Programmatic
Biological Opinion
For
Polar Bears (*Ursus maritimus*)
On
Chukchi Sea Incidental Take Regulations

Photo by Steve Hillebrand, USFWS

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List of Abbreviations

AOGA = Alaska Oil & Gas Association
AMAP = Arctic Monitoring and Assessment Program
BLM = Bureau of Land Management
BO = biological opinion
BOP = blowout preventer
CFR = Code of Federal Regulations
COE = U.S. Army Corps of Engineers
CPAI = ConocoPhillips Alaska, Inc.
CS = Chukchi Sea polar bear population
DEIS = Draft Environmental Impact Statement
DLP = defense of life & property
EA = Environmental Assessment
ESA = Endangered Species Act of 1973, as amended
FEIS = Final Environmental Impact Statement
FFWFO = Fairbanks Fish & Wildlife Field Office (of the Service, Fairbanks, AK)
FLIR = Forward Looking Infrared imagery
FR = Federal Register
Industry = oil and gas industry
IUCN = International Union for the Conservation of Nature
LOA = Letter of Authorization (under sec. 101(a)(5) of the MMPA)
MMM = Marine Mammal Management Office (of the Service, Anchorage, AK)
MMO = marine mammal observer
MMPA = Marine Mammal Protection Act of 1972, as amended
MMS = Minerals Management Service
NB = Northern Beaufort Sea polar bear population
NEPA = National Environmental Policy Act
NPR-A = National Petroleum Reserve-Alaska
NWT = Northwest Territory
OCs = organochlorine compounds
OCS = outer continental shelf
PBSG = Polar Bear Specialist Group
POC = Plan of Cooperation
POPs = persistent organic pollutants
Regulations = incidental take regulations for oil and gas exploration activities in the Chukchi Sea and adjacent western coast of Alaska
SB = Southern Beaufort Sea polar bear population
Secretary = Secretary of the Department of the Interior
Service = U.S. Fish and Wildlife Service
USGS = U.S. Geological Survey
VSP = vertical seismic profile

1. Introduction

This document transmits the U.S. Fish and Wildlife Service's (Service) programmatic biological opinion (BO) in accordance with section 7 of the Endangered Species Act of 1973, as amended (ESA), on effects to the polar bear (*Ursus maritimus*) of proposed incidental take regulations for year-round oil and gas exploration activities in the Chukchi Sea and adjacent western coast of Alaska (Regulations). No other threatened or endangered species will be affected by the proposed action. The Chukchi Sea Regulations were proposed on June 1, 2007 (72 FR 30670) and would provide authorization under the Marine Mammal Protection Act of 1972, as amended (MMPA) for the non-lethal, *incidental take* of *small numbers* of Pacific walruses (*Odobenus rosmarus divergens*) and polar bears (MMPA term definitions provided below). The Chukchi Sea Regulations would be in effect for five years after date of issuance (requested for 2007-2012).

The Service proposed to *list* the polar bear range-wide as a *threatened species* under the ESA on January 9, 2007 (72 FR 1064, January 9, 2007) (ESA term definitions provided below). Critical habitat was not determinable at that time. When a species is proposed for listing, the Service utilizes section 7(a)(4) of the ESA that provides a conference mechanism for identifying and resolving potential conflicts between a proposed action and proposed species or proposed critical habitat. While consultations are required when the proposed action *may affect* listed species, a conference is required only when the proposed action is likely to *jeopardize the continued existence* of a proposed species or destroy or adversely modify proposed critical habitat. However, Federal action agencies may request a conference on any proposed action that may affect proposed species or proposed critical habitat. Because it was determined by the Service that activities authorized in the proposed Regulations may affect polar bears, a conference was initiated in January 2008. While the conference opinion was being drafted, the final rule listing the polar bear as a threatened species was published on May 15, 2008 (73 FR 28211). The conference opinion, therefore, was finalized as a BO.

The proposed Regulations were promulgated by the Service's Marine Mammal Management (MMM) office. ESA section 7 conferences/consultations on proposed/listed species that primarily inhabit northern Alaska are conducted by the Service's Fairbanks Fish and Wildlife Field Office (FFWFO). Therefore this consultation for polar bears on the Chukchi Sea Regulations is an intra-Service consultation, which considers effects of Service actions on listed species.

The Service has responsibility for the polar bear under the MMPA (16 U.S.C. 1361 *et seq.*) and ESA (16 U.S.C. 1531 *et seq.*). Section 101 (a)(5) of MMPA allows for the incidental take of small numbers of marine mammals, in response to requests by U.S. citizens engaged in a specified activity (other than commercial fishing) in a specified geographic region; section 7(o)(2) of ESA allows for exemptions, under certain circumstances, to the section 9 take prohibitions for endangered and threatened species incidