contingent on the accumulation of sufficient snow cover along the access route, and travel cannot commence prior to January 26, 2021; crew will be staged on gravel pads allowing for tundra access and resupply.

All mobile equipment and vehicles will be equipped with navigation systems primarily for hazard identification and logistics. Tracked and wheeled tundra-specific vehicles will be used as the main transport and for sled-camps during the activities. It is expected that the camps will move every 5 to 7 days depending on the survey progress and snow cover. At the end of the planned seismic surveys, all equipment will travel back to the Deadhorse or Kaktovik pads. As trail locations may depend on the snow coverage and terrain conditions during mobilization, the KIC operators (hereafter "the Operator") will consider and coordinate with companies for use of existing or planned trails.

The original KIC request was received on August 17, 2020. Additional details regarding the project specifics, activities, and locations were requested from KIC by the Service on August 30, 2020, and received on September 1, 2020. Additional information on the proposed seismic acquisition blocks was requested by the Service and received at a meeting with KIC on September 4, 2020. Geographic Information System (GIS) Shapefiles for use in ArcGIS Pro were received by the Service on September 9, 2020. Additional information pertaining to the planned aircraft activities for the proposed project was received on September 14, 2020. The Service and representatives from KIC held numerous meetings (including August 26 and 27, 2020; September 4, 10, and 29, 2020; and October 19, 2020) to discuss project details, potential impacts to polar bears, and the feasibility of various mitigation measures and modifications to the project design. Two updated requests were received by the Service on October 24 and 28, 2020. This proposed IHA is in response to KIC's October 28, 2020, request.

Description of Specified Activities and Geographic Area

The specified activities (hereafter the "project") consists of transportation (via air and ground-based methods), various surveys (aerial infrared [AIR] surveys, handheld/vehicle forward-looking infrared [FLIR or IR] surveys, environmental, 3D seismic), camping, temporary developments *(i.e.,* airstrips), and potential environmental activities (*i.e.*, water withdrawal, river/ice crossing, summer cleanup activities). The area in which these specified activities will occur is referred to as the Marsh Creek East Program Area (Program Area). The Program Area is within the area established under section 1002 of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) of the Refuge. The Refuge is the largest National Wildlife Refuge in the United States with an area of 78,051.88 km^2 (30,136 mi^2). Of this total area, KIC owns 372.31 km^2 (143.75 mi^2) of surface land within the Refuge, pursuant of the Alaska Native Claims Settlement Act (ANCSA) of 1971. The Program Area includes surface land owned by KIC, sub-surface land owned by the Arctic Slope Regional Corporation (ASRC), and land and waters owned by the Department of the Interior (DOI). The geographic region of the seismic survey activities will extend from the Kajutakrok Creek in the west to Pokok Bay in the east, and from the coastline to 40 km (25 mi) inland. The specified geographic region of the activities is expected to cover a total of 1,441.82 km^2 (556.69 mi^2), incorporating the seismic area of 1,426.18 km^2 (550.65 mi^2) and a 1.6-km (1-mi) buffer (figure 1).

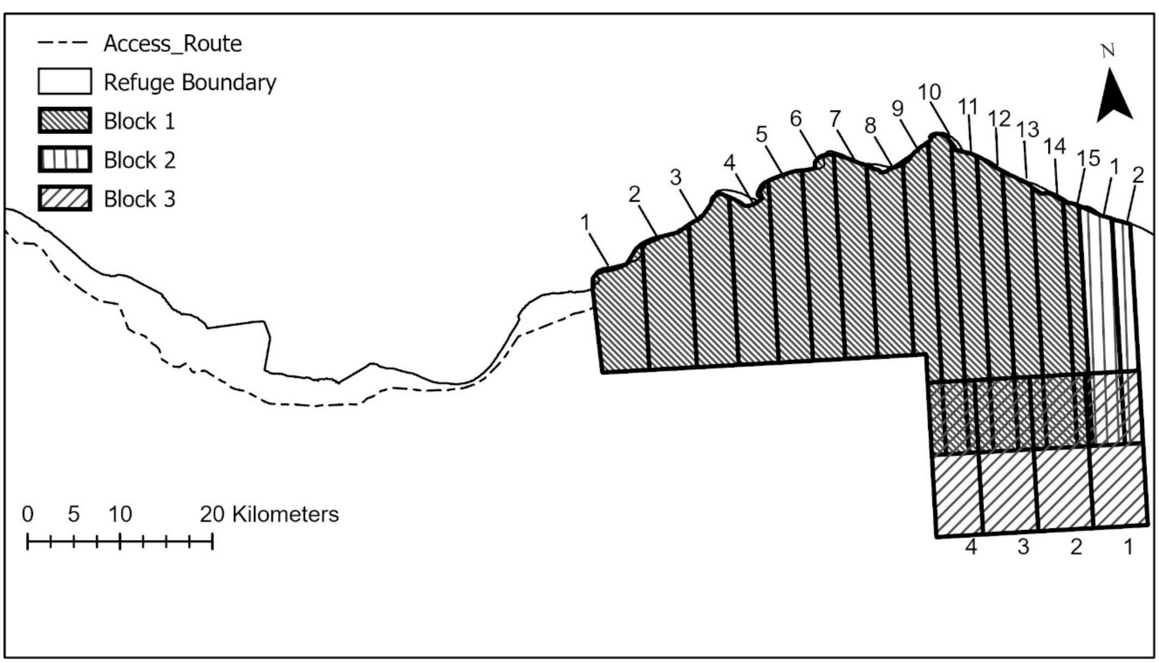

Figure 1: Access route, survey blocks, and survey sub-blocks of the proposed project.

Seismic activities will include operations in all of the following townships: U006N036E, U007N036E, U008N033E, U008N034E, U008N035E, U008N036E. Seismic operations will further include operations in parts of the following townships: U005N035E, U005N036E, U005N037E, U006N035E, U006N037E, U007N031E, U007N032E, U007N033E, U007N034E, U007N035E, U007N037E, U008N031E, U008N032E, U008N037E, U009N032E, U009N033E, U009N034E, U009N035E, U009N036E.

KIC will conduct activities starting January 21, 2021, and ending September 30, 2021, during which data collection will be performed using a variety of equipment and methods. The operations will primarily occur during 2021 winter, starting with three aerial infrared surveys for polar bear maternal dens between January 2021 and early February 2021 (surveys will not begin before January 21, 2021, nor extend past February 13, 2021). Mobilization of the seismic survey equipment and crew will begin once the tundra opens to winter travel (but not before January 26, 2021). Three AIR surveys are to be performed before moving into the access route or seismic survey area. Seismic operations will commence as soon as February 1, 2021, if all AIR surveys are performed before this time, and will conclude by May 25, 2021, or the close of the winter travel season, whichever is first. To maintain the safety of field personnel, work days are subject to change based on weather, equipment delays, polar bear presence, or discovery of a maternal den at survey sites.

At the end of the snow season or the close of tundra travel (July or August), whichever is first, KIC will contract one helicopter and crew to travel over the Program Area to collect any refuse or debris that may have been inadvertently left during the winter activities. These cleanup activities are expected to continue for approximately 15 days, including possible weather days. The cleanup area will not exceed the completed portion of the winter operating zone in the Program Area. Standard aircraft operational limitations will apply, and weather delays, flight ceilings, etc., will be at the discretion of the flight contractor.

All project-related travel outside of the 1002 region of the Refuge will occur in areas for which regulations authorizing the incidental take of polar bears already exist, and are not considered in this draft IHA (50 CFR part 18, subpart J; 81 FR 52275, August 5, 2016). Incidental take of polar bears caused by this work is expected to be authorized by a Letter of Authorization (LOA).

All field personnel will be fully trained in bear safety awareness and will utilize appropriate deterrence methods (see 50 CFR 18.34 for further information) should deterrence of polar bears become necessary. Additional information is provided in the **Mitigation and Monitoring, Proposed Authorization** section below and in the *Polar Bear Avoidance and Interaction Plan* incorporated by reference in KIC's application (appendix A in KIC 2020).

The following project descriptions (*Mobilization and Site access* through *Summer Cleanup Activities*) have been inserted directly from KIC's *Application for Incidental Harassment Authorization for the Marsh Creek East 3D Seismic Program North Slope, Alaska* (KIC 2020). Additional details can be found in the application and are incorporated by reference.

Mobilization and Site Access

Equipment will be staged at existing facilities in Deadhorse. Camp and equipment will be transported via an overland access route from Deadhorse to the Program Area. The portion of the route within the Refuge measures 78.23 km (48.61 mi). Using a 100-m (328-ft) buffer on each side, the area of the tundra access route in the

Refuge is 15.64 km^2 (6.04 mi^2). Upon entry, data acquisition will begin immediately in the western portion of the Program Area. Specific areas and dates of progressing through the Program are described in Section 3.0 (KIC 2020). Mobilization will begin in January 2021 at which time KIC estimates there will be sufficient snow cover for mobilization and all permits for tundra travel from the State of Alaska have been received. All mobile equipment will have a navigation system installed for logistics and hazard identification. All transit outside of the 1002 Area will be covered under the existing 2016–2021 Beaufort Sea Incidental Take Regulations (ITR) and permitted under separate cover.

Tracked and wheeled tundra vehicles will be used to transport the sled camp along the tundra. The camp will remain close to the survey activities and will move every 5 to 7 days depending on the survey progress and snow cover. When the survey is completed, the camp and equipment will travel along the tundra back to a Deadhorse or Kaktovik pad location. Snow-packed trails will be made throughout the Program Area. The location of these trails will depend on snow coverage and terrain conditions. The Operator will attempt to coordinate with companies to use any existing or planned trails.

Survey and Ice Check

Prior to the start of seismic data collection, a smaller crew performs a survey for hazards, including ice integrity of rivers, lakes, and sea ice. One of the highest risk potentials for arctic operations is properly verifying the integrity of the ice. This will be done by “ice checking units” consisting of a Tucker vehicle capable of supporting 24-hour operations, manned by two personnel. Snow machines may also be used for survey and ice check operations. The survey units will be equipped with ground-penetrating radar systems (GPR), which are extremely accurate on freshwater. In addition, each ice check unit is equipped with battery-operated ice auger, which is used to verify the calibration of the GPR, measure ice depths on sea ice, or verify depths where the GPR units cannot reach. Freeboard testing (ice stabilization) is also conducted when working on floating ice to ensure the ice has the strength to safely hold the equipment. Tucker vehicles that are conducting the advance ice check operations will also have a handheld or vehicle-mounted FLIR device to scan at tributary crossings for potential dens in defined polar bear denning habitat. Preliminary trails or snail trails will be established for wherever the vibrators must travel on the sea ice, lakes, or rivers, which will minimize the potential for breaking through the ice. Surveyors will also map each hazard that is discovered and placed into our navigation system that allows each vehicle to display the Program Area, hazards, and avoidance areas.

Snow surveys will be conducted to substantiate depths and will be recorded for equipment movement efforts. Snow survey crews will move out ahead of the main crew by approximately 7–20 days, accessing the Program Area. The crew includes camp trailers, fuelers, Steigers, Tuckers, and support trailers and consists of three to four crews of two personnel per crew. These crews work independently of each other to check ice conditions, identify and mark hazards, and scout safe routes for seismic operations. Depending on the number of locations needed to be verified, crews can complete and travel up to 16 km (10 mi) per day. At the end of each day, crews return to camp. Once operations are too far from camp, the camp is moved to stay close to operations. When the main camp arrives with the recording crew, the advance camp will merge with main camp.

Seismic Acquisition

The method of seismic acquisition is Source Driven Shooting (SDS). Seismic operations will be conducted utilizing rubber tracked/buggy vibrators with a rectangular base plate and wireless, autonomous recording channels (nodes). Wireless nodes will be laid out by crews on foot and through the use of rubber-tracked tundra-travel-approved vehicles.

Using the SDS methodology, multiple vibrators can collect data at the same time. This methodology means that only a single vibrator is required to travel down any source line, thereby reducing risk of compaction or damage to the tundra and the footprint of operations. Vibrators will only operate on snow-covered tundra or grounded sea ice. There are two sizes of vibrators used for this survey: large vibrators with a weight of 44,000 kilograms (kg; 97,000 pounds [lb]) and small vibrators (Univibes) with a weight of 12,475 kg (27,500 lb). The lighter Univibes are utilized to further reduce potential disturbance in narrow riverbeds and on ungrounded lakes, risk from working in areas that do not have grounded landfast ice, and noise levels.

Seismic operations continue for 24 hours per work day and are based on two 12-hour shifts. Communications with the crews while out in the field will be via very high frequency radio systems and wireless data transfer radios.

Survey Design

The goal of the program is to collect seismic data across the entire Program Area to inform stakeholders on the potential for oil and gas over the period of the IHA. The duration is expected to take one winter season as data is only collected when the snow cover and ice thickness are sufficient to support operations. The method of collecting data over this area is by collecting data over a patch of recording channels and moving the patch progressively throughout the area. It takes approximately 5–7 days to pick and re-layout the spread over the entire patch area, the crews move continuously on to the next patch progressively, including the camps and materials.

The method for collecting data is to establish a spread of source lines and receiver lines over a set area (or patch). The camp is typically set in the center of the patch. The crews establish source lines and receiver lines within an acquisition spread. This spread is approximately 248 km^2 (95 mi^2), or 8 km wide by 31 km long (5 mi wide by 19 mi long), with a camp for the crew at the center of the spread. As the vibrators move, the nodes behind the vibrations are retrieved, the data are downloaded, and the nodes are replaced ahead of the source lines. This method allows for efficient data collection over the winter season.

Vibrators typically operate within a distinct area proximal to each other. Geophone receiver lines are spaced approximately at 201 m (660 ft) and run perpendicular to source lines that are spaced approximately 402 m (1,320 ft) apart. Up to five receiver lines could be placed on the ground at one time. Wireless nodes will be laid out by crews on foot and through the use of rubber-tracked tundra-travel-approved vehicles. Each station will be placed individually and will be surveyed by global positioning system (GPS) upon deployment. All GPS data are entered into a database.

During the acquisition phase of the project, occupancy of camp will be at its highest consisting of approximately 160 to 180 people. Approximately 7 Tuckers will be working on layout and pickup, and approximately 12 large vibrators and 4 small vibrators (Univibes) with 1 person each could be working on source lines. The lighter Univibes will be utilized to further reduce potential disturbance in narrow riverbeds and on ungrounded lakes, risk from working in areas that do not have grounded landfast ice, and noise levels.

Camp Facilities

The camp can accommodate up to 180 personnel. Equipment included at camp stations include long haul fuel tractors, remote fuelers, water maker, incinerator, resupply and survival sleigh, tractors, loaders, and Tuckers. Camp locations are selected based on environmental conditions. Typically, once the camp reaches the Program Area, a site will be picked based on topography and snow conditions. When good conditions allow, the camp may stay at current location up to 7 days. Typically, the camp will move 1.6–3.2

km (1–2 mi) every 5–7 days, which could be four to six camp moves per month. The camp will generally remain in the center of the spread, moving as the spread moves. A maximum footprint for a large camp is approximately 91×122 m (300×400 ft).

The mobilization of the camp or camps will be from the existing gravel roads, starting off a gravel pad located outside of the Program Area. A predetermined route will be used to move equipment to the project location. The camp will travel in a single-file configuration pulled by a rubber-tracked Steiger or CAT. Each string of camp has 5 trailers, and typically a camp consists of 8 strings, but can consist of up to 10 strings. Camp trails during the project will be scouted out in advance by a project manager or survey personnel to avoid hazards and to measure and ascertain proper snow depth. To mitigate any tundra damage, the sleigh camp could be moved up to 3.2 km (2 mi) every 5–7 days, depending on the weather, snow covering, and the advancement of the project. Sanitary conditions in the kitchen and diner and washrooms will be maintained in full compliance with governmental regulations. Gray water will be filtered to meet the discharge requirements of the Alaska Department of Environmental Conservation (ADEC) Alaska Pollutant Discharge Elimination System (APDES) permit prior to discharge. The Operators holds a current APDES discharge permit for this purpose.

Temporary Snow Airstrips

The program will need airstrips to transport crews on crew change days and to allow personnel, food, and potentially fuel (in emergency situations) to be delivered to the remote camp. The Program Area has few lakes; therefore, tundra airstrip is most likely to be used. Airstrips will be located close to camp locations. Airstrips will be within a couple of miles of camp to ensure efficiency. The footprint of prepacked airstrips could be up to approximately 22.8 m (75 ft) wide and 701 to 1,066 m (2,300 to 3,500 ft) long for the aircraft to land. The length of the airstrip will depend on which plane is to be used. Aircraft will use either wheels or skis to land. Estimated air traffic will be approximately two trips per week, or as operations require.

Having temporary airstrips will save several hours of tundra travel. The Operator will create a flat area on predetermined grounded ice or tundra with sufficient snow cover to serve as a landing strip to receive the aircraft for crew changes. Planes may be wheeled or on skis, whichever will be the safest fit for the current environment. An advance scouting trip will identify grounded lakes, if any, and/or tundra locations that can be used for this purpose. The landing strip will only be on areas that have adequate space for safely landing aircraft. On lakes, a rubber-tracked Steiger with a blade will clear the snow down for the aircraft to land. Black bags filled with snow will be placed along the side of the berm to delineate the edge of the landing strip along with lighting. Airstrips on snow-covered tundra will be constructed similarly. On tundra areas, a flat area with sufficient snow cover will be identified by advanced scouting. If determined adequate, the Operator will utilize groomers to pack a landing strip and will delineate the landing strip similar to those on grounded lakes.

After the crews and camps have moved to a different location, the airstrips will not be maintained unless they are needed again. After use of the strip is no longer necessary, the crews will inspect the location and record the area that was used by GPS location to be included in the final reporting.

River Crossings

There may be areas where floating ice is encountered that may not safely support the weight of some equipment. In these cases, the Operator will permit this activity with the State of Alaska Department of Fish and Game (ADF&G) to apply water to increase the thickness of the ice to establish temporary river crossings. There also may be areas on rivers, streams, and lakes that need to be protected with snow for traversing from tundra to ice for crossing. As identified in section 10 of their application, KIC has committed to several mitigation measures specifically for drainages through reduction of the number of source lines crossing major drainages by using a slope analysis tool (KIC 2020). The slopes along these lines can be measured during the preplanning and advance crew phases of the operations. Equipment will only cross these areas at the lowest possible relief points, as vibrators are not able to shake on slopes greater than 10º. KIC is requiring its Operator to place a 25-m (82.5-ft) buffer on each side of slopes greater than 10º. For areas that are defined denning critical habitat (16° slope and height of 1.6 m [5.2 ft]), a 100-m (328-ft) buffer will be used. The area will be mapped using digital elevation modeling (DEM) data for slopes. Ramp areas or transits across these areas will be cleared by the advance ice check crews with handheld or truck-mounted FLIR prior to movement.

The Operator will make snow ramps in these areas and establish that the ice is grounded or the ice is of sufficient ice depth to cross. Scouting by the Operator will determine locations of river crossings based on the best available information from advanced scouting, environmental and terrain conditions, local knowledge, surveys, and operational safety.

Water Withdrawal

Potable water will be produced at camp with a skid-mounted snow melter. The primary source of water is melting snow; if, however, conditions are inadequate, snow-melting activities can be supplemented by withdrawing water from lakes through the ADEC-approved water system. KIC has worked with the Operator to identify lakes and withdrawal that will require permits if used. If lakes are used, ADF&G-approved water withdrawal pumps will be used. If there is not an adequate source of snow and water withdrawal from lakes is not possible, water may need to be transported to each camp from an approved source.

Fuel Supply and Storage

Long-haul sleigh tanks will be used for fueling. All fuel will be ultralow sulfur for vehicles and equipment. Fuel will be delivered using overland Rolligon or rubber-tracked carriers. In the event the supply is disrupted by weather or other unforeseen events, fuel may also be delivered by aircraft to a public airstrip; temporary airstrips may be required for these occasions if needed in emergency situations. Offloading fuel from aircraft will be done in accordance with the Operator's approved fueling procedure. Fueling storages and fueling activity will be located at least 30.5 m (100 ft) from any water body. All equipment fuel locations will be tracked and recorded. KIC fueling procedures include spill management practices such as drip pan placement under any vehicle parked and placement of vinyl liners with foam dikes under all valves or connections to diesel fuel tanks. All fuel tanks are double-wall tank construction. Fuel dye is added to all fuel as part of spill detection.

All spills, no matter what the size, are recorded and cleaned up. The Operator holds a Spill Prevention Countermeasure Control (SPCC) plan for fueling and fuel storage operations associated with seismic operations. This SPCC plan is site-specific and will be amended for each new project. All reportable spills will be communicated through the proper agencies and reporting requirements.

Waste Management

Food waste generated by the field operations will be stored in vehicles until the end of the shift. The garbage will then be consolidated at camp in wildlife-resistant containers for further disposal. All food waste generated in camp will also be collected and stored in the same consolidation area. A skid-mounted incinerator will be used for daily garbage waste. This equipment falls within the regulatory requirements of 40 CFR part 60. The cyclonator will use an average of 3.8 to 7.6 liters (1 to 2 gallons) of fuel per hour while in use. The use of electricity is for the motor to the unit that maintains the air-to-fuel mixture. Data will be collected to provide the required records on a calendar basis of description and weight of camp waste burned.

Any waste generated by seismic operations will be properly stored and disposed of in accordance with applicable permit stipulations and Operator controls. Food waste is continually incinerated to avoid attracting wildlife. Gray water generated from the mobile camp will be discharged according to general permit AKG332000 and 18 AAC 83.210 and APDES discharge limits. Toilets are "PACTO" type to eliminate "black water." Ash from the incinerator will be back-hauled to the North Slope Borough (NSB) disposal facility in Deadhorse. The sleigh camp will move approximately every 5–7 days depending on weather conditions. An inspection by the Health, Safety, and Environment Advisor will be done after camp has left to ensure that the area is clean of all debris.

Summer Cleanup Activities

After all snow is gone, KIC will contract one helicopter to perform flyovers of the Program Area looking for any debris that may have been left behind in July or August of 2021. The cleanup crew will also inspect all camp locations and any area that had an unplanned release or tundra disturbance. Each source and receiver line will be inspected. This phase of the project will require one helicopter, based in Kaktovik, for approximately 15 days, including possible weather days. The area of the cleanup will be determined by the completed portion from that winter's acquisition and will not go beyond the Program Area. An aircraft use plan will be developed to minimize impacts on subsistence hunting and activities through consultation with local stakeholders and ensuring regulatory compliance. The coastal portion of summer activities (within 2 km of the coast) is targeted to be completed by July 19, and all cleanup activities will be completed by mid-August.

On-the-Ground Safety and Preparations

Safety of the personnel will remain a top priority of all work within the Refuge. The optimal strategy to reduce dangerous interactions with a polar bear is through a detailed bear plan, as well as sufficient training and a high level of awareness for all field personnel when at work sites. Specific guidelines and suggestions on interacting with polar bears can be viewed at https://www.fws.gov/alaska/pages/marine-mammals/polar-bear/interaction-guidelines.

All activities will be performed under the guidance of a detailed bear interaction and avoidance plan developed by KIC and approved by the Service prior to beginning field activities (see appendix A of KIC 2020). The Service will provide KIC with the most up-to-date Polar Bear Observation Form in which to record sightings of bears within 24 hours to *fw7_mmm_reports@fws.gov*. Details on monitoring guidelines and reporting requirements can be read in **Proposed Authorization**, **Monitoring, and Reporting Requirements**. Attractants and waste will be minimized to reduce likelihood of bear presence. All field personnel will be up-to-date in their bear awareness and safety training. The Service can require the presence of a bear guard or subsistence advisor if deemed necessary and appropriate, which will then add one to two staff to the survey crew sizes. Further details on safety and mitigation techniques can be read in **Mitigation and Monitoring** and **Avoidance and Minimization**.

Description of Marine Mammals in the Specified Area

The polar bear is the only marine mammal under the Service's jurisdiction that occupies the Refuge region. Polar bears are distributed throughout the circumpolar Arctic in 19 subpopulations, also known as stocks. Two polar bear stocks occur in Alaska, the Southern Beaufort Sea (SBS) and Chukchi/Bering Sea (CBS) stocks. Together, the two stocks range throughout the Beaufort, Chukchi, and Bering Seas, including nearshore habitats. The stocks overlap seasonally in the eastern Chukchi and western Beaufort Seas. Management of the SBS stock is shared between the United States and Canada, and management of the CBS stock is shared between the United States and the Russian Federation. Detailed descriptions of the SBS and CBS polar bear stocks can be found in the *Polar Bear (*Ursus maritimus*) Draft Revised Stock Assessment Reports* (SARs) (announced at 82 FR 28526, June 22, 2017), and available at *https://www.fws.gov/alaska/pages/marine-mammals/polar-bear*. Once finalized, these revised SARs will replace the current SARs last revised in 2010 and available at *https://www.fws.gov/alaska/pages/marine-mammals/polar-bear*.

On May 15, 2008, the Service listed polar bears as threatened under the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531, *et seq.*) due to loss of sea-ice habitat caused by climate change (73 FR 28212). The Service later published a final special rule under section 4(d) of the ESA for the polar bear (78 FR 11766, February 20, 2013) that provides measures necessary and advisable for the conservation of polar bears. Specifically, the 4(d) rule: (a) adopts conservation regulatory requirements of the MMPA and the Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora for the polar bear as appropriate regulatory provisions, in most instances; (b) provides that incidental, nonlethal take of polar bears resulting from activities outside the polar bear's current range is not prohibited under the ESA; (c) clarifies that the special rule does not alter the section 7 consultation requirements of the ESA; and (d) applies the standard ESA protections for threatened species when an activity is not covered by an MMPA or CITES authorization or exemption.

The Service designated critical habitat for polar bear populations in the United States effective January 6, 2011 (75 FR 76086, December 7, 2010). Critical habitat identifies geographic areas that contain features that are essential for the conservation of a threatened or endangered species and that may require special management or protection. Polar bear critical habitat units include barrier island habitat, sea-ice habitat (both described in geographic terms), and terrestrial denning habitat (a functional determination). Barrier island habitat includes coastal barrier islands and spits along Alaska's coast; it is used for denning, refuge from human disturbance, resting, feeding, and travel along the coast. Sea-ice habitat is located over the continental shelf, and it includes water 300 m (984 ft) or less in depth. Terrestrial denning habitat includes lands within 32 km (20 mi) of the northern coast of Alaska between the Canadian border and the Kavik River and within 8 km (5 mi) of the coast between the Kavik River and Barrow. The total area designated as critical habitat covers 484,734 km^2 (187,157 mi^2), and is entirely within the lands and waters of the United States. The specified geographic area of this proposed IHA is estimated to contain approximately 1,608.11 km^2 (620.89 mi^2) of critical habitat inclusive of barrier islands, sea ice habitat, and denning habitat. Polar bear critical habitat is described in detail in the final rule (75 FR 76086, December 7, 2010). It should be noted that designation of polar bear denning critical habitat is not intended to identify actual denning sites but rather to identify the essential features that support denning habitat. KIC is planning to perform work during winter months, the primary period when polar bears are denning or on the sea ice hunting seals.

Polar bears may occur anywhere within the specified geographic area of this proposed IHA. SBS polar bears historically spent the entire year on the sea ice hunting for seals, with the exception of a relatively small proportion of denning adult females that would come ashore during autumn and overwinter to den. However, over the last two decades, the SBS has experienced a marked decline in summer sea-ice extent, along with a pronounced lengthening of the open-water season (period of time between sea ice break-up and freeze-up) (Stroeve *et al.* 2014; Stern and Laidre 2016). The dramatic changes in the extent and phenology of sea-ice habitat have coincided with evidence suggesting that use of terrestrial habitat has increased during summer and prior to denning, including in the Refuge.

The most recent population estimate for SBS polar bears was approximately 900 individuals in 2010 (Bromaghin *et al.* 2015, Atwood *et al*. 2020). This number represents an approximately 30 percent decline in SBS polar bear abundance between 1986 and 2010 (Amstrup *et al.* 1986, Regehr *et al.* 2006, Bromaghin *et al.* 2015); however, the population appears to have remained stable from 2010 to 2015 (Atwood *et al.* 2020). In addition, analyses of more than 20 years of data on the size and body condition of SBS polar bears demonstrated declines for most sex and age classes and a significant negative relationship between annual sea ice availability and body condition (Rode *et al.* 2010). These lines of evidence suggest that the SBS subpopulation is declining due to sea ice loss. Schliebe *et al.* (2008) determined that an average of 4.0 percent of the SBS subpopulation of polar bears were on land in autumn during 2000 to 2005, and that the percentage increased when sea ice was farther from the coast. More recently, Atwood *et al.* (2016) determined that the percentage of radio-collared adult females coming ashore in summer and fall increased from 5.8 to 20 percent between 2000 and 2014. Over the same period, the mean duration of the open-water season increased by 36 days and the mean length of stay on land by polar bears increased by 31 days (Atwood *et al.* 2016). While on shore, the distribution of polar bears is largely influenced by the opportunity to feed on the remains of subsistence-harvested bowhead whales. Most polar bears are aggregated at three sites along the coast, Utqiaġvik (formerly Barrow), Cross Island, and Kaktovik, a community located on Barter Island just off the Coastal Plain (Rogers *et al.* 2015; McKinney *et al.* 2017; Wilson *et al.* 2017).

In addition to increased use of land during the open-water season, SBS polar bears have also increasingly used land for maternal denning. Olson *et al.* (2017) examined the choice of denning substrate (land compared to sea ice) by adult females between 1985 and 2013 and determined that the frequency of land-based denning increased over time, constituting 34.4 percent of all dens from 1985 to 1995, 54.6 percent from 1996 to 2006, and 55.2 percent from 2007 to 2013. Additionally, the frequency of land denning was directly related to the distance that sea ice retreated from the coast. From 1985 to 1995 and 2007 to 2013, the average distance from the coast to 50 percent sea ice concentration in September (when sea ice extent reaches its annual minimum) increased 351±55 km (218.10±34.17 mi), while the distance to 15 percent sea ice concentration increased by 275±54 km (170.88±33.55 mi). Rode *et al.* (2018) determined that reproductive success was greater for females occupying land-based dens compared to ice-based dens, which may be an additional factor contributing to the increase in land-based denning. Land-based dens are mostly distributed along the central and eastern coast of Alaska's Beaufort Sea, including the Coastal Plain (Durner *et al.* 2010). Durner and Atwood (2018) estimate there is approximately 79.6 km^2 (30.7 mi^2) of maternal denning habitat available to polar bears in the Coastal Plain.

The proportion of SBS polar bears found in the Coastal Plain at any given time is not known. Though polar bears can be found throughout the Coastal Plain year-round, their density and distribution across the area differs across seasons. Polar bear density is greatest in summer and fall (*i.e.,* the open-water period, typically mid-July through mid-November), along the shore and barrier islands. During late fall and winter (generally late mid-November to March), non-denning polar bears (*i.e.,* adult and subadult males, adult females with and without dependent young, and subadult females) may travel throughout the Coastal Plain, though likely in lower numbers than would be expected along the coast during the open-water period. In late fall (generally late October through November), pregnant females will begin to excavate and enter dens distributed throughout the Coastal Plain in areas where snow accumulates, such as along coastal bluffs or riverbanks. Denning female polar bears give birth to cubs, on average, December 15th, and remain in their dens until they emerge in spring (generally March and April). Polar bears in all life stages may travel throughout the Coastal Plain in spring and early summer (generally March to June).

Mitigation and Monitoring

KIC has proposed to reduce the effects of its action by implementing mitigation and monitoring measures described in chapter 10 of its application, in its Polar Bear Avoidance and Interaction Plan (appendix A of the application), and in its Plan of Cooperation (POC; appendix B of the application). These measures have been incorporated into **Proposed Authorization**, **(B) Avoidance and Minimization, and (E) Reporting Requirements**, which KIC will be required to implement as part of its project if an IHA is issued.

The MMPA requires incidental take authorizations to prescribe, where applicable, permissible methods of taking and other means of effecting the least practicable impact on the affected stock. In our analysis, we considered the availability and feasibility (economic and technological) of equipment, methods, and manners of conducting the proposed seismic acquisition and other specified activities in order to effect the least practicable adverse impact upon the SBS stock of polar bears, their habitat, and their availability for subsistence uses. In doing do, we paid particular attention to polar bear denning habitat in the action area given the significance of this habitat and life stage to polar bears.

The Service's efforts to identify means to achieve the least practicable adverse impact began immediately upon receipt of KIC's initial request for an IHA. Specifically, the Service began working with KIC to revise its request by subdividing acquisition blocks and establishing dates no earlier than which work would begin in each block. The purpose of this was to, where feasible, delay acquisition in blocks with greater overlap with polar bear denning habitat. As demonstrated in Wilson and Durner, spatial and temporal project planning has the greatest impact on reducing potential impacts to denning polar bears.

In addition to avoiding work in polar bear denning areas until later in the season when more mothers and cubs will have naturally emerged from their dens, the Service also worked with KIC to revise its request by placing a 1-mile buffer around known dens and prohibiting activities with the potential to disturb denning bears within that buffer. The Service also worked with KIC to incorporate into its request the use of additional AIR surveys to detect polar bear dens. Dens of a depth greater than 100 cm are not able to be detected. Durner *et al.* (2003) reported the mean den roof thicknesses for 22 polar bear dens in northern Alaska was 72±87 cm, and ranged from as little as 10 cm to more than 400 cm. Snow depth over many dens, therefore, is likely near, or above, the limits of FLIR detection capabilities, regardless of weather (Smith *et al.* 2020). A single AIR survey (as was proposed in KIC's original request) is able to detect 45 percent of the dens that are less than 100 cm deep. In order to increase the likelihood of detecting dens, and then being able to protect them with a 1-mile buffer, KIC's latest request proposes to conduct three AIR surveys of the action area before work proceeds. Three AIR surveys increases the likelihood of detecting dens at less than 100 cm deep to 98 percent. Detecting and then placing a 1-mile buffer around known polar bear dens is an accepted means of effecting the least practicable impact on denning polar bears and therefore the SBS polar bear stock.

Additionally, after coordination with the Service, KIC modified its project design to incorporate reduced line density and reduced crossings in areas of high elevation change near streams and rivers. These high relief areas contain conditions suitable for polar bear denning, so reducing activity in these areas is an appropriate method to help achieve the least practicable adverse impact. In addition, prior to conducting work in high relief stream or river crossings, KIC will use handheld FLIR to investigate if a polar bear den is present and if so will protect it with a 1-mile buffer.

The Service also worked with KIC to develop and incorporate into its request a plan for management of food, waste, and other potential attractants. Development and implementation of such a plan is a means of reducing impacts on SBS polar bears as it reduces the likelihood that bears will be attracted to camps and other project-related infrastructure. This has immediate benefits in reducing the potential for interactions between project personnel and polar bears that could result in injury to humans or bears. In addition, it helps reduce the potential for polar bears to associate humans and human activities with positive food rewards that could result in them seeking out human establishments later in life.

The above measures reduce the potential for overlap between KIC's seismic acquisition and polar bears and therefore reduces the potential for exposing polar bears to potential disturbance. The required attractant management and human polar bear interaction plans reduce the probability and severity of negative consequences to polar bears exposed to KIC's operations. These methods, implemented in the past, have proven to be both practical and effective. The Service has determined that these mitigation measures constitute the means of effecting the least practicable impact to SBS polar bears.

We also evaluated potential alternative mitigation measures but determined they do not warrant inclusion in this proposed IHA. The Service considered the use of dogs as an alternative mitigation measure to identify polar bear dens; however, it was determined that, given the large area to be surveyed and the limited availability of trained dogs, this mitigation measure was not practicable for the proposed project. The Service also considered a requirement that the work be conducted outside of polar bear denning season, but this approach would be in direct conflict with ground temperature and snow cover requirements for tundra access. Additionally, we considered applying minimum flight altitudes without exception; however, this requirement is not practicable given cloud and fog conditions encountered in the project area.

Mitigation techniques to achieve the least practicable impact are detailed below in **Proposed Authorization, (B) Avoidance and Minimization**, paragraphs **(a) General avoidance measures**, **(b) Mitigation measures for onshore activities**, and **(c) Mitigation measures for aircraft**. Additionally, all measures outlined in the application (KIC 2020), including the appendices with the Monitoring and Mitigation Plan and Plan of Cooperation, are incorporated by reference herein.

Types of Incidental Take

Lethal Take

Human activity may result in biologically significant impacts to polar bears. In the most serious interactions, human actions can result in mortality of polar bears, especially in situations where human life is at risk. On the North Slope, unintentional mortality has occurred during efforts to deter polar bears from a work area for safety and from direct chemical exposure (81 FR 52276, August 5, 2016). Incidental lethal take could also result from a vehicle collision or collapse of a den if it were run over by a vehicle. Harassment of a female during the denning season may cause the female to either abandon her den prematurely with cubs or abandon her cubs in the den before the cubs can survive on their own. Either scenario may result in lethal take of the cubs.

Level A Harassment

Human activity may also result in the injury of polar bears. Level A harassment, for nonmilitary readiness activities, is defined as any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild. Take by Level A harassment can be caused by numerous actions, including the incorrect use of a deterrent projectile, a vehicle collision, or a den collapse that impairs the animal or reduces its likelihood of survival or reproduction. Other examples include, but are not limited to, separation of mothers from dependent cub(s) (Amstrup 2003), activities that result in mothers leaving the den early (Amstrup and Gardner 1994, Rode *et al.* 2018), or prolonged or repeated interruptions in nursing or resting (cubs), both of which can negatively affect cub survival.

Level B Harassment

Level B Harassment for nonmilitary readiness activities means any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. Reactions that disrupt biologically significant behaviors for the affected animal meet the criteria for take by Level B harassment under the MMPA. Reactions that indicate take by Level B harassment of polar bears in response to human activity include, but are not limited to, the following examples:

- Fleeing (running or swimming away from a human or a human activity);

- Displaying a stress-related behavior such as jaw or lip-popping, front leg stomping, vocalizations, circling, intense staring, or salivating;
- Abandoning or avoiding preferred movement corridors such as ice floes, leads, polynyas, a segment of coast line, or barrier islands;
- Using a longer or more difficult route of travel instead of the intended path;
- Interrupting breeding, sheltering, feeding, or hunting;
- Moving away at a fast pace (adult) and cubs struggle to keep up;
- Ceasing to nurse or rest (cubs);
- Ceasing to rest repeatedly or for a prolonged period (adults);
- Loss of hunting opportunity due to disturbance of prey; or
- Any interruption in normal denning behavior that does not cause injury, den abandonment, or early departure of the family group from the den site.

This list is not meant to encompass all possible behaviors; other behavioral responses may equate to take by Level B harassment. Relatively minor reactions such as increased vigilance or a short-term change in direction of travel are not likely to disrupt biologically important behavioral patterns, and the Service does not view such minor reactions as resulting in a take by Level B harassment. It is also important to note that depending on the duration and severity of the above-described behaviors, such responses could constitute take by Level A harassment (*e.g.,* repeatedly disrupting a polar bear versus a single interruption).

Estimating Incidental Take

The general approach for quantifying take in this proposed IHA was as follows: (1) determine the number of animals in the project area; (2) assess the likelihood, nature, and degree of exposure of these animals to project-relative activities; (3) evaluate these animals' probable responses; and (4) calculate how many of these responses constitute take. Our evaluation of take included quantifying the number of responses that met the criteria for lethal take, Level A harassment (potential injury), or Level B harassment (potential disruption of a biologically significant behavioral pattern), factoring in the degree to which effective mitigation measures will reduce the amount or consequences of take. To better account for differences in how various aspects of the project could impact polar bears, we performed separate take estimates for Surface-Level Impacts, Aircraft Activities, and Impacts to Denning Bears. These analyses are described in more detail in the subsections below. Once these various types of take were quantified, the next steps were to: (5) determine whether the total take will be of a small number relative to the size of the stock; and (6) determine whether the total take will have a negligible impact on the stock, both of which are determinations required under the MMPA.

Analysis of Surface-Level Impact

Individual polar bears can be affected by activities of the oil and gas industry ("Industry") in numerous ways during the open-water and ice-covered seasons. During the early portion of the open-water season (June and mid-July), most polar bears occur in offshore areas associated with multiyear pack ice. However, in the latter portion of the open-water season (mid-July to mid-November), polar bears are attracted to whale carcasses deposited at bone piles following subsistence whaling activities in Alaska Native communities. During this time, polar bears can be found in large numbers and high densities on barrier islands, along the coastline, and in the nearshore waters of the Beaufort Sea, particularly on and around Barter Island. Alternatively, as sea ice recedes over the deeper waters of the Arctic Ocean, some bears may abandon the sea ice for shore. During late fall, winter, spring, and early summer (generally mid-November to mid-July), non-denning polar bears may travel throughout the Coastal Plain, though in lower numbers than would be expected along the coast during the open-water period.

Non-denning polar bear responses will vary by the type, duration, intensity, and location of the source of disturbance.

Disturbance from surface-level activities associated with the proposed project would originate primarily from camp activities and mobile sources such as vehicle and aircraft traffic, 3D winter seismic surveys, and summer cleanup work. The noises, sights, and smells produced by the project could elicit variable responses from polar bears. Noise disturbance can originate from either stationary or mobile sources. Stationary sources include construction, maintenance, repair and remediation activities, operations at production facilities, gas flaring, and drilling operations from either onshore or offshore facilities. Mobile sources include aircraft traffic, open-water winter vibroseis programs, geotechnical surveys, ice road construction, vehicle traffic, and tracked vehicles and snowmobiles.

Noise may act as a deterrent to polar bears entering work areas, conversely camp odors could attract them (see 50 CFR 18.34 for further guidance). Attracting polar bears to these locations could result in human–bear encounters, unintentional harassment, intentional hazing, or possible lethal take in defense of human life. When disturbed by noise, animals may respond behaviorally (*e.g.*, escape response) or physiologically (*e.g.*, increased heart rate, hormonal response) (Harms *et al.* 1997; Tempel and Gutierrez 2003). Noise produced by Industry activities during the open-water and ice-covered seasons could disturb polar bears. The available studies of polar bear behavior indicate that polar bears can be sensitive to noise disturbance based on previous interactions, sex, age, and maternal status (Anderson and Aars 2008; Dyck and Baydack 2004). Additionally, habituation may impact individual bear behavior. A more detailed description of the impact of noise on polar bear hearing can be found below in *Analysis of Aircraft Impact*.

Encounter Rate

The most comprehensive dataset of human–polar bear encounters along the coast of Alaska consists of records of Industry encounters during activities on the North Slope. This database is referred to as the "LOA database" because it aggregates data reported by the oil and gas industry to the Service pursuant to the terms and conditions of LOAs, issued under current and previous incidental take regulations (50 CFR part 18, subpart J). While KIC's project area does not spatially overlap with the activities that inform the LOA database, the LOA database does include data from the same types of activities as specified in KIC's request and serves as a reasonable proxy for how polar bears may interact with KIC's project. We have used the LOA database in conjunction with bear density projections for the entire coastline to generate quantitative encounter rates in the project area. We used records from 2014–2018 to conduct the analyses described below. These records were entered into a larger LOA database, which included the date and time of the encounter, a general description, number of bears encountered, latitude and longitude, weather variables, and a take determination made by the Service. If latitude and longitude were not supplied in the initial report, we georeferenced the encounter using the location description and a map of North Slope infrastructure. We also calculated distance to shore for each encounter record using a shapefile of the coastline and the *dist2Line* function found in the R geosphere package.

Spatially partitioning the North Slope into "coastal" and "inland" zones

Polar bear encounters along the Alaskan coast exhibit a high degree of spatial autocorrelation, with the vast majority of encounters occurring along the shore or immediately offshore (Atwood *et al.* 2015, Wilson *et al.* 2017). Thus, encounter rates for inland operations should be significantly lower than those for offshore or coastal operations. To partition the North Slope into "coastal" and "inland" zones, we calculated the distance to shore for all encounter records in the period 2014–2018 in the Service's LOA database. Linked sightings of the same bear(s) were removed from the analysis, and individual records were created for each bear encountered. However, because we were only able to identify and remove repeated sightings that were designated as linked within the database, it is likely that some repeated encounters of the same bear remained in our analysis. Of the 1,713 bears encountered from 2014 through 2018, 1,140 (66.5 percent) of the bears were offshore. While these bears were encountered offshore, the encounters were reported by onshore or island operations (*i.e.*, docks, drilling and production islands, or causeways). We examined the distribution of bears that were onshore and up to 10 km (6.2 mi) inland to determine the distance at which encounters sharply decreased (figure 2).

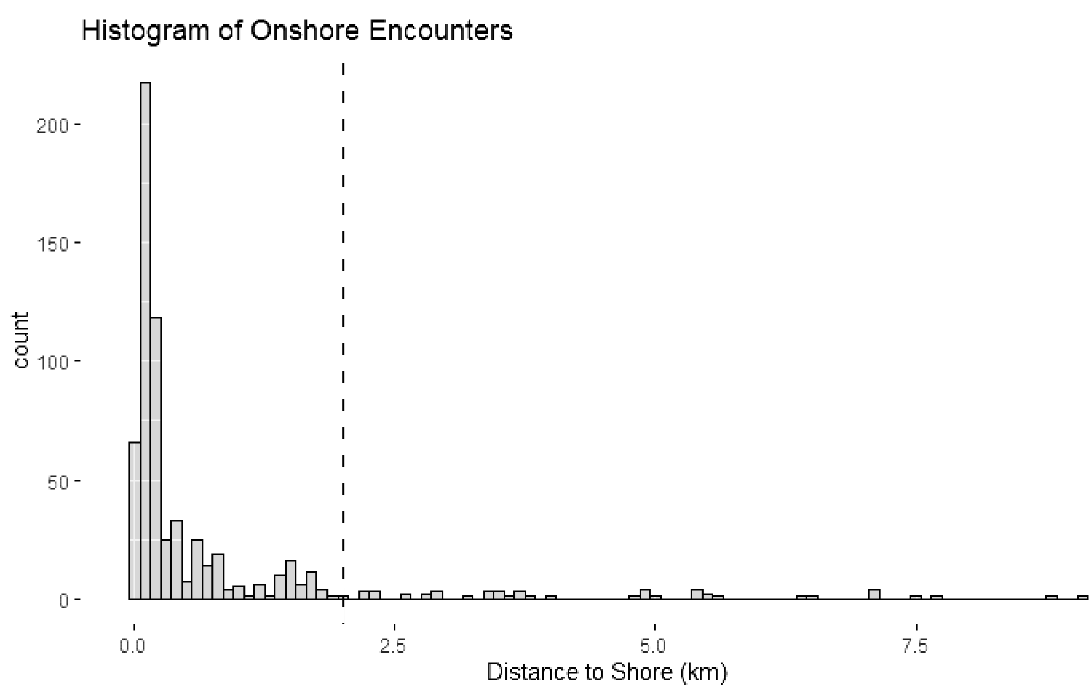

Figure 2. Distribution of onshore polar bear encounters by distance to shore (km). The decrease in encounters was used to designate a "coastal" zone up to 2.0 km (1.2 mi) from shore, and an "inland" zone greater than 2.0 km (1.2 mi) from shore.

The histogram illustrates a steep decline in human–polar bear encounters at 2 km (1.2 mi) from shore. Using this data, we divided the North Slope into the "coastal zone," which includes offshore operations and up to 2 km (1.2 mi) inland, and the "inland zone," which includes operations more than 2 km (1.2 mi) inland.

Dividing the year into seasons

The Service's LOA database was also used to divide the year into seasons of high bear activity and low bear activity. Below is a histogram of all bear encounters from 2014 through 2018 by day of the year (Julian date). Two clear seasons of polar bear encounters can be seen: an "open water season" that begins in mid-July and ends in mid-November, and an "ice season" that begins in mid-November and ends in mid-July. The 200th and 315th days of the year were used to delineate these seasons when calculating encounter rates (figure 3).

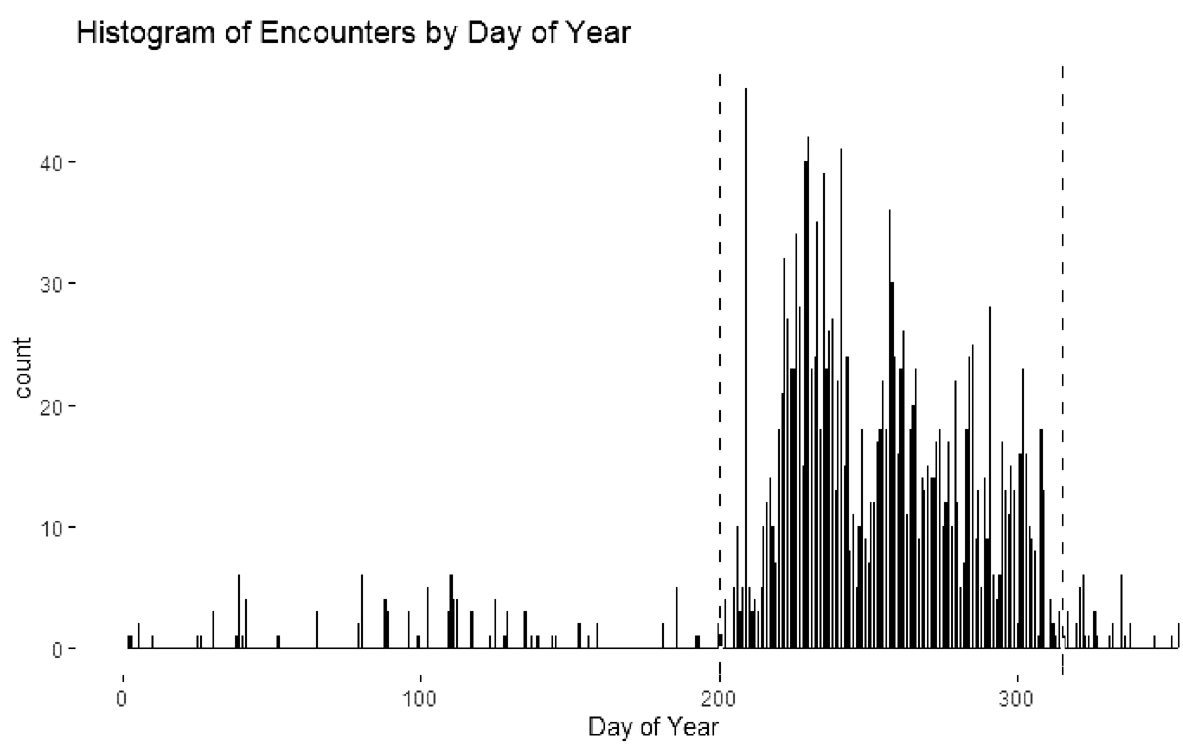

Figure 3. Distribution of polar bear encounters by Julian day of year. Dotted lines delineate the "open" vs. "ice" seasons. Open season begins on the 200th day of the year (July 19th) and ends on the 315th day of the year (November 11th).

North Slope Encounter Rates

Encounter rates in bears/season/km^2 were calculated using a subset of the Industry encounter records maintained in the Service's LOA database. The following formula was used to calculate encounter rate (Equation 1):

$$\frac{Bears\ Encountered\ by\ Season}{Area\ Occupied\ (km^2)}$$

Equation 1

The subset consisted of encounters in areas that were constantly occupied year-round to prevent artificially inflating the denominator of the equation and negatively biasing the encounter rate. To identify constantly occupied North Slope locations, we gathered data from a number of sources. We used past LOA applications to find descriptions of projects that occurred anywhere within 2015–2018 and the final LOA reports to determine the projects that proceeded as planned and those that were never completed. Finally, we relied upon the institutional knowledge of our staff, who have worked with operators and inspected facilities on the North Slope. To determine the area around industrial facilities in which a polar bear can be seen and reported, we queried the LOA database for records that included the distance to an encountered polar bear. It is important to note that these values may represent the closest distance a bear came to the observer, or the distance at initial contact. The histogram of these values shows a drop in the distance at which a polar bear is encountered at roughly 1,600 m (1 mi) (figure 4).

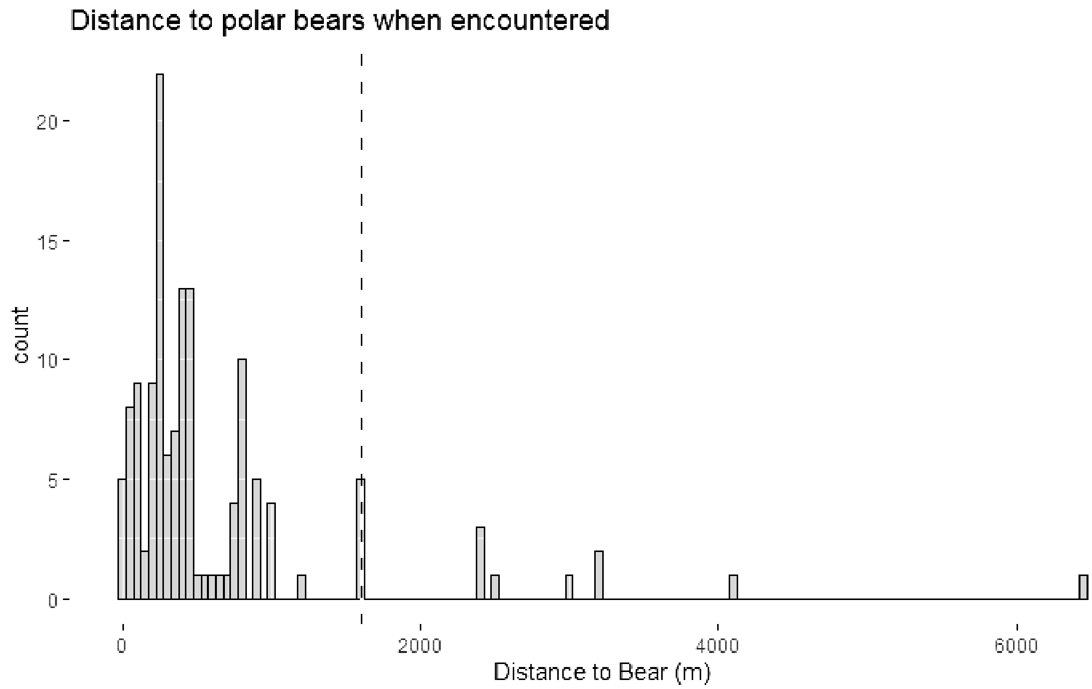

Figure 4. Distribution of polar bear encounters by distance to bear (m). Given this distribution, search area was set at 1,600 m (1.0 mi) from industrial infrastructure.

Using this information, we buffered the 24-hour occupancy locations listed above by 1,600 m (1 mi) and calculated an overall search area for both the coastal and inland zones. The coastal and inland occupancy buffer shapefiles were then used to select encounter records that were associated with 24-hour occupancy locations, resulting in the number of bears encountered per zone. These numbers were then separated into open-water and ice seasons (table 1).

Table 1. Summary of encounters within 1,600 m (1 mi) of the 24-hour occupancy locations and subsequent encounter rates for coastal (a) and inland (b) zones.

(A) Coastal Zone (Area = 133 km^2)		
Year	Ice Season Encounters	Open-Water Season Encounters
2014	2	193
2015	8	49
2016	4	227
2017	7	313
2018	13	205

Average	6.8	197.4
Seasonal Encounter Rate	**0.05 bears/km^2**	**1.48 bears/km^2**

(B) Inland Zone (Area = 267 km^2)		
Year	Ice Season Encounters	Open-Water Season Encounters
2014	3	3
2015	0	0
2016	0	2
2017	3	0
2018	0	2
Average	1.2	1.4
Seasonal Encounter Rate	**0.004 bears/km^2**	**0.005 bears/km^2**

Correction for increased bear density in the project area

Distribution patterns of polar bears along the coast of the SBS were estimated by Wilson *et al.* (2017) using a Bayesian hierarchical model based on 14 years of aerial surveys in late summer and early fall. The model estimated 140 polar bears per week along the coastline (a measurement that included barrier islands), with the highest density occurring on Barter Island, which is within the project area. In order to correct the encounter rates for the higher density of polar bears in this area, we calculated the proportional relationship between bear density in the North Slope area and the project area. Wilson *et al.* (2017) divided the coastline into 10 equally sized grids. The North Slope area for which the above encounter rates are calculated falls within grids 4–7, and the Marsh Creek–East 3D seismic survey project area falls within grids 8 and 9. Wilson *et al.* (2017) found 40 percent of the bears along the coastline were estimated to occur in grids 4–7, and 40 percent were estimated to occur in grids 8 and 9. When accounting for the length of coastline in these segments, we found the number of bears in grids 8 and 9 to be 2.33 times higher than the number of bears in grids 4–7. We therefore multiplied the North Slope coastal and inland encounter rates described above by 2.33 during the open-water and ice seasons.

Take Rate

Level B take rate, or the probability that an encountered bear will experience either incidental or intentional Level B take, was calculated using the 2014–2018 dataset from the LOA database. A binary logistic regression of take regressed upon distance to shore was not significant ($p = 0.65$), supporting the use of a single take rate for both the coastal and inland zones. However, a binary logistic regression of take regressed upon day of the year was significant. This significance held when encounters were binned into either ice or open-water seasons ($p<0.0015$). We calculated the take rate for each season separately and found the combined rate of incidental and intentional Level B take to be 0.28 (*i.e.*, 28 percent of encounters end in take) during the ice season, and 0.16 during the open-water season.

Take Area

As noted above, we have calculated a bear density depending on the distance from shore and season, and a take rate depending on season. In order to estimate take from the project activities, we must calculate the area affected by project activities to such a degree that take is likely. This is sometimes referred to as a zone or area of influence. Behavioral response rates of polar bears to disturbances are highly variable, but disturbances within 805 m (0.5 mi) are generally more likely to cause take by Level B harassment than those at greater distances. Observational data to support the relationship between distance to bears and disturbance is limited. During the Service's coastal aerial surveys, most polar bears that responded in a way that indicated possible take by Level B harassment (polar bears that were running when detected or began to run or swim in response to the aircraft) did so at 760 m (0.47 mi) or less (as measured from the ninetieth percentile horizontal detection distance from the flight line). Similarly, Andersen and

Aars (2008) found that polar bears began to walk or run away from approaching snowmobiles at a mean distance of 843 m (0.52 mi). The authors also found females with cubs responded by walking or running away at a distance of 1.5 km (0.95 mi). Conversely, Dyck and Baydack (2004) found females showed decreased vigilance in the presence of vehicles on the tundra. Furthermore, in their summary of polar bear behavioral response to icebreaking vessels in the Chukchi Sea, Smultea *et al.* (2016) found no difference between reactions of males, females with cubs, or females without cubs. Thus, while further research into the reaction of polar bears to anthropogenic disturbance may indicate a greater zone of potential impact is appropriate, the current literature suggests 805 m (0.5 mi) will likely encompass the majority of polar bear takes.

Estimated Take

We used the spatio-temporally specific encounter rates and temporally specific take rates derived above, in conjunction with the spatially and temporally specific project proposal from KIC, to calculate estimated take. The activities proposed by KIC can be grouped into three categories: an access route, seismic activity, and summer cleanup activities. The distribution of personnel and equipment across the project area is different for each of these categories, thus they differ slightly. Table 2 provides the definition for each variable used in the take formulas.

Table 2. Definitions of variables used in take estimates.

Variable	Definition
d_i	days of impact
d_s	days in each season (open-water season = 116, ice season = 249)
S_p	proportion of the season an area of interest is impacted
B_{es}	bears encountered in an area of interest for the entire season
a_c	coastal exposure area
a_i	inland exposure area
r_o	occupancy rate
e_{co}	coastal open-water season bear-encounter rate in bears/season

e_{ci}	coastal ice season bear-encounter rate in bears/season
e_{io}	inland open-water season bear-encounter rate in bears/season
e_{ii}	inland ice season bear-encounter rate in bears/season
t_i	ice season take rate
t_o	open-water season take rate
B_t	number of estimated Level B takes
B_T	total bears taken for activity type

The variables defined above were used in a series of formulas to ultimately estimate the total take from surface-level interactions. Encounter rates were originally calculated as bears encountered per square kilometer per season (see *North Slope Encounter Rates* above). Therefore, we calculated the proportion of the season (S_p) that an area of interest (*i.e.*, a buffered access route, seismic sub-block, or summer cleanup area) would be impacted with the following formula (Equation 2).

$$S_p = \frac{d_i}{d_s}$$

Equation 2

The area of impact to non-denning bears from linear (access route) activities was calculated by buffering the access route by 805 m (0.5 mi) on each side, creating a 1,610-m (1.0-mi) corridor of impact. We calculated the area of access road impact in both the coastal and inland zones for each camp movement, as the access road grows in length with each advance of the camp. To determine the area of impact for the on-the-ground portion of summer cleanup activities, the maximum size of a camp (91×122 m; 300×400 ft) was buffered by 1,610 m (1 mi) to account for personnel venturing outside the immediate camp area to pick up debris, resulting in a 2.9-km^2 impact area. KIC will use only one cleanup crew, thus only 2.9 km^2 will be impacted at any given time. The areas of impact were then clipped (a function that retains only overlapping areas) by coastal and inland zone shapefiles in ArcGIS Pro to determine the coastal areas of impact (a_c)

and inland areas of impact (a_i) for each activity category. Impact areas were multiplied by the appropriate encounter rate to obtain the number of bears expected to be encountered in the area of interest per season (B_{es}). The equation below (Equation 3) provides an example of the calculation of bears encountered in the ice season for an area of interest in the coastal zone.

$$B_{es} = a_c * e_{ci}$$

Equation 3

The rate of occupancy (r_o) of each operation category was determined using the description of activities provided by the applicant. KIC has stated they may use the access road up to once a day. We have estimated this use will lead to up to 50 percent occupancy of the access road impact area at any given time. Advance crews activity was assigned an occupancy rate of r_o=0.33, as they will be present in only one third of the survey block at any given time. Both the main seismic and summer cleanup activities were assigned r_o=1, as these areas will be impacted constantly. To generate the number of estimated Level B takes for each area of interest, we multiplied the number of bears in the area of interest per season by the proportion of the season the area is occupied, the rate of occupancy, and the take rate (Equation 4).

$$B_t = B_{es} * S_p * r_o * t_i$$

Equation 4

The total number of Level B takes for surface-level interactions was calculated by adding the takes for each activity type (table 3). A total of one Level B take of polar bears are anticipated from surface-level activities.

Table 3. Values for the variables defined above for each activity category.

Variable	Access Road	Seismic Activity	Summer Cleanup
d_i	See table 9 for days per sub-block.	See table 9 for days per sub-block.	3 days in coastal zone 12 days in inland zone
d_s	Open water = 116, Ice = 249	Open water = 116, Ice = 249	Open water = 116, Ice = 249
S_p	0.008–0.012 unique to date and sub-block	0.008–0.012 unique to sub-block	0.012 in coastal zone 0.10 in inland zone
B_{es}	0.364–23.053 bears unique to date and sub-block	0.32–4.39 bears unique to sub-block	0.344 bears in coastal zone 0.033 bears in inland zone
a_c	101–194 km^2 unique to sub-block	7–37 km^2 unique to sub-block	2.9 km^2
a_i	35–103 km^2 unique to sub-block	16–95 km^2 unique to sub-block	2.9 km^2
r_o	0.5	0.33 for advance crew 1 for main crew	1
e_{co}	3.45 bears/km^2/season	3.45 bears/km^2/season	3.45 bears/km^2/season
e_{ci}	0.118 bears/km^2/season	0.118 bears/km^2/season	0.118 bears/km^2/season
e_{io}	0.0116 bears/km^2/season	0.0116 bears/km^2/season	0.0116 bears/km^2/season
e_{ii}	0.0104 bears/km^2/season	0.0104 bears/km^2/season	0.0104 bears/km^2/season
t_i	0.28	0.28	0.28
t_o	0.16	0.16	0.16
B_t	0.0004–0.038 bears unique to sub-block	0.0002–0.008 bears unique to sub-block	0.0005–0.001 bears unique to sub-block
B_T	0.70 Level B takes	0.25 Level B takes	0.0017 Level B takes
Total Level B takes due to surface interactions is 1 bear			

Analysis of Aircraft Impact to Surface Bears

Potential Impacts from KIC Aircraft Activities

Behavioral responses can be seen from acute exposure to high sound levels or from long periods of exposure to lower sound levels. Prolonged exposure over time can lead to a chronic stress response (see *Level B Harassment*) that may inhibit necessary life activities for polar bears (see *Level A Harassment*). Both the sound levels and durations of exposure from KIC's aircraft will depend primarily on a polar bear's vertical distance from the aircraft. Airborne sound attenuation rates are affected by characteristics of the atmosphere and topography, but can be conservatively generalized for line sources (such as flight lines) over acoustically "hard" surfaces like water (rather than "soft" surfaces like snow) by a loss of 3 dB per doubling of distance from the source. At this attenuation rate, a sound registering 90 dB directly below a flyover at 91 to 152 m (300 to 500 ft) above sea level (ASL) will attenuate to 80 dB in 1 to 1.5 km (0.6 to 0.9 mi). The same noise level will attenuate to 68 dB within 15 to 24 km (9 to 15 mi).

Sound frequencies produced by KIC's aircraft will likely fall within the hearing range of polar bears (see Nachtigall *et al.* 2007) and will be audible to animals during flyovers. During FAA testing, the test aircraft produced sound at all frequencies measured (50 Hz to 10 kHz) (Healy 1974; Newman 1979). At frequencies centered at 5 kHz, jets flying at 300 m (984 ft) produced 1/3 octave band noise levels of 84 to 124 dB, propeller-driven aircraft produced 75 to 90 dB, and helicopters produced 60 to 70 dB (Richardson *et al.* 1995).

Observations of polar bears during fall coastal surveys, which flew at much lower altitudes than is required of Industry aircraft (see *Estimating Take Rates of Aircraft Activities*), indicate that the reactions of non-denning polar bears is typically varied but limited to short-term changes in behavior ranging from no reaction to running away. Larson *et al.* 2020 has recently determined "a 20.0 percent probability (*95 percent CI* = 05.1–34.9) of eliciting increased vigilance, a 57.4 percent probability (*95 percent CI* = 38.9–75.9) of initiating rapid movement, and a 22.6 percent probability (*95 percent CI* = 06.8–38.4) of causing den abandonment" in polar bears when exposed to aircraft activity. This finding indicates the potential that aircraft activities can cause the take of both surface and denning bears via a biologically significant response. Aircraft activities can impact bears over all seasons; however, during the summer and fall seasons, aircraft have the potential to disturb both individuals and congregations of polar bears. Polar bears are onshore during this time of year and spend the majority of their time resting and limiting their movements on land. Exposure to aircraft traffic at this time of year is expected to result in changes in behavior, such as going from resting to walking or running, and therefore has the potential to be more energetically costly compared to other times of year. Mitigation measures, such as minimum flight elevations over polar bears, habitat areas of concern, and flight restrictions around known polar bear habitat will be required to achieve least practicable adverse impact of the likelihood that polar bears are disturbed by aircraft.

KIC has requested authorization for Level B incidental harassment of polar bears. Polar bears in the project area will likely be exposed to the visual and auditory stimulation associated with KIC's flight plans. If polar bears are disturbed, it may be more likely due to the airborne noise associated with KIC's take-offs and landings, or possibly the noise in tandem with the sight of the aircraft during flight. These impacts are likely to be minimal and not long-lasting to surface bears. KIC's flights will generate noise that is louder and recurs more frequently than noise from regular air traffic due to the survey's particular aircraft and flight pattern, taking off and landing multiple times per day. Flyovers may cause disruptions in the polar bear's normal behavioral patterns, thereby resulting in incidental take by Level B harassment. Sudden changes in direction, elevation, and movement may also increase the level of noise produced from the helicopter, especially at lower altitudes. This increased level of noise could result in a Level B take and adverse behavioral modifications from polar bears in the area. Mitigation measures, such as minimum flight elevations over polar bears and restrictions on sudden changes to helicopter movements and direction, will be required to reduce the likelihood that polar bears are disturbed by aircraft. Once mitigated, such disturbances are expected to have no more than short-term, temporary, and minor impacts on individuals.

Estimating Take Rates of Aircraft Activities

To predict how polar bears will respond to aircraft overflights during North Slope oil and gas work, we first developed a behavioral response curve to determine various exposure areas at which polar bears may react to aircraft noise. We then developed an aircraft noise profile using noise mapping software and Federal Aviation Administration (FAA) test values for aircraft noise in A-weighted decibels (dBA). With the noise profile and exposure distances, we then developed a Level B take rate response curve to determine the estimated take rate within each exposure area based on the noise levels of the aircraft.

The behavioral response curve plots the decibel level and distance at which polar bears exposed to aircraft noise show behavioral responses that indicate take by Level B harassment. To develop the behavioral response curve, we examined existing data on the behavioral responses of polar bears during aircraft surveys conducted by the Service along with the U.S. Geological Survey (USGS) between August and October during most years from 2000 to 2014 (Wilson *et al.* 2017, Atwood *et al.* 2015, and Schliebe *et al.* 2008). Behavioral responses due to sight and sound of the aircraft have both been incorporated into this analysis as there was no ability to differentiate between the two response sources during aircraft survey observations. Aircraft types used for surveys during the study included a fixed-wing Aero-Commander from 2000 to 2004, an R-44 helicopter from 2012 to 2014, and an A-Star helicopter for a portion of the 2013 surveys. During surveys, all aircraft flew at an altitude of approximately 90 m (295 ft), and at a speed of 150 to 205 km per hour (km/h) or 93 to 127 mi per hour (mi/h). Reactions indicating possible take by Level B harassment were recorded when a polar bear was observed running from the aircraft or began to run or swim in response to the aircraft. Of 951 polar bears observed during coastal aerial surveys, 162 showed these reactions, indicating that the percentage of Level B take during these low-altitude coastal survey flights was 17 percent.

Detailed data on the behavioral responses of polar bears to the aircraft were available for only the flights conducted between 2000 and 2004 (n = 581). The Aero Commander 690, also known as the Turbo Commander, was used during this period. The horizontal detection distance from the flight line was recorded for 108 polar bears that reacted by running or swimming away from aircraft, indicating a Level B harassment. Using these data, we parameterized a logistic function to predict distances at which bears responded ($R^2 = 0.99$; Equation 5).

$$y = 0.0069987922 + \frac{0.40588153 - 0.0069987922}{1 + \left(\frac{x}{155.10902}\right)^{3.1068933}}$$

Equation 5

Accordingly, the approximate sum of the declining response rates from the center of the flight line to 400 m (0.25 mi) was 0.87 and to 800 m (0.5 mi) was 0.92. This calculation indicates that the majority (92 percent) of polar bears with responses to aircraft indicating take by Level B harassment responded within 800 m, whereas 8 percent of Level B take occurred beyond that (1-0.92 = 0.08) (figure 5). The response distances (400 m [0.25 mi], 800 m [0.5 mi], and 2,000 m [1.2 mi]) were then combined with the sound produced by the aircraft, based on altitude, to determine the level of noise at which polar bears are likely to exhibit a behavioral response.

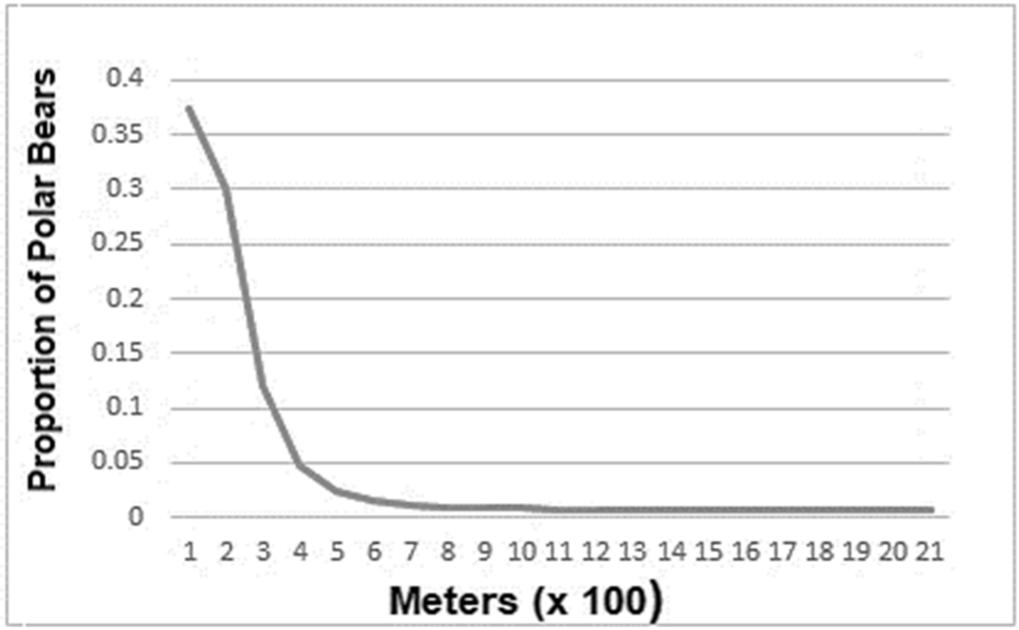

Figure 5. Cumulative frequency (Y axis) of distance from the center of flight line in meters (X axis) times 100 for polar bears showing Level B responses to aircraft overflights.

The intensity of response within each exposure area will be affected by the altitude and aircraft type. To predict how polar bears might respond to different levels of noise within each exposure area, we evaluated the sound levels at the source that were generated during the coastal surveys using the Aero Commander. Sound waves propagate as a sphere and follow the "inverse square law" of attenuation. A general rule is that the level reduces by 6 dB per doubling of distance. The source sound levels of the Aero Commander were back-calculated from the FAA test values based on this generalized modelling approach. Specifically, we used noise mapping software by MAS Environmental, Ltd. (2020), to generate a geometric spreading loss model with attenuation by atmospheric absorption according to International Organization for Standardization (ISO) 9613-2 methodology (ISO 1996).

Parameters for estimating the source sound pressure levels include the received sound levels, frequency distribution of aircraft sound, and atmospheric conditions. The received sound pressure level for the Aero Commander 690 flying at an altitude of 305 m (1,000 ft) and maximum continuous power (approximately 525 km/hr or 326 m/hr [Twin Commander Aircraft]) was 76.4 dBA measured at ground level (FAA 2012). The Aero Commander's noise levels have also been measured during a gliding flight path at 152.4 m (500 ft) altitude and airspeeds up to 324 km/hr (201 mi/hr), during which the aircraft produced a maximum of 75.4 dB (Healy 1974).

Frequency distribution of broadband aircraft sound was generalized from figure 2 in Bajdek *et al.* (2016). Environmental parameters were based on average Prudhoe Bay weather conditions (Thorsen 2020) of -11°C, 82 percent humidity, and a "ground factor" of 0 for hard ground, ice, and water. Based on these parameters, the source levels of the Aero Commander were estimated to be 132.5 dB during the test flights conducted by the FAA.

The noise levels that would have been received by polar bears on the ground surface during the USFWS/USGS coastal surveys were then estimated using the same geometric spreading loss model for attenuation at a flight altitude of 90 m (295 ft). The model outputs indicated that polar bears under the center of the flight line were likely to have been exposed to approximately 80.4 dBA, while those at 400 m (0.25 mi) from the centerline were likely exposed to approximately 65.3 dBA (figure 6).

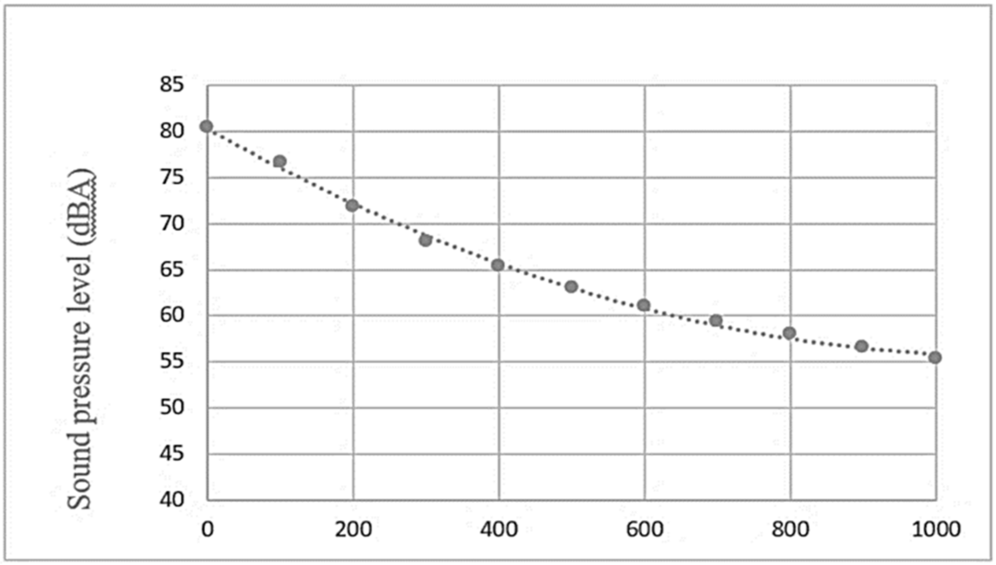

Figure 6. Sound attenuation by distance from center of USFWS/USGS coastal survey flight line. Surveys were flown at 90 m (152.4 ft) above ground level.

Model outputs incorporated A-weighting. A-weighting reduces the decibel levels perceived outside of the best hearing range of human beings and was applied herein as a conservative reduction of decibel levels for polar bears due to the high degree of overlap in the frequency ranges of hearing (figure 7).

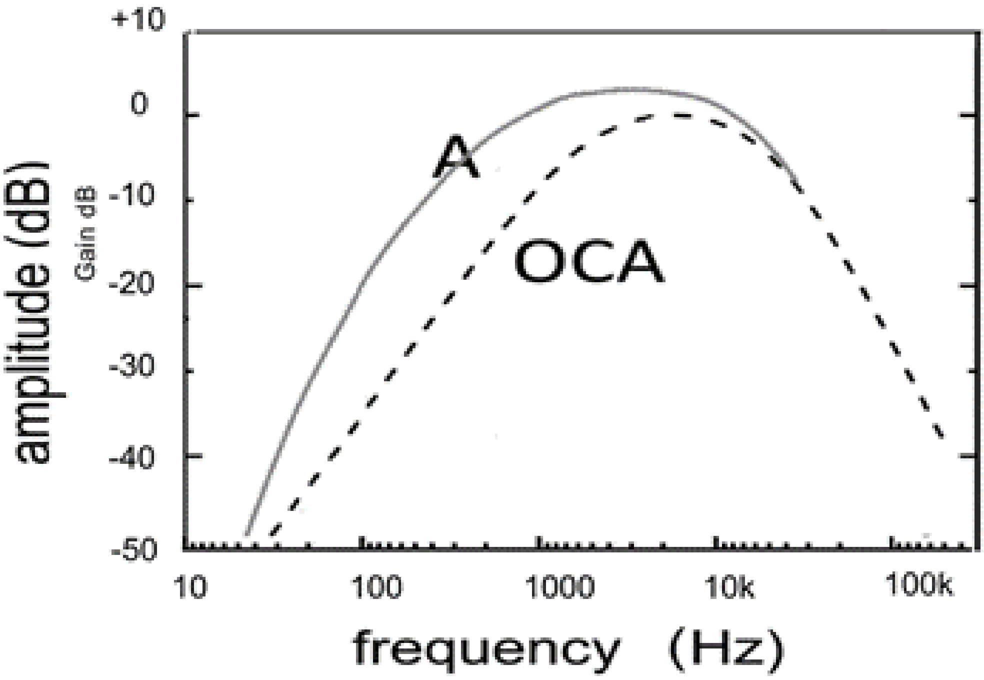

Figure 7. Comparison of the A-weighting function for human hearing ("A"; solid line) with the recommended weighting function from Southall *et al.* (2019) for other carnivores, including polar bears, in air ("OCA"; black).

Aircraft flight for the oil and gas Industry on the North Slope seldom occur at cruising altitudes less than 152.4 m (500 ft). But, the estimated rate of Level B take at less than 152.4 m (500 ft) was assumed to be appropriate for takeoffs and landings. The sound source levels of the Aero commander and corresponding behavioral response rates at various distances from the center line of flight path were used to inform the spatiotemporally explicit Level B take rate response curve (figure 8). We were then able to apply this take rate response curve to noise profiles calculated for other types of aircraft. For winter and summer activities, we used the De Havilland DH6-300 Twin Otter and noise tests conducted for this aircraft by the FAA (2012). Although the Bell 206 is planned to be used during summer operations, there was a lack of information to inform the sound propagation model. We do know, however, that the estimated dBA at 400 ft above ground level for the Bell 206 is less than what is estimated for the Twin

Otter (82.4 dBA [NPS 2007] and 89.7 dBA respectively). Therefore, there is likely a slight overestimation of take in regards to summer activities. Decibel levels from flights at various altitudes were estimated using the geometric spreading model, and the resulting take rate was predicted from the response curve (table 4).

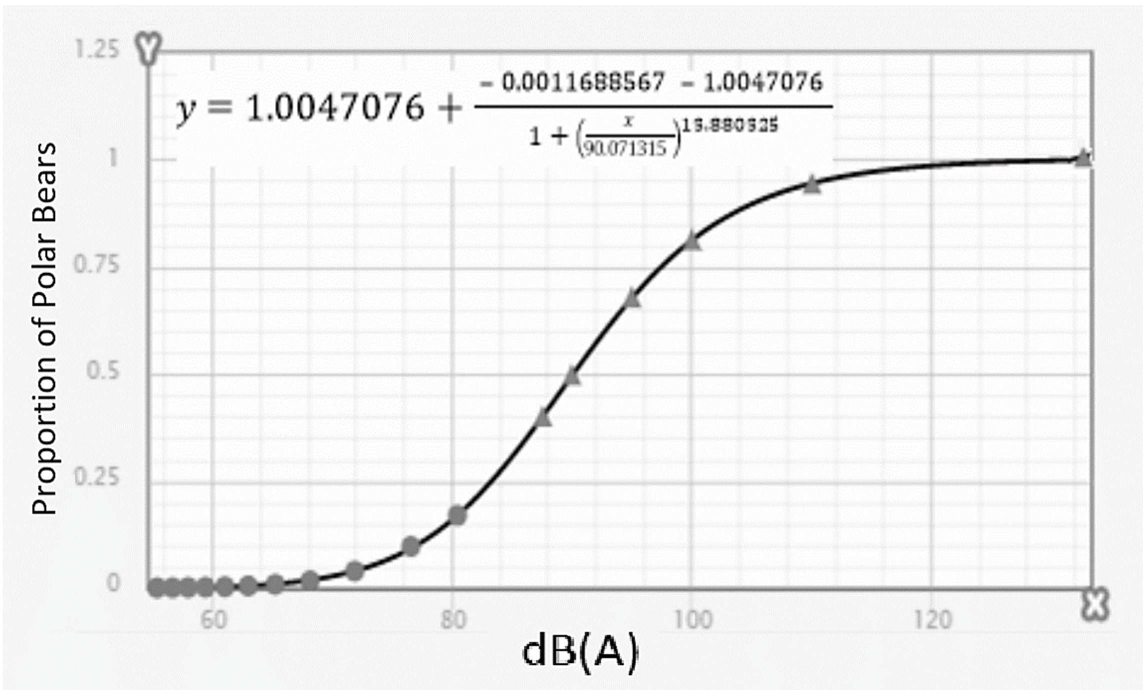

Figure 8. Observed (circles) and predicted (triangles) rates of Level B take of polar bears by sound pressure level (dBA) from exposure to aircraft.

The sound level at which all polar bears would respond was set to 132.5 dBA based on thresholds identified for possible hearing damage due to sound exposure for proxy marine mammal species identified by Kastak *et al.* (2007), Southall (2019), and Finneran (2015).

Table 4. Rate of Level B take by exposure type (altitude and distance from center of flight line) and activities for which these rates apply.

Aircraft	Up to (m) altitude	Max estimated	Up to (m) Distance from center	Level B response rate for the	Applicable to

		SPL in the zone (dBA)		distance category	
Twin Otter	90	95.2	0–399	**68.6 percent**	Takeoffs/landings (<300 ft)
Twin Otter	90	79.1	400–799	**14.1 percent**	Takeoffs/landings (<300 ft)
Twin Otter	90	71.5	800–2,000	**3.8 percent**	Takeoffs/landings (<300 ft)
Twin Otter	152.4	89.7	0–399	**48.7 percent**	Flights 500–1,000 ft
Twin Otter	152.4	78.6	400–799	**13.1 percent**	Flights 500–1,000 ft
Twin Otter	152.4	71.3	800–2,000	**3.7 percent**	Flights 500–1,000 ft
Twin Otter	457	82.3	0–399	**22.2 percent**	Flights 1,000–1,500 ft
Twin Otter	457	76.8	400–799	**9.8 percent**	Flights 1,000–1,500 ft
Twin Otter	457	70.7	800–2,000	**3.3 percent**	Flights 1,000–1,500 ft

General Approach to Estimating Take for Aircraft Activities

Aircraft information was determined using details provided in the application, including flight paths, flight take-offs and landings, altitudes, and aircraft type. We marked the approximate flight path start and stop points using ArcGIS Pro (version 2.4.3), and the paths were drawn.

For winter activities, we started the flight paths at the Deadhorse airport and ended them at the centroid of each sub-block using a frequency of 3 flights per week totaling approximately 62 flights during the winter season. A portion of this flight path lies within the authorization area for the 2016–2021 Beaufort Sea ITR and was excluded from this analysis. For summer cleanup activities, we started flight paths at Barter Island Airport and extended one flight path approximately 160 km (~99 mi) into the coastal zone, extended one flight path approximately 160 km (~99 mi) into the inland zone, and added an additional flight path in the inland zone to serve as the basis for inland tundra landing analysis. Because Barter Island Airport is within the coastal zone, we did not have to draw a separate tundra landing path to analyze coastal landings. These flight paths were analyzed based on the coastal portion of summer cleanup activities occurring prior to July 19th and lasting for 3 days before moving inland for the remaining 12 days occurring after July 19th. A total of 32 tundra landings per day were also included in the analysis.

Flight segments flown at lower altitudes were estimated to have greater impact on encountered polar bears due to higher received sound levels. For example, received sound levels are higher from aircraft flying at 91 m (300 ft) than at 305 m (1,000 ft). To account for this, once the flight paths were generated, flights were broken up into segments for landing, take-off, and traveling. For winter activities, the take-off area and a portion of the travel segment of the flight path resides within the area covered by the 2016–2021 Beaufort Sea ITR and is excluded from KIC's IHA request and this analysis. "Landing" and "take-off" areas were marked along the flight paths at each end point to designate low-altitude areas. The "traveling area" is considered the point in which an aircraft is likely to be at its maximum altitude (altitudes of 152.4 m (500 ft) up to 457 m (1,500 ft) depending on the aircraft activity). The distance considered the "landing" area is based on approximately 4.83 km (3 mi) per 305 m (1,000 ft) of altitude descent speed. For all flight paths at or exceeding an altitude of 152.4 m (500 ft), the "take-off" area was marked as 2.41 km (1.5 mi) based on flight logs found through FlightAware, which noted that ascent to maximum flight altitude took approximately half the time of the average descent. We then applied exposure areas along the flight paths (see section *Estimating*

Take Rates of Aircraft Activities). These areas consisted of 0–399 m (0.25 mi), 400–799 m (0.50 mi), and 800–2,000 m (1.2 mi) distances from the center of the flight path.

After these exposure areas were determined, we differentiated the coastal and inland zones. The coastal zone was the area offshore and within 2 km (1.2 mi) of the coastline (see section *Spatially Partitioning the North Slope into "coastal" and "inland" zones*), and the inland zone is anything greater than 2 km (1.2 mi) from the coastline. We calculated the areas in square kilometers for each exposure area within the coastal zone and the inland zone for all take-offs, landings, and traveling areas (with the exception of winter aircraft activities authorized through an LOA and excluded from KIC's request). For flights that involve an inland and a coastal airstrip, we considered landings to occur at airstrips within the coastal zone, such as Barter Island. Seasonal encounter rates developed for both the coastal and inland zones (see section *Search Effort Buffer*) were applied to the appropriate segments of each flight path.

Surface encounter rates are calculated based on the number of bears per season (see section *Search Effort Buffer)*. To apply these rates to aircraft activities, we needed to calculate a proportion of the season in which aircraft were flown. However, the assumption involved in using a seasonal proportion is that the area is impacted for an entire day (*i.e.*, for 24 hours). Therefore, in order to prevent estimating impacts along the flight path over periods of time where aircraft are not present, we calculated a proportion of the day the area will be impacted by aircraft activities for each season (table 5).

Table 5. Variable definitions and constant values used in polar bear take estimates for winter and summer aircraft activities.

Variable	Definition	Value
d_s	days in each season	open water season = 116, ice season = 249
S_p	proportion of the season an area of interest is impacted	varies by flight
f	flight frequency	varies by flight
$D_{p(LT)}$	proportion of the day landing/take-off areas are impacted by aircraft activities	varies by flight
t_{LT}	amount of time an aircraft is impacting landing/take-off areas within a day	10 minutes per flight
$D_{p(TR)}$	proportion of the day traveling areas are impacted by aircraft activities	varies by flight
t_{TR}	amount of time an aircraft is impacting traveling areas	2 minutes per 4km [2.49mi] segment per flight
x	number of 4km (2.49mi) segments within each traveling area	varies by flight
B_{es}	bears encountered in an area of interest for the entire season	varies by flight
B_i	bears impacted by aircraft activities	varies by flight
a_c	coastal exposure area	varies by distance to center line
a_i	inland exposure area	varies by distance to center line
e_{co}	coastal open water season bear encounter rate in bears/season	3.45 bears/km^2/season
e_{ci}	coastal ice season bear encounter rate in bears/season	0.118 bears/km^2/season
e_{io}	inland open water season bear encounter rate in bears/season	0.0116 bears/km^2/season
e_{ii}	inland ice season bear encounter rate in bears/season	0.0104 bears/km^2/season
t_a	aircraft take rate	varies by distance to center line and altitude
B_t	number of estimated level B takes	varies by flight

The number of times each flight path was flown (*i.e.*, flight frequency) was determined from the application. We used the description combined with the approximate number of weeks and months within the open-water season and the ice season to determine the total number of flights per season for each year (*f*). We then used flight frequency and number of days per season (d_s) to calculate the seasonal proportion of flights (S_p; Equation 6).

$$S_p = \frac{f}{d_s}$$

Equation 6

After we determined the seasonal proportion of flights, we estimated the amount of time an aircraft would be impacting the landing/take-off areas within a day (t_{LT}).

Assuming an aircraft is not landing at the same time another is taking off from the same airstrip, we estimated the amount of time an aircraft would be present within the landing or take-off zone would be t_{LT}= 10 minutes. We then calculated how many minutes within a day an aircraft would be impacting an area and divided by the number of minutes within a 24-hour period (1,440 minutes). This determined the proportion of the day in which a landing/take-off area is impacted by an aircraft for each season ($D_{p(LT)}$; Equation 7).

$$D_{p(LT)} = \frac{S_p * t_{LT}}{1440}$$

Equation 7

To estimate the amount of time an aircraft would be impacting the travel areas (t_{TR}), we calculated the minimum amount of time it would take for an aircraft to travel the maximum exposure area at any given time, 4 km (2.49 mi). We made this estimate using average aircraft speeds at altitudes less than 305 m (1,000 ft) to account for slower flights at lower altitudes, such as summer cleanup activities, and determined it would take approximately 2 minutes. We then determined how many 4-km (2.49-mi) segments are present along each traveling path (x). We determined the total number of minutes an aircraft would be impacting any 4-km (2.49-mi) segment along the travel area in a day and divided by the number of minutes in a 24-hour period. This calculation determined the proportion of the day in which an aircraft would impact an area while traveling during each season ($D_{p(TR)}$; Equation 8).

$$D_{p(TR)} = \frac{S_p * (t_{TR} * x)}{1440}$$

Equation 8

We then used an aircraft noise profile and the parametric behavioral response curve (see section *Estimating Take Rates of Aircraft Activities*) to determine the appropriate take rate in each exposure area (up to 400 m [0.25 mi], 800 m [0.5 mi], and 2,000 m [1.2 mi] from the center of the flight line; see *Estimating Take Rates of Aircraft Activities*). The take rate areas were then calculated separately for the landing and take-off areas along each flight path as well as the traveling area for flights with altitudes at or exceeding 152.4 m (500 ft).

To estimate number of polar bears taken due to aircraft activities, we first calculated the number of bears encountered (B_{es}) for the landing/take off and traveling sections using both coastal ($e_{ci \text{ or } co}$) and inland ($e_{ii \text{ or } io}$) encounter rates within the coastal (a_c) and inland (a_i) exposure areas (Equation 9).

$$B_{es} = (e_{ci \text{ or } co} * a_c) + (e_{ii \text{ or } io} * a_i)$$

Equation 9

Using the calculated number of coastal and inland bears encountered for each season, we applied the daily seasonal proportion for both landings/take-offs and traveling areas to determine the daily number of bears impacted due to aircraft activities (B_i). We then applied the appropriate aircraft take rates (t_a) associated with each exposure area at the altitude intervals of <91.4 m (<300 ft; take-offs and landings), 152.4 m (500 ft) to 305 m (1,000 ft), and 305 m (1,000 ft) to 457 m (1,500 ft) (see section *Estimating Take Rates of Aircraft Activities*) resulting in a number of bears taken during each season (B_t; Equation 10). Take associated with AIR surveys were analyzed separately.

$$B_t = B_i * t_a$$

Equation 10

Analysis Approach for Estimating Take During Aerial Infrared Surveys

Typically during every ice season Industry conducts polar bear surveys using AIR. These surveys are not conducted along specific flight paths and generally overlap previously flown areas within the same trip. The altitudes for these surveys can also vary. Given the above, the take estimates for surface bears during AIR surveys were analyzed using a different methodology.

Rather than estimate potential flight paths, we used the provided survey blocks to serve as a basis for our flight areas. We then estimated the area of each block that was within the coastal and inland zones. We accounted for three survey trips consisting of approximately 7 days each, and calculated the daily proportion of the ice season in which AIR surveys were impacting the direct area (see *General Approach to Estimating Take for Aircraft Activities*). Using the seasonal bear encounter rates for the appropriate zones multiplied by the proportion of the day the areas were impacted for the season AIR surveys were flown, we determined the number of bears encountered. Because the altitude is variable (ranging from 152.4 m [500 ft] – 305 m [1,000 ft] or greater), we calculated a constant take rate based on the Twin Otter's noise profile. We averaged take rates associated with three categorical exposure areas measured as the perpendicular distance to the center of the flight line at ground level. The exposure areas were 0–399 m (0–0.25 mi), 400–799 m (0.25–0.5 mi), and 800–2,000 m (0.5–1.2 mi) for altitudes of 152.4 m (500 ft) – 305 m (1,000 ft). We then applied this take rate to the number of bears encountered per zone to determine number of bears taken for the project's duration.

Estimated Take from Aircraft Activities

Using the approach described in *General Approach to Estimating Take for Aircraft Activities* and *Analysis Approach for Estimating Take during Aerial Infrared Surveys*, we were able to estimate the total number of bears taken by the aircraft activities during the KIC project Marsh Creek East 3D seismic project (table 6).

Table 6. Estimated Level B polar bear takes by season as a result of aircraft operations during the Marsh Creek East 3D seismic project.

Estimated Bear Takes			
	Open Season	Ice Season	**Total**
Winter Flights	0.000	0.038	**0.038**
Summer Flights	0.139	0.000	**0.139**
AIR Surveys	0.000	0.142	**0.142**
Total	**0.139**	**0.180**	**0.319**

Analysis of Impact to Denning Bears

To assess the likelihood and degree of exposure and predict probable responses of denning polar bears to activities proposed in the application, we characterized, evaluated, and prioritized a series of definitions and rules in a predictive model. We used information from published sources as well as information submitted to the Service by the Industry on denning chronology, behavior, and cub survival (i.e., case studies). We considered all available scientific and observational data on polar bear denning behavior and effects of disturbance to that behavior.

In the models discussed below, we define the following terms: (1) Exposure means any human activity within 1,610 m (1 mi) of a polar bear or active den. In the case of aircraft, an overflight within 1,500 feet (0.3 mi) above ground level; (2) Discrete exposure means an exposure that occurs only once; (3) Repeated exposure means an exposure that occurs more than once; and (4) Response probability means the probability that an exposure resulted in a response by denning polar bears. Additionally, we applied the following rules to our review of the case studies:

(1) Any exposure that did not result in a Level A or lethal take could result in a Level B harassment take. Consequently, multiple exposures could result in multiple Level B harassment takes.

(2) If dates of exposure were not explicit in a case study and the type of exposure could be daily (*e.g.*, the den was located within 1,610 m (1 mi) of an ice road versus exposed to an aerial den survey), we assumed exposures occurred daily.

(3) In the event of an exposure that resulted in a disturbance to denning bears, take was assigned for each bear (*i.e*., female and each cub) associated with that den.

(4) In the absence of additional information, we assumed dens did not contain cubs prior to December 1, but did contain cubs on or after December 1.

(5) If an exposure occurred and the female subsequently abandoned her den after cubs were born (i.e., after December 1), we assigned a lethal take for each cub.

(6) If an exposure occurred during the early denning period and bears emerged from the den before cubs reached 60 days of age, we assigned a lethal take for each cub. In the absence of information about cub age, den emergences that occurred between December 1 and February 15 were considered to be early emergences and resulted in a lethal take of each cub.

(7) If an exposure occurred during the late denning period and bears emerged from the den after cubs reached 60 days of age but before their intended (*i.e.,* undisturbed) emergence date, we assigned a serious injury (i.e., an injury likely to result in mortality) Level A harassment take for each cub. In the absence of information about cub age and intended emergence date (which was known only for simulated dens), den emergences that occurred between (and including) February 16 and March 14 were considered to be early emergences and resulted in a serious injury Level A harassment

take of each cub. If a den emergence occurred after March 14 but was clearly linked to an exposure, we considered the emergence to be early and resulted in a serious injury Level A harassment take of each cub.

(8) For dens where emergence was not classified as early, if an exposure occurred during the post-emergence period and bears departed the den site prior to their intended (*i.e.*, undisturbed) departure date, we assigned a non-serious Level A harassment take for each cub. In the absence of information about the intended departure date (which was known only for simulated dens), den site departures that occurred <9 days after the emergence date were considered to be early departures and resulted in a non-serious Level A harassment take of each cub. Lethal take of cubs could occur if a female abandoned them at the den site even after they spent ≥9 days at the den post-emergence.

We used details from 85 disturbance events from 56 polar bear dens to generate probabilities for model outcomes (table 7). Below, we provide definitions for terms used in this analysis category, a general overview of each denning stage, and the rules established for the model.

Table 7. Probability that a discrete or repeated exposure elicited a response by denning polar bears that would result in Level B, Level A, or lethal take. Level B take was applicable to both adults and cubs, if present; Level A and lethal take were applicable to cubs only and were not possible during the den establishment period, which ended with the birth of cubs. Probabilities were calculated from the analysis of 56 case studies of polar bear responses to human activity.

Exposure type	Period	Level B	Level A	Lethal
Discrete	Den Establishment	0.667	NA	NA
	Early Denning	NA	NA	0.000
	Late Denning	0.091	0.909	0.000
	Post-emergence	0.000	0.600	0.400
Repeated	Den Establishment	0.000	NA	NA
	Early Denning	0.000	NA	0.222
	Late Denning	0.650	0.200	0.050
	Post-emergence	0.250	0.625	0.125

We further define the following exposure categories for clarification based on polar bear response: (1) No response indicates a physiological and/or behavioral reaction by a polar bear to an exposure that is so minor that it may be discounted as having no effect; (2) A likely physiological response would be indicated by an alteration in the normal physiological function of a polar bear (*e.g.*, elevated heart rate or stress hormone levels) that is typically unobservable, but is likely to occur in response to an exposure; and (3) An observed behavioral response is when changes in behavior are observed in response to an exposure. Changes can be minor or significant. For example, a resting bear raising its head and sniffing the air in response to a vehicle driving along a road is a minor behavioral response to exposure to vehicle activity. If a female nursing cubs-of-the-year stops nursing and runs away from a flying aircraft, that activity would constitute a significant behavioral response to the exposure.

Defining the terms used to describe the timing for the den emergence period as well as the den entry period was a relevant consideration within the models: (1) The entrance date was considered the date that a female bear first enters a maternal den after excavation is complete; (2) The emergence is the time where a maternal den is first opened and a bear is exposed directly to external conditions; and (3) The departure date is typically the date when the bears leave the den site to return to the sea ice. If a bear leaves the den site after a disturbance but later returns, we considered the initial movement to be the departure date. Although a bear may exit the den completely at emergence, we considered even partial-body exits (*e.g.,* only a bear's head protruding above the surface of the snow) to represent emergence in order to maintain consistency with dates derived from temperature sensors on collared bears (*e.g.,* Rode *et al.* 2018). For dens located near regularly occurring human activity, we considered the first day a bear was observed near a den to be the emergence date.

Several denning stages were also considered in the models, which might impact the outcome: (1) The den establishment period was considered the period of time between the start of maternal den excavation and the birth of the cubs. Unless evidence indicates otherwise, all dens that are excavated by adult females in the fall or winter are presumed to be maternal dens. In the absence of other information, this period is defined as denning activity prior to December 1. (2) The early denning period was considered the period of time from the birth of the cubs until the point where they reach 60 days of age and are capable of surviving outside the den. In the absence of other information, this period is defined as any denning activity occurring between December 1 and February 13. (3) The late denning stage was determined to be the period of time between when cubs reach 60 days of age and den emergence. In the absence of other information, this period of time was defined as any denning activity occurring between February 14 and den emergence. (4) The post-emergence period was determined to be the period of time between den emergence and den site departure.

The negative outcomes of disturbance were categorized as follows: (1) Cub abandonment: Occurs when a female leaves all or part of her litter, either in the den or on the surface, at any stage of the denning process. We classified events where a female left her cubs but later returned (or was returned by humans) as cub abandonment. (2) Early departure: Departure of the denning female with her cubs from the den site post-emergence that occurs as the result of an exposure. (3) Early emergence: Den emergence that occurs as the result of an exposure.

Den Establishment

"Den Establishment" occurs in autumn between den excavation and birth of cub(s). Mating takes place in the spring (March–May) (Ramsay and Stirling 1986; Lønø 1970). Implantation is delayed until September to November (Lønø 1972; Deroche *et al.*, 1992), and timing of implantation likely depends on female body condition, as is the case for other Ursids (Robbins *et al.* 2012). Gestation is probably around 60 days, as suggested by Tsubota *et al.* (1987) for brown bears, and cubs are born in early to mid-winter (Ramsay and Stirling 1988). Pregnant female polar bears begin scouting for, excavating, and occupying a den near the time of implantation. For polar bears of the SBS, the den establishment phase extends between October and December. Durner *et al.* (2001) and Amstrup (2003) documented den excavation activities throughout this time. Data from USGS (2018) and Rode *et al.* (2018) found no significant difference in den entrance dates between SBS and CBS populations, and estimated a mean den entrance date of November 15 ± 1.9 days (n = 215).

In the case studies, the beginning of the den establishment period was variable and based on the behavior of the bear being observed (i.e., constructing a den). November 30th was selected as the end of the den establishment period, and December 1 as the beginning of the "Early Denning" phase unless the observed behavior of the bear indicated it was still in the den establishment phase. These dates correlate well with available information on timing of denning and parturition. Curry *et al.* (2015) found the mean and median birth dates for captive polar bears in the Northern Hemisphere were both November 29. Messier *et al.* (1994) estimated, based on activity level of females in maternity dens, that by December 15 most births already had occurred among polar bears of the Canadian Arctic archipelago.

Much of what is known of the effects of disturbance during early denning comes from studies of polar bears captured in the autumn. Capture is a severe form of disturbance and is not typical of disturbance that is likely to occur during oil and gas activities, but bear responses to capture events provide some information that can help inform our understanding of how polar bears respond to disturbance. Ramsay and Stirling (1986) reported that 10 of 13 pregnant female polar bears that were captured and collared at dens in October or November abandoned their existing dens. The polar bears instead moved a median distance of 24.5 km, excavated, and occupied new dens within a day or two after their release. The remaining 3 polar bears reentered their initial dens or different dens <2 km from their initial den soon after being released. Amstrup (1993, 2003) documented in Alaska a similar response and reported 5 polar bears that abandoned den sites following human disturbances during autumn and subsequently denned elsewhere.

The observed high rate of den abandonment during autumn capture efforts suggests that polar bears have a low tolerance threshold for intense disturbance during den initiation and are willing to expend energy to avoid further disturbance. During the den establishment period, the female is scouting for, excavating, and occupying a den while pregnant. A disturbance during den establishment may cost the female polar bear energy and fat reserves. While denning, female Ursids do not eat or drink, instead relying solely on body fat (Nelson *et al.*1983; Spady *et al.* 2007). Female body condition during denning affects the size of cubs at emergence from the den, and larger cubs have better survival rates (Derocher and Stirling 1996; Robbins *et al.* 2012). Therefore, disturbances that cause additional energy expenditures in fall could have latent effects on cubs in spring.

During any disturbance event, a polar bear must expend energy that would otherwise be invested in denning. Abandoning a den site requires energy to travel and excavate a new den, and polar bears, subject to capture and release, were willing to expend this energy in addition to the energy required for recovery from capture. Among Ursids, recovery from capture and immobilization requires from 3 days to 6 weeks (Cattet *et al.* 2008; Thiemann *et al.* 2013; Rode *et al.* 2014).

The available research does not conclusively demonstrate whether capture or den abandonment during den initiation is consequential for survival and reproduction.

Ramsay and Stirling (1986) reported that captures of females did not significantly affect numbers and mean weights of cubs, but the overall mean litter size and weights of cubs of previously handled mothers consistently tended to be slightly lower than those of mothers not previously handled. Amstrup (1993) could see no significant effect of handling on cub weight, litter size, or survival. Seal *et al.* (1970) reported no loss of pregnancy among captive Ursids following repeated chemical immobilization and handling. However, Lunn *et al.* (2004) concluded that handling and observations of pregnant female polar bears in the autumn resulted in significantly lighter female, but not male, cubs in spring. Swenson *et al.* (1997) found that female grizzly bears (*U. arctos horribilis*) that abandoned a den site lost cubs significantly more often than those that did not.

Polar bears may be willing to abandon a den site during den initiation because the pregnant female has less investment in a den site at this time than at later stages, and she may be able to re-den with fewer consequences than at later times during denning (Amstrup 1993). Amstrup (1993) and Lunn *et al.* (2004) supported the hypotheses that, after giving birth, females are likely to be more invested in the denning process and less likely to abandon a den site.

Den establishment is influenced by environmental variables, which suggests that polar bears may be able to tolerate low-level disruptions to the den establishment process. Environmental variables affecting Ursid den establishment include the number and timing of snowfall events (Zedrosser *et al.* 2006; Evans *et al.* 2016; Pigeon *et al.* 2016), accumulation of snowpack (Amstrup and Gardner 1994; Durner *et al.* 2003, 2006), temperature (Rode *et al.* 2018), and timing of sea ice freeze-up (Webster *et al.* 2014). Environmental variability across the polar bear's range results in a high degree of variability in den initiation dates among subpopulations (see summary data in Escajeda *et al.* 2018). For example, Ferguson *et al.* (2000) observed females entering their dens on eastern Baffin Island in the 1990s considerably earlier than reported by Harington (1968) for polar bears in the 1960s. This suggests that polar bears are able to accommodate a wide variety of influences during den initiation if a minimum total denning duration can be achieved.

Although additional energy expenditures from disturbance would be compounded by natural food restriction during denning, we have determined that, before giving birth, females will be able to accommodate the effects of a low-level disturbance without experiencing injury or a reduction in likelihood of her or her cub's survival. This conclusion is based on evidence that den initiation is influenced by a variety of factors, and polar bears appear to tolerate many of these influences without experiencing lethal or Level A effects on denning success. Energy reserves are biologically significant for denning polar bears. Therefore, a polar bear will experience Level B take if it responds to anthropogenic exposures by devoting energetic resources or sufficient time to behaviors that disrupt the progression of normal denning.

Early Denning

We defined early denning as the period of time from the birth of cubs until they are capable of surviving outside of the den. In the absence of other information, this period is defined as any denning activity that occurs between December 1 and February 13 when cubs are on average presumed to be 60 days old (Messier *et al.* 1994).

Although cubs grow quickly and may weigh 10–12 kg upon emergence from the den in the spring, sufficient time (≥2 months) is needed prior to den emergence for adequate development (Harington 1968, Lønø 1970, Amstrup 1993, Amstrup and Gardner 1994, Smith *et al.* 2007, Rode *et al.* 2018). Polar bear cubs are among the most undeveloped mammals at birth (Ramsay and Dunbrack 1986). Altricial, newborn polar bears have little fur, are blind, and weigh ~0.6 kg (Blix and Lentfer 1979). At birth, cubs have limited fat reserves and thin natal fur, which provides little thermoregulatory value (Blix and Lentfer 1979, Kenny and Bickel 2005). However, roughly 2 weeks after birth their ability to thermoregulate begins to improve as they grow longer guard hairs and an undercoat (Kenny and Bickel 2005). As development continues, cubs first open their eyes at an average age of 35 days (Kenny and Bickel 2005). At 60–70 days of age, cubs achieve sufficient musculoskeletal development to walk (Kenny and Bickel 2005); however, movements may still be clumsy at this time (Harington 1968). Based on the abovementioned developmental milestones, we define the minimum amount of time required in the den prior to emergence to be 60 days; longer denning periods have been found to increase cub survival probabilities (Rode *et al.* 2018).

Currently no studies have directly examined birth dates of polar bear cubs in the wild; however, several studies have estimated parturition based on indirect metrics. Messier *et al.* (1994) found that the activity levels of radio-collared females dropped significantly in mid-December, leading the authors to conclude that a majority of births occurred before or around December 15.

Additionally, Van de Velde *et al.* (2003) evaluated information from historic records of bears legally harvested in dens. Their findings suggest that cubs were born between early December and early January. Based on the cumulative evidence presented in these studies, we assume that the average birth date of polar bear cubs is December 15; however, births could occur as early as December 1 or as late as January 15. Therefore, we defined the early denning period as the time when it was first possible to have cubs in the den (December 1) until 60 days after the average birth date (February 13). Due to the variability of birth dates, we selected December 15 as the most appropriate metric for this analysis given most cubs are born around mid-December (Messier *et al.* 1994).

Given that cubs are largely undeveloped during early denning (*i.e.,* unable to thermoregulate, see, or walk), den abandonment and early den departure due to disturbance are both assumed to result in lethal take of cubs.

Late Denning

We defined late denning as the time period from when cubs reach 60 days of age until the date of natural emergence from the den (*i.e.,* emergence without disturbance). In a study of marked polar bears in the CBS and SBS subpopulations, Rode *et al.* (2018) report all females that denned through the end of March had ≥1 cub when re-sighted ≤100 days after den emergence. Conversely, roughly half of the females that emerged from dens before the end of February did not produce cubs or had cubs that did not survive to emergence, suggesting that later den emergence may result in a greater likelihood of cub survival (Rode *et al.* 2018). Date of emergence was also identified as the most important variable determining cub survival (Rode *et al.* 2018). For land denning bears in the SBS, the median emergence date was March 15 (Rode *et al.* 2018, USGS 2018).

Any disturbance to denning bears is costly as the amount of time females spend in dens has been found to influence reproductive success (*i.e.*, cub production and survival) (Elowe and Dodge 1989, Amstrup and Gardner 1994, Rode *et al.* 2018). If a female leaves a den (with or without the cubs) prematurely, decreased cub survival is likely (Linnell *et al.* 2000) for reasons including, for example, susceptibility to cold temperatures (Blix and Lentfer 1979, Hansson and Thomassen 1983, Van de Velde *et al.* 2003) or predation (Derocher and Wiig 1999) and mobility limitations (Frame *et al.* 2007, Habib and Kumar 2007, Tablado and Jenni 2017). While den abandonment is the most extreme response to disturbance, lower level responses including increased heart rate (Craighead *et al.* 1976, Laske *et al.* 2011) or increased body temperature (Reynolds *et al.* 1986) can result in significant energy expenditure (Karpovich *et al.* 2009, Geiser 2013, Evans *et al.* 2016).

We divided the period of time polar bears spend in dens into two phases: early denning and late denning. The late denning phase differs from the early denning phase in that the cubs are more developed, *e.g*., they are larger in size, able to see and walk, and have grown some fur for insulation. While any disturbance to cubs while within a den is considered detrimental, we distinguished between these two phases because the cubs of females disturbed in the late denning phase may survive, whereas cub survival is highly unlikely if a den is disturbed in the early phase and the female abandons the den. In the absence of other information, late denning is defined as any denning activity occurring between February 14 and median den emergence (March 15). While exact birth date of wild polar bears cubs is unknown, most births are estimated to occur between early December and late January (Blix and Lentfer 1979, Messier at al. 1994, Van de Velde *et al.* 2003). For our purposes, we assumed the average cub birth date is December 15 (Messier *et al.* 1994).

During the late denning period there were five possible outcomes to disturbance: cub abandonment, early emergence, behavioral response, likely physiological response, or insufficient information.

Post-emergence Period

This denning stage is defined as the period of time after the female polar bear first emerges from her den up to her final departure from the den site. Polar bears are known to remain at or near den sites for up to 30 days after emergence before heading out to the sea ice (Harington 1968, Jonkel *et al.* 1972, Kolenosky and Prevett 1980, Hansson and Thomassen 1983, Ovsyanikov 1998, Robinson 2014). Behaviors observed when outside the den include: walking short distances away from the den, foraging on vegetation, digging, rolling, grooming, nursing, playing, sitting, standing, and repeatedly reentering the den (Harington 1968, Jonkel *et al.* 1972, Hansson and Thomassen 1983, Ovsyanikov 1998, Smith *et al.* 2007, 2013). While mothers outside the den spend most of their time inactive, cubs tend to be more active (Robinson 2014). These behaviors likely reflect the need for an adjustment period that allows for improving cub mass and strength and their acclimation to the harsh environmental conditions that will be encountered once they depart for the sea ice (Harington 1968, Lentfer and Hensel 1980, Hansson and Thomassen 1983, Messier *et al.* 1994). Departure from the den site before this adjustment period may hinder a cub's ability to travel (Ovsyanikov 1998), thereby increasing the chances for cub abandonment (Haroldson *et al.* 2002) or susceptibility to predation (Derocher and Wiig 1999, Amstrup *et al.* 2006).

While considerable variation exists in the duration of time that bears spend at dens post-emergence, it remains unclear whether a minimum or maximum number of days is required to prevent negative consequences to cub survival. For 25 dens observed in the Beaufort Sea region from 2002 through 2010, a mean post-emergence duration of 8.3 days was noted (see table 1 in Smith *et al.* 2007, table 1 in Smith *et al.* 2010, table 1.1 in Robinson 2014). Therefore, in the absence of information on the intended departure date (which was known only for simulated dens), we considered a "normal" duration at the den site between first emergence and departure to be ≥8 days and classified departures that occurred post emergence "early" if they occurred <9 days after emergence. If the adult female left the den site (with or without cubs) after a disturbance but later returned, we considered the initial movement to be the departure date.

During review of the case studies, early departures during post emergence were classified as a non-serious level A harassment for each cub, and a Level B take (potential to disturb) for the adult female. We classified these instances as non-serious Level A harassment because cubs were at an age where they could effectively thermoregulate and keep up with their mother as they headed towards the sea ice. We acknowledge, however, that there must be some survival consequence for cubs to stay at the den site for a period of time given that the adult female's long fasting period should lead her to want to reach sea ice to begin hunting as soon as possible. Thus, an early departure from the den site could have potential survival consequences for cubs. However, if following exposure the female left without her cubs, we classified this as "cub abandonment," which is assigned a lethal take for each cub and Level B take for the adult female.

Post-emergent departure information was not used to assess disturbances when an incident(s) resulted in an early emergence during the late (or early) denning period; rather, the final outcomes from these incidents were classified as "early emergence," in keeping with the decision criteria to use the most severe outcome when an incident has more than one outcome classification (*e.g.,* early emergence and early departure).

Methods for Modeling the Effects of Den Disturbance

Den Simulation

We simulated dens across the Coastal Plain of the Refuge on areas identified as denning habitat (Durner *et al.* 2006). To simulate dens on the landscape, we relied on the estimated number of dens in the Coastal Plain provided by Atwood *et al.* (2020). The mean estimated number of dens in the Coastal Plain was 14 dens (*95 percent* CI: 5–30; Atwood *et al.* 2020). For each iteration of the model (described below), we drew a random sample from a gamma distribution for the number of dens in the Refuge based on the above parameter estimates, which allowed uncertainty in the number of dens in each area to be perpetuated through the modeling process. Specifically, we used the method of moments (Hobbs and Hooten 2015) to develop the shape and rate parameters and modeled the number of dens in the Coastal Plain as Gamma $(14^2/6.3^2, 14/6.3^2)$.

Because not all areas in the Coastal Plain are equally used for denning, and some areas do not contain the requisite topographic attributes required for sufficient snow accumulation for den excavation, we did not simply randomly place dens on the landscape. Instead, we followed a similar approach to that used by Wilson and Durner (2020). For each iteration of the model, we randomly distributed dens across areas within the focal area identified as denning habitat (Durner *et al.* 2006), with the probability of a den occurring at a given location being proportional to the density of dens predicted by a kernel density map (figure 9). The kernel density map was developed by using known den locations in northern Alaska identified either by GPS-collared bears or through systematic surveys for denning bears (Durner *et al.* 2020). To approximate the distribution of dens we used a scaled adaptive kernel density estimator applied to *n* observed den locations, which took the form $\mathrm{f}(\boldsymbol{s}) \propto \frac{\theta \mathrm{z}(\boldsymbol{s})}{\mathrm{n}} \sum_{\mathrm{i}}^{\mathrm{n}} \mathrm{k}\left(\frac{\boldsymbol{s}}{\mathrm{h}(\boldsymbol{s})}\right)$, where the adaptive bandwidth $\mathrm{h}(\boldsymbol{s}) = (\beta_0 + \beta_1 I(\boldsymbol{s}_i \in \mathcal{M}) I(\boldsymbol{s} \in \mathcal{M}))\beta_2 z(\boldsymbol{s})$ for the location of the *ith* den and each location in the study area. An east-west gradient $z(\boldsymbol{s})$ scaled the density and bandwidth to account for lower sampling effort in western areas, and the indicator functions allowed the bandwidth to vary abruptly between the mainland $\mathcal{M}$ and barrier islands. The kernel k was the Gaussian kernel, and the parameters $\theta, \beta_0, \beta_1, \beta_2$ were chosen so that the density estimate approximated the observed density of dens and our understanding of likely den locations in areas with low sampling effort.

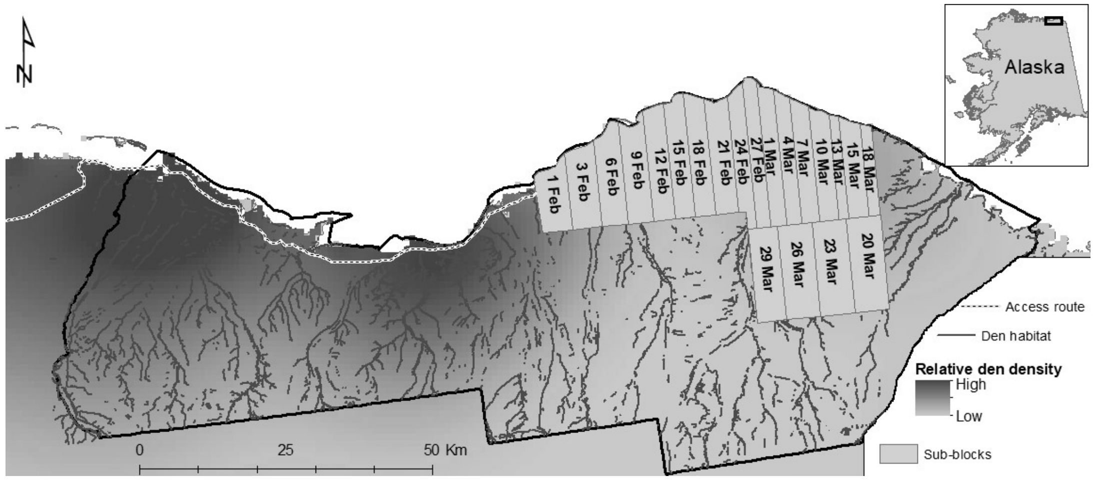

Figure 9. Depiction of the proposed project area within the 1002 Area (black outline) of the Arctic National Wildlife Refuge (the Refuge) with the underlying relative density of polar bear dens and potential polar bear den habitat. The survey area is depicted by the solid light-gray blocks with the specific dates indicating the first date that activity would occur to estimate the level of take to denning bears.

For each simulated den, we assigned dates of key denning events: den entrance, birth of cubs, when cubs reached 60 days of age, den emergence, and departure from the den site after emergence. These events represent the chronology of each den under undisturbed conditions. We selected the entrance date for each den from a normal distribution parameterized by entrance dates of radio-collared bears in the SBS subpopulation that denned on land included in Rode *et al.* (2018) and published in USGS (2018; n = 52, mean = November 11, SD = 18 days); we truncated this distribution to ensure that all simulated dates occurred within the range of observed values (*i.e.*, September 12 to December 22) +/- 1 week. We selected a date of birth for each litter from a normal distribution of mean of 348 (i.e., corresponding to the ordinal date for December 15) and standard deviation of 10. The mean corresponds to the date around when most cubs are thought to be born (Messier *et al.* 1994), and a standard deviation of 10 was used because it allowed the tails of the normal distribution to occur at approximately the earliest (December 1) and latest (January 15) dates expected for cubs to be born (Messier *et al.* 1994, Van de Velde *et al.* 2003).

To ensure that birth dates remained within the range of December 1 to January 15, we restricted draws from the normal distribution to occur within this range. We selected the emergence date as a random draw from an asymmetric Laplace distribution with parameters $\mu = 81.0$, $\sigma = 4.79$, and $p = 0.79$ estimated from the empirical emergence dates in Rode *et al.* (2018) and published in USGS (2018, n = 52) of radio-collared bears in the SBS subpopulation that denned on land using the mleALD function from package 'ald' (Galarza and Lachos 2018) in program R (R Core Development Team 2019, 2020). We constrained simulated emergence dates to occur within the range of observed emergence dates (Jan 9 to Apr 9) +/- 1 week and not to occur prior to cubs reaching an age of 60 days. Finally, we assigned the number of days each family group spent at the den site post-emergence based on values reported in three behavioral studies, Smith *et al.* (2007, 2013) and Robinson (2014), which monitored dens near the target area immediately after emergence (n = 25 dens).

Specifically, we used the mean (8.3) and SD (5.6) of the dens monitored in these studies to parameterize a gamma distribution using the method of moments (Hobbs and Hooten 2015) with a shape parameter equal to $8.3^2/5.6^2$ and a rate parameter equal to $8.3/5.6^2$; we selected a post-emergence, pre-departure time for each den from this distribution. Additionally, we assigned each den a litter size by drawing the number of cubs from a multinomial distribution with probabilities derived from litter sizes (n = 25 litters) reported in Smith *et al.* (2007, 2010, 2013) and Robinson (2014). Because there is some probability that a female naturally emerges with 0 cubs, we also wanted to ensure this scenario was captured. It is difficult to parameterize the probability of litter size equal to 0 because it is rarely observed. We therefore assumed that dens in the USGS (2018) dataset had denning durations less than the shortest den duration where a female was later observed with cubs (*i.e.*, 79 days). There were only 3 bears in the USGS (2018) data that met this criteria, leading to an assumed probability of a litter size of 0 at emergence being 0.07. We therefore assigned the probability of 0, 1, 2, or 3 cubs as 0.07, 0.15, 0.71, and 0.07, respectively.

Seismic Activities

The model developed by Wilson and Durner (2020) provides a template for estimating the level of potential impact to denning polar bears from proposed activities while also considering the natural denning ecology of polar bears in the region. The approach developed by Wilson and Durner (2020) also allows for the incorporation of uncertainty in both the metric associated with denning bears and in the timing and spatial patterns of proposed activities when precise information on those activities is unavailable. Below we describe how the model was applied based on information provided in the request.

The application from KIC indicates that winter seismic surveys will occur over an area of approximately 1,430 km^2 in the central portion of the Coastal Plain (figure 9). The seismic acquisition area is broken into 21 sub-blocks that are assigned specific dates before which the model assumes no activity will occur (figure 9) and which will require 2–3 days from which to acquire seismic data. KIC requested obtaining incidental take authorization for starting at the northwestern sub-block and then moving through the rest of the sub-blocks in a clockwise manner.

Access to the seismic acquisition blocks will occur along a land-based route beginning near the northwestern corner of the Refuge and reaching the northwestern corner of the northwestern-most sub-block (figure 9). The route can deviate up to 250 m south and 500 m north of the proposed route. This does not imply that the entire area can be used to access the survey area, but rather the linear access route can occur anywhere within that region.

The application states that crews will first enter the Refuge along the access route on January 26, 2021, and have continuous activity along the access route until the end of the acquisition period (May 15, 2021). Crews are proposed to arrive at the seismic blocks on February 1, 2021, and begin activities associated with seismic acquisition. Crews would then move sequentially through the sub-blocks according to the number of days required to fully survey the sub-block as indicated in the application. The results of this analysis rely on the access route not being used prior to January 26 and having crews enter the acquisition area no earlier than February 1.

Aerial Infrared Surveys

The application indicates that three complete aerial infrared (AIR) surveys of denning habitat along the access route and seismic blocks will occur prior to activity commencing in those areas. For the analysis, we assumed that independent aerial infrared surveys occurred on January 21, 23, and 25, 2021. However, surveys could occur as late as February 13, 2021, without affecting take estimates, as long as they occurred prior to activity commencing in an area.

We applied the same approach as Wilson and Durner (2020) to simulate if a den was detected during an AIR survey, including the assumption that dens with snow depths >100 cm would be unavailable for detection by AIR (Amstrup *et al.* 2004, Robinson 2014). For those dens that were detected during a simulated AIR survey, we assumed effective mitigation measures would be put in place to avoid further disturbance to the den until after bears emerged from and departed the den (*i.e.,* a 1,610-m buffer around dens where activity is prohibited). We also assumed that dens would not be run over given the condition in the application restricting driving over embankments, when possible, and using vehicle-based infrared sensors to survey areas where vehicles will intersect denning habitat.

Model Implementation

For each iteration of the model, we first determined which (undetected) dens were exposed to activity associated with the access route and seismic operations inside the Refuge. We assumed that any den within 1.61 km (1 mi) of infrastructure or human activities was exposed (MacGillivray *et al.* 2003, Larson *et al.* 2020), excluding those detected during AIR surveys. We then identified the stage in the denning cycle when the exposure occurred based on the date range of the activities to which the den was exposed: early denning (*i.e.,* birth of cubs until they are 60 days old), late denning (*i.e.,* date cubs are 60 days old until den emergence), and post-emergence (*i.e.*, the date of den emergence until permanent departure from the den site). We then determined whether the exposure elicited a response by the denning bear based on probabilities derived from the reviewed case studies (table 7). Level B take was applicable to both adults and cubs, if present, whereas Level A and lethal take were only applicable to cubs.

For dens exposed to activities associated with seismic surveys, we applied a multinomial distribution with the probabilities of different levels of take for that period associated with continuous activity (table 7). If the probabilities summed to <1, the remainder was assigned to a no-response class. After a Level A or lethal take was simulated to occur, a den was not allowed to be disturbed again during the subsequent denning periods because the outcome of that denning event was already determined.

The level of take associated with a disturbance varied according to the severity and timing of the exposure (table 7). Exposures that resulted in abandonment of cubs (during late denning or post-emergence) or emergence from dens prior to cubs reaching

60 days of age were considered lethal takes of cubs. If a disturbance resulted in den emergence prior to the date assigned to the den in the absence of disturbance, the level of take was considered serious Level A. If a post-emergence exposure resulted in bears leaving the den site prior to the non-exposure departure date, the outcome was classified as a non-serious Level A take for each cub. Adult females also received Level B takes for any disturbance that resulted in Level B takes for cubs. Cubs could similarly be applied a Level B take during the late denning and post-emergence time periods if only a behavioral response was simulated to have occurred.

We developed the code to run this model in program R (R Core Development Team 2020) and ran 10,000 iterations of the model (*i.e.,* Monte Carlo simulation) to derive the estimated number of dens disturbed and associated levels of take for starting at the northwestern block and moving clockwise (figure 9).

Model Results

We estimated an average of 2.74 (*95 percent* CI: 0–7, median=2) land-based dens in the area of proposed activity. For seismic surveys, starting in the northwestern block (figure 9), we estimated a mean of 1.26 (*95 percent* CI: 0–8, median=0) Level B takes would occur. We estimated a mean of 0.45 (*95 percent* CI: 0–3, median=0) serious Level A or Lethal takes during the proposed project, with a probability of ≥1 Serious Level A or Lethal take occurring during the project being 0.21.

Sum of Take from All Sources

The applicant will conduct seismic work over the entire project area within one winter season. A summary of total numbers of estimated take via Level B harassment during the duration of the project by season and take category is provided in table 8. The potential for lethal or Level A take was explored and estimated to be 0.45 lethal or Level A takes of polar bears.

Table 8. Total estimated Level B takes of polar bears per season and source.

Estimated Level B Takes of Polar Bears			
Take Category	Open Season	Ice Season	**Total**
Surface Interactions	0.001	0.954	0.955
Aircraft Activities	0.139	0.180	0.319
Denning Bears*	0.000	1.260	1.260
Total	0.140	2.394	2.534
**includes denning bears impacted by AIR surveys*			

Critical Assumptions

In order to conduct this analysis and estimate the potential amount of Level B take, several critical assumptions were made.

Level B take by harassment is equated herein with behavioral responses that indicate harassment or disturbance. There are likely to be a proportion of animals that respond in ways that indicate some level of disturbance but do not experience significant biological consequences. A correction factor was not applied, although we considered using the rate of Level B take reported by Service biologists during polar bear surveys conducted between 2008 and 2015 (below 0.01 percent; USFWS and USGS, unpublished data). In 2016, the Service applied such a correction factor when analyzing behavioral responses in polar bears; however, we have not included this correction factor in our current analysis. Consequently, the reported rate of take prior to 2016 may not represent the current definition; therefore, it was not deemed appropriate for use in determining the ratio of behavioral response to Level B take. The analysis' lack of a correction factor may result in overestimation of take.

Our estimates do not account for variable responses by age and sex; however, sensitivity of denning bears was incorporated into the analysis. The available information suggests that polar bears are generally resilient to low levels of disturbance. Females with dependent young and juvenile polar bears are physiologically the most sensitive (Andersen and Aars 2008) and most likely to experience take from disturbance. There is not enough information on composition of the SBS polar bear population in the KIC survey area to incorporate individual variability based on age and sex or to predict its influence on take estimates. Our estimates are derived from a variety of sample populations with various age and sex structures, and we assume the exposed population will have a similar composition and therefore the response rates are applicable.

The estimates of behavioral response presented here do not account for the individual movements of animals away from the KIC survey area or habituation of animals to the survey noise. Our assessment assumes animals remain stationary; *i.e.*, density does not change. There is not enough information about the movement of polar bears in response to specific disturbances to refine this assumption. This situation could result in overestimation of take; however, we cannot account for take resulting from a polar bear moving into less preferred habitat due to disturbance.

Potential Impacts on the Polar Bear Stock

The KIC project is predicted to result in up to 3 Level B takes of polar bears in 8 months and 10 days (table 8). The most recent population size estimate for the SBS stock was approximately 907 polar bears in 2010 (Bromaghin *et al.* 2015, Atwood *et al*. 2020). The greatest proportion of the stock that may experience Level B harassment in a given year during KIC's activities is 0.33 percent ((3÷907)×100 = 0.0033).

Denning polar bears encountered during KIC's winter activities may be in a sensitive physiological state or may be less tolerant of disturbance, resulting in a heightened stress response. Nutrient-deprived females or dependent young that are disturbed during or shortly after denning may take longer to recover and could remain sensitive to additional environmental stressors for some time after the encounter. Up to eight denning females may be present in the project area during the course of KIC's proposed work (see *Analysis of Impact to Denning Bears, Model Results*). The number of adult females in the SBS stock is estimated at 316 based on Bromaghin *et al.* (2015) and Atwood *et al*. (2020). The proportion denning in the project area might therefore constitute up to 2.5 percent of the breeding stock.

Noise levels are not expected to reach levels capable of causing harm. Animals in the area are neither expected to incur hearing impairment (*i.e*., Temporary Threshold Shift or Permanent Threshold Shift), nor level A harassment. Aircraft noise may cause behavioral disturbances (*i.e.,* Level B harassment). Polar bears exposed to sound produced by the project are likely to respond with temporary behavioral modification or displacement. With the adoption of the measures proposed in KIC's mitigation and monitoring plan and required by this proposed IHA, we conclude that the only anticipated effects from noise generated by the proposed project would be the short-term temporary behavioral alteration of polar bears.

Animals that encounter the proposed activities may exert more energy than they would otherwise due to temporary cessation of feeding, increased vigilance, and retreat from the project area, but we expect that most would tolerate this exertion without measurable effects on health or reproduction. In sum, we do not anticipate injuries or mortalities to result from KIC's operation, and none will be authorized. The takes that are anticipated would be from short-term Level B harassment in the form of startling reactions or temporary displacement.

Potential Impacts on Subsistence Uses

The proposed activities will occur near marine subsistence harvest areas used by Alaska Natives from the village of Kaktovik. From 2008 to 2017, 16 polar bears were reported harvested for subsistence use in and around Kaktovik, the majority of which were taken within 16 km (10 mi) of Kaktovik. Harvest occurs year-round, but peaks in September, with about 60 percent of the total taken during this month. October and November are also high harvest months.

The proposed project has the potential to disrupt subsistence activities if activities occur after the beginning of August near Kaktovik; however, KIC has proposed to conduct helicopter-based cleanup activities prior to the main subsistence hunting season. If activities were to be delayed, the applicant's activities may disrupt hunter access, displace polar bears, and polar bears may be more vigilant during periods of disturbance, which could affect hunting success rates. Additionally, KIC's aircraft may temporarily displace polar bears, resulting in changes to availability of polar bears for subsistence use during the project period. Through implementation of the Plan of Cooperation (POC), and spatial temporal planning, impacts to subsistence hunting are not anticipated.

While KIC's activities may have a temporary effect on polar bear distribution, it will not alter the ability of Alaska Native residents of Kaktovik to harvest polar bears in the long term. KIC will coordinate with Alaska Native villages and Tribal organizations to identify and avoid the potential short-term conflicts. KIC has developed a POC specifying the particular steps that will be taken to minimize any effects the project might have on subsistence harvest. The POC is available online at *https://www.regulations.gov* and may be requested as described under **FOR FURTHER INFORMATION CONTACT**. The POC also describes KIC's intentions for stakeholder engagement and for communicating information to oversight agencies. These measures are likely to reduce potential conflicts and to facilitate continued communication between KIC and subsistence users of polar bears, ensuring availability of the species at a level sufficient for harvest to meet subsistence needs.

The proposed project will be completed by August 2021 and therefore avoids significant overlap with peak polar bear subsistence harvest months. KIC's activities will not preclude access to hunting areas or interfere in any way with individuals wishing to hunt.

Findings

Small Numbers

For small numbers analyses, the statute and legislative history do not expressly require a specific type of numerical analysis, leaving the determination of "small" to the agency's discretion. In this case, we propose a finding that the KIC project may result in approximately 3 takes by harassment of polar bears from the SBS stock. This figure represents about 0.33 percent of the stock (USFWS 2010, Bromaghin *et al.* 2015, Atwood *et al.* 2020) $((3 \div 907) \times 100 \approx 0.33)$. Based on these numbers, we propose a finding that the KIC project will take only a small number of animals.

Negligible Impact

We propose a finding that any incidental take by harassment resulting from the proposed project cannot be reasonably expected to, and is not reasonably likely to adversely affect the SBS stock of polar bears through effects on annual rates of recruitment or survival. The proposed project would therefore have no more than a negligible impact on the stock. In making this finding, we considered the best available scientific information, including: the biological and behavioral characteristics of the species, the most recent information on species distribution and abundance within the area of the specified activities, the potential sources of disturbance caused by the project, and the potential responses of animals to this disturbance. In addition, we reviewed material supplied by the applicant, other operators in Alaska, our files and datasets, published reference materials, and consulted species experts.

Polar bears are likely to respond to proposed activities with temporary behavioral modification or displacement. These reactions are unlikely to have consequences for the health, reproduction, or survival of affected animals. Sound production is not expected to reach levels capable of causing harm, and Level A harassment is not expected to occur. Most animals will respond to disturbance by moving away from the source, which may cause temporary interruptions of foraging, resting, or other natural behaviors. Affected animals are expected to resume normal behaviors soon after exposure, with no lasting consequences. Some animals may exhibit more severe responses typical of Level B harassment, such as fleeing or ceasing feeding. These responses could have significant biological impacts for a few affected individuals, but most animals will also tolerate this type of disturbance without lasting effects. Thus, although the KIC project may result in approximately 3 takes by Level B harassment of polar bears from the SBS stock, we do not expect this type of harassment to affect annual rates of recruitment or survival or result in adverse effects on the species or stocks.

Our proposed finding of negligible impact applies to incidental take associated with the proposed activities as mitigated by the avoidance and minimization measures identified in KIC's mitigation and monitoring plan and in this authorization. These mitigation measures are designed to minimize interactions with and impacts to polar bears. These measures, and the monitoring and reporting procedures, are required for the validity of our finding and are a necessary component of the IHA. For these reasons, we propose a finding that the 2021 KIC project will have no more than a negligible impact on polar bears.

Impact on Subsistence

We propose a finding that the anticipated harassment caused by KIC's activities would not have an unmitigable adverse impact on the availability of polar bears for taking for subsistence uses. In making this finding, we considered the timing and location of the proposed activities and the timing and location of polar bear subsistence harvest activities in the area of the proposed project. We also considered the applicant's consultation with subsistence communities, proposed measures for avoiding impacts to subsistence harvest, and development of a POC, should any adverse impacts be identified. Further information on impacts to subsistence can be found in *Potential Impacts on Subsistence Uses*.

Required Determinations

National Environmental Policy Act (NEPA)

We have prepared a draft environmental assessment in accordance with the NEPA (42 U.S.C. 4321 *et seq.).* We have preliminarily concluded that authorizing the nonlethal, incidental, unintentional take of up to three polar bears from the SBS stock by Level B harassment in Alaska during activities conducted by KIC and its subcontractors in 2021 would not significantly affect the quality of the human environment, and that the preparation of an environmental impact statement for this incidental take authorization is not required by section 102(2) of NEPA or its implementing regulations. We are accepting comments on the draft environmental assessment as specified above in **DATES** and **ADDRESSES**.

Endangered Species Act

Under the ESA (16 U.S.C. 1536(a)(2)), all Federal agencies are required to ensure the actions they authorize are not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of critical habitat. Prior to issuance of this IHA, the Service will complete intra-Service consultation under section 7 of the ESA on our proposed issuance of an IHA. These evaluations and findings will be made available on the Service's website at *https://ecos.fws.gov/ecp/report/biological-opinion* and added to Docket No. FWS–R7–ES–2020–0129 at regulations.gov when completed.

It is our responsibility to communicate and work directly on a Government-to-Government basis with federally recognized Alaska Native Tribes and organizations in developing programs for healthy ecosystems. We seek their full and meaningful participation in evaluating and addressing conservation concerns for protected species. It is our goal to remain sensitive to Alaska Native culture, and to make information available to Alaska Natives. Our efforts are guided by the following policies and directives: (1) The Native American Policy of the Service (January 20, 2016); (2) the Alaska Native Relations Policy (currently in draft form); (3) Executive Order 13175 (January 9, 2000); (4) Department of the Interior Secretarial Orders 3206 (June 5, 1997), 3225 (January 19, 2001), 3317 (December 1, 2011), and 3342 (October 21, 2016); (5) the Alaska Government-to-Government Policy (a departmental memorandum issued January 18, 2001); and (6) the Department of the Interior's policies on consultation with Alaska Native Tribes and organizations.

We have evaluated possible effects of the proposed activities on federally recognized Alaska Native Tribes and organizations. Through the IHA process identified in the MMPA, the applicant has presented a communication process, including a POC, with the Native organizations and communities most likely to be affected by their work. KIC has engaged these groups in informational meetings.

We invite continued discussion, either about the project and its impacts, or about our coordination and information exchange throughout the IHA/POC process. The Service will contact Tribal organizations in Kaktovik, Nuiqsut, and Arctic Village, as well as relevant ANSCA corporations, to inform them of the availability of this proposed authorization and offer them the opportunity to consult.

Proposed Authorization

We propose to authorize the nonlethal take by Level B harassment of three animals from the Beaufort Sea stock of polar bears. Authorized take will be limited to disruption of behavioral patterns that may be caused by aircraft overflights, seismic surveys, and support activities conducted by KIC in the 1002 area of the Refuge, from January to September 30, 2021. We anticipate no take by injury or death to polar bears resulting from these activities.

A. General Conditions for Issuance of the Proposed IHA

(1) Activities must be conducted in the manner described in the request for an IHA and in accordance with all applicable conditions and mitigations measures. The taking of polar bears whenever the required conditions, mitigation, monitoring, and reporting measures are not fully implemented as required by the IHA will be prohibited. Failure to follow measures specified may result in the modification, suspension, or revocation of the IHA.

(2) If project activities cause unauthorized take (i.e., take of more than three polar bears or take of one or more polar bear through methods not described in the IHA), KIC must take the following actions: (i) cease its activities immediately (or reduce activities to the minimum level necessary to maintain safety); (ii) report the details of the incident to the Service within 48 hours; and (iii) suspend further activities until the Service has

reviewed the circumstances and determined whether additional mitigation measures are necessary to avoid further unauthorized taking.

(3) All operations managers, vehicle operators, and aircraft pilots must receive a copy of the IHA and maintain access to it for reference at all times during project work. These personnel must understand, be fully aware of, and be capable of implementing the conditions of the IHA at all times during project work.

(4) The IHA will apply to activities associated with the proposed project as described in this document and in KIC's amended application. Changes to the proposed project without prior authorization may invalidate the IHA.

(5) KIC's IHA application will be approved and fully incorporated into the IHA, unless exceptions are specifically noted herein or in the final IHA. The application includes:

- KIC's original request for an IHA, dated August 17, 2020 (KIC 2020);
- The letters requesting additional information, dated August 30, 2020, September 4, 2020, and October 26, 2020;
- KIC's responses to requests for additional information from the Service, dated September 1, 9, and 14, 2020, and October 27, 2020;
- The letters requesting an amendment to the original application, dated August 30, 2020, and October 23, 2020;
- Updated applications from KIC, dated October 24 and 28, 2020;
- The *Polar Bear Avoidance and Interaction Plan* (Appendix A in KIC 2020);
- The *Plan of Cooperation* (Appendix B in KIC 2020).

(6) Operators will allow Service personnel or the Service's designated representative to visit project work sites to monitor impacts to polar bears and subsistence

uses of polar bears at any time throughout project activities so long as it is safe to do so. "Operators" are all personnel operating under KIC's authority, including all contractors and subcontractors.

B. Avoidance and Minimization

KIC must implement the following policies and procedures to avoid interactions with and minimize to the greatest extent practicable any adverse impacts on polar bears, their habitat, and the availability of these marine mammals for subsistence uses.

(a) *General avoidance measures.*

(1) Avoidance and minimization policies and procedures shall include temporal or spatial activity restrictions in response to the presence of polar bears engaged in a biologically significant activity (*e.g.,* resting, feeding, denning, or nursing, among others). Dates of access to survey sub-blocks are detailed in table 9, below.

Table 9. Dates of earliest entry and locations of sub-blocks[1]. Geographic coordinates (X, Y, datum WGS 1984 Alaska Polar Stereographic) and earliest possible access dates are shown for sub-blocks within each block of KIC's seismic survey in the Coastal Plain.

Sub-block No.	Date of Earliest Access	Number of Days in Block	Northwest Corner (X, Y) m	Northeast Corner (X, Y) m	Southwest Corner (X, Y) m	Southeast Corner (X, Y) m
Mobilization	26 January 2020	6	See Figure 1 for designated access route to survey area			
1.1	1 February 2021	2	2223374 -225114	2228717 -221397	2224397 -235331	2229482 -235046
1.2	3 February 2021	3	2228717 -221397	2233761 -219327	2229482 -235046	2234629 -234756
1.3	6 February 2021	3	2233761 -219327	2238136 -216352	2234629 -234756	2239158 -234501
1.4	9 February 2021	3	2239158 -234501	2242370 -214588	2239158 -234501	2243481 -234257
1.5	12 February 2021	3	2242370 -214588	2246042 -213443	2243481 -234257	2247187 -234047
1.6	15 February 2021	3	2246042 -213443	2249447 -211741	2247187 -234047	2250687 -233849
1.7	18 February 2021	3	2249447 -211741	2253010 -212947	2250687 -233849	2254187 -233650
1.8	21 February 2021	3	2253010 -212947	2256907 -212795	2254187 -233650	2258099 -233427

1.9	24 February 2021	3	2256907 -212795	2259678 -210417	2258099 -233427 2260056 -244262	2261603 -244174
1.10	27 February 2021	3	2259678 -210417	2262159 -210463	2261603 -244174	2264074 -244033
1.11	1 March 2021	3	2262159 -210463	2264925 -211912	2264074 -244033	2266751 -243881
1.12	4 March 2021	3	2264925 -211912	2267701 -213530	2266751 -243881	2269428 -243728
1.13	7 March 2021	3	2267701 -213530	2270898 -215289	2269428 -243728	2272517 -243551
1.14	10 March 2021	3	2270898 -215289	2274285 -216733	2272517 -243551	2275811 -243362
1.15	13 March 2021	2	2274285 -216733	2275966 -217272	2275811 -243362	2277459 -243267
2.1	15 March 2021	3	2275966 -217272	2279558 -218691	2277459 -243267	2280960 -243066
2.2	18 March 2021	2	2279558 -218691	2281556 -219294	2280960 -243066	2282918 -242953
3.1	20 March 2021	3	2276598 -235467	2282467 -235129	2277556 -252164	2283429 -251826
3.2	23 March 2021	3	2270627 -235809	2276598 -235467	2271583 -252506	2277556 -252164
3.3	26 March 2021	3	2264657 -236150	2270627 -235809	2265610 -252848	2271583 -252506
3.4	29 March 2021	3	2259611 -236438	2264657 -236150	2260561 -253136	2265610 -252848

1 The sub-blocks are formed by straight-line connections following this order: southwest, southeast, northeast, and northwest, except where borders of sub-blocks follow the coastline. In these instances, the sub-block boundaries roughly follow the coastline, including barrier islands where present.

(2) KIC must cooperate with the Service and other designated Federal, State, and local agencies to monitor and mitigate the impacts of their activities on polar bears.

(3) Trained and qualified personnel must be designated to monitor for the presence of polar bears, initiate mitigation measures, and monitor, record, and report the effects of the proposed activities on polar bears. KIC must provide polar bear awareness training to all personnel with the Service playing a major role in delivering this training.

(4) An approved polar bear safety, awareness, and interaction plan must be on file with the Service MMM and available onsite. The interaction plan must include:

(i) A description of the activity (*i.e.,* a summary of the plan of operation);

(ii) A food, waste, and other attractants management plan;

(iii) Personnel training policies, procedures, and materials;

(iv) Site-specific polar bear interaction risk evaluation and mitigation measures;

(v) Polar bear avoidance and encounter procedures; and

(vi) Polar bear observation and reporting procedures.

(5) KIC must contact affected subsistence communities and hunter organizations to discuss potential conflicts caused by the activities and provide the Service documentation of communications as described in *(D) Measures to Reduce Impacts to Subsistence Users*.

(b) *Mitigation measures for onshore activities*. KIC must undertake the following activities to limit disturbance around known polar bear dens:

(1) Attempt to locate polar bear dens. Prior to carrying out activities in known or suspected polar bear denning habitat during the denning season (November to April), KIC must make efforts to locate occupied polar bear dens within and near areas of operation, utilizing appropriate tools, such as AIR cameras and vehicle-mounted FLIR, among others. All observed or suspected polar bear dens must be reported to the Service prior to the initiation of activities. "Suitable denning habitat" is defined as terrain with features of slope greater than or equal to 16 degrees, and of height greater than or equal to 1.3 m (4.3 ft).

(i) Prior to the start of project activities, and no earlier than January 1 (or date of issuance of the IHA, whichever is later), and no later than February 13, three AIR polar bear den detection surveys will be conducted. Each survey must cover the entire project area. Exact dates will be determined by weather such that the surveys are conducted during the best practicable atmospheric and surface snow conditions.

(A) Surveys will be conducted during darkness or civil twilight and not during daylight hours. Flight crews will record and report environmental parameters including air temperature, dew point, wind speed and direction, cloud ceiling, and percent humidity, and a flight log will be provided to the Service within 48 hours of the flight.

(B) An experienced scientist will be on board the survey aircraft to analyze the AIR data in real-time. The data (infrared video) will be available for viewing by the Service immediately upon return of the survey aircraft to the base of operations in Deadhorse, Alaska. Data will be transmitted electronically to the Service in Anchorage for review.

(C) If a suspected den site is located, KIC will immediately consult with the Service to analyze the data and determine if additional surveys or mitigation measures are required. All located dens will be subject to the 1.6-km (1.0-mi) exclusion zone as described in paragraph (b)(4) of this section.

(ii) Vehicle-mounted and hand-held infrared radar units will be used to locate polar bear dens when personnel or vehicles are advancing along the transit corridor or entering new terrain within the seismic survey area. If a suspected den site is located, KIC will immediately consult with the Service to analyze the data and determine if additional surveys or mitigation measures are required. All located dens will be subject to the 1.6 km (1.0 mi) setback buffer as described in paragraph (b)(4) of this section.

(2) Construction or use of transit routes cannot deviate more than 250 m south or 500 m north of the centerline of the routes shown in figure 1 in *Methods for Modeling the Effects of Den Disturbance*. Deviations beyond these limits invalidate the assumptions of the analyses, and resulting take estimates, and would invalidate this authorization. All identified mitigation measures will be applied. If the infrared surveys cannot be completed as described, work in that area will not proceed.

(3) Where suitable denning habitat, as defined in paragraph (5) of this section, is identified, KIC will plot survey lines such that a 100-m (330-ft) exclusion buffer exists on either side of the survey midline. Ramp areas or transits across rivers occurring in suitable denning habitat will be cleared with hand-held or truck-mounted FLIR prior to movement. Crossings will also take place at the lowest possible relief points. Coordinates for crossings will be installed in all navigation systems to ensure that drivers use plotted crossings.

(4) Avoid the exclusion zone around known polar bear dens. Operators must avoid a 1.6-km (1.0-mi) operational exclusion zone around all known polar bear dens during the denning season (November to April, or until the female and cubs leave the area). Should previously unknown occupied dens be discovered within 1.6 km (1.0 mi) of activities, work must immediately cease and the Service contacted for guidance. All personnel and vehicles are to be moved beyond 1.6 km (1.0 mi) from the den. The Service will evaluate these instances on a case-by-case basis to determine the appropriate action. Potential actions may range from cessation or modification of work to conducting additional monitoring; KIC must comply with any additional measures specified.

(5) Use the den habitat map developed by the USGS. A map of potential coastal polar bear denning habitat can be found at: *https://alaska.usgs.gov/products/data.php?dataid=201*. This measure ensures that the location of potential polar bear dens is considered when conducting activities in the Coastal Plain. A 100-m (330-ft) buffer will be placed on each side of defined denning critical habitat (16° slope and height of 1.6 m [5.2 ft]). The critical habitat will be entered into the navigation system that allows each vehicle to display the Program Area, hazards, and avoidance areas.

(c) *Mitigation measures for aircraft.*

(1) Operators of support aircraft should, at all times, conduct their activities at the maximum distance possible from polar bears.

(2) Aircraft must not operate at an altitude lower than 457 m (1,500 ft) within 805 m (0.5 mi) of polar bears observed on ice, land, or in water. Helicopters may not hover, circle, or land within this distance. When weather conditions do not allow a 457-m (1,500-ft) flying altitude, such as during severe storms or when cloud cover is low, aircraft may be operated below this altitude for the minimum duration necessary to maintain safety.

(3) Aircraft operators must not fly directly over or within 805 m (0.5 mile) of areas of known polar bear concentrations on Barter Island, Bernard Spit, and Jago Spit between September 1 and October 31 except along standard approach and departure routes to or from the Kaktovik airport during arrivals and departures.

(4) Aircraft routes must be planned to minimize any potential conflict with active or anticipated polar bear hunting activity as determined through community consultations.

(5) KIC must not land in the Barter Island, Bernard Spit, Jago Spit, and Arey Island complex (other than at the Kaktovik airport) from September 7 to 30.

(6) Aircraft will not land within 805 m (0.5 mi) of a polar bear(s).

(7) If a polar bear is observed while the aircraft is grounded, personnel will board the aircraft and leave the area. The pilot will also avoid flying over the polar bear.

(8) Aircrafts should avoid performing any evasive and sudden maneuvers, especially when traveling at lower altitudes. The Service recommends that if a bear is spotted within the landing zone or work area, aircraft operators travel away from the site,

and slowly increase altitude to 1,500 ft or a level that is safest and viable given current traveling conditions.

(9) Aircraft may not be operated in such a way as to separate members of a group of polar bears from other members of the group.

C. Monitoring

(1) Implement the Service-approved polar bear avoidance and interaction plan to monitor the project's effects on polar bears and subsistence uses and to evaluate the effectiveness of mitigation measures.

(2) Provide trained, qualified, and Service-approved onsite observers to carry out monitoring and mitigation activities identified in the polar bear avoidance and interaction plan, with the Service playing a major role in delivering this training to all personnel.

(3) Cooperate with the Service and other designated Federal, State, and local agencies to monitor the impacts of project activities on polar bears. Where information is insufficient to evaluate the potential effects of activities on polar bears and the subsistence use of this species, KIC may be required to participate in joint monitoring efforts to address these information needs and ensure the least practicable impact to this resource.

(4) Allow Service personnel or the Service's designated representative to visit project work sites to monitor impacts to polar bears and subsistence use at any time throughout project activities so long as it is safe to do so.

D. Measures for Subsistence Use of Polar Bears

KIC must conduct its activities in a manner that, to the greatest extent practicable, minimizes adverse impacts on the availability of polar bears for subsistence uses.

(1) KIC will conduct community consultation as specified in *(D)Measures to Reduce Impacts to Subsistence Users*.

(2) KIC has provided a Service-approved POC as described in *(D)Measures to Reduce Impacts to Subsistence Users.*

Prior to conducting the work, KIC will take the following steps to reduce potential effects on subsistence harvest of polar bears: (i) avoid work in areas of known polar bear subsistence harvest; (ii) discuss the planned activities with subsistence stakeholders including the North Slope Borough (NSB), the Native Village of Kaktovik, the City of Kaktovik, subsistence users in Kaktovik, community members of Kaktovik, the State of Alaska, the Service, the Bureau of Land Management (BLM), and other interested parties on a Federal, State, and local regulatory level; (iii) identify and work to resolve concerns of stakeholders regarding the project's effects on subsistence hunting of polar bears; (iv) if any unresolved or ongoing concerns remain, modify the POC in consultation with the Service and subsistence stakeholders to address these concerns; and (v) develop mitigation measures that will reduce impacts to subsistence users and their resources.

E. Reporting Requirements

KIC must report the results of monitoring and mitigation to the Service MMM via email at: *fw7_mmm_reports@fws.gov*.

(1) *In-season monitoring reports.*

(i) *Activity progress reports.* KIC must:

(A) Notify the Service at least 48 hours prior to the onset of activities;

(B) Provide the Service weekly progress reports summarizing activities. Reports must include GPS/GIS tracks of all vehicles including scout vehicles in .kml or .shp format with time/date stamps and metadata.

(C) Notify the Service within 48 hours of project completion or end of the work season.

(ii) *Polar bear observation reports.* KIC must report, within 48 hours, all observations of polar bears and potential polar bear dens during any project activities including AIR surveys. Upon request, monitoring report data must be provided in a common electronic format (to be specified by the Service). Information in the observation report must include, but is not limited to:

(A) Date and time of each observation;

(B) Locations of the observer and bears (GPS coordinates if possible);

(C) Number of polar bears;

(D) Sex and age class—adult, subadult, cub (if known);

(E) Observer name and contact information;

(F) Weather, visibility, and if at sea, sea state, and sea-ice conditions at the time of observation;

(G) Estimated closest distance of polar bears from personnel and facilities;

(H) Type of work being conducted at time of sighting;

(I) Possible attractants present;

(J) Polar bear behavior—initial behavior when first observed (e.g., walking, swimming, resting, etc.);

(K) Potential reaction—behavior of bear potentially in response to presence or activity of personnel and equipment;

(L) Description of the encounter;

(M) Duration of the encounter; and

(N) Mitigation actions taken.

(2) *Notification of human–bear interaction incident report.* KIC must report all human–bear interaction incidents immediately, and not later than 48 hours after the incident. A human–bear interaction incident is any situation in which there is a possibility for unauthorized take. For instance, when project activities exceed those included in an IHA, when a mitigation measure was required but not enacted, or when injury or death of a polar bear occurs. Reports must include:

(i) All information specified for an observation report in paragraphs (1)(ii)(A–N) of this section;

(ii) A complete detailed description of the incident; and

(iii) Any other actions taken.

Injured, dead, or distressed polar bears that are clearly not associated with project activities (*e.g.,* animals found outside the project area, previously wounded animals, or carcasses with moderate to advanced decomposition or scavenger damage) must also be reported to the Service immediately, and not later than 48 hours after discovery. Photographs, video, location information, or any other available documentation must be included.

(3) *Final report.* The results of monitoring and mitigation efforts identified in the polar bear avoidance and interaction plan must be submitted to the Service for review within 90 days of the expiration of this IHA. Upon request, final report data must be provided in a common electronic format (to be specified by the Service). Information in the final report must include, but is not limited to:

(i) Copies of all observation reports submitted under the IHA;

(ii) A summary of the observation reports;

(iii) A summary of monitoring and mitigation efforts including areas, total hours, total distances, and distribution;

(iv) Analysis of factors affecting the visibility and detectability of polar bears during monitoring;

(v) Analysis of the effectiveness of mitigation measures;

(vi) A summary and analysis of the distribution, abundance, and behavior of all polar bears observed; and

(vii) Estimates of take in relation to the specified activities.

Request for Public Comments

If you wish to comment on this proposed authorization, the associated draft environmental assessment, or both documents, you may submit your comments by any of the methods described in **ADDRESSES**. Please identify if you are commenting on the proposed authorization, draft environmental assessment or both, make your comments as specific as possible, confine them to issues pertinent to the proposed authorization, and explain the reason for any changes you recommend. Where possible, your comments should reference the specific section or paragraph that you are addressing. The Service will consider all comments that are received before the close of the comment period (see **DATES**). The Service does not anticipate extending the public comment period beyond the 30 days required under section 101(a)(5)(D)(iii) of the MMPA.

Comments, including names and street addresses of respondents, will become part of the administrative record for this proposal. Before including your address, telephone number, email address, or other personal identifying information in your comment, be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comments to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

Gregory Siekaniec,

Regional Director, Alaska Region.

[FR Doc. 2020-26747 Filed: 12/7/2020 8:45 am; Publication Date: 12/8/2020]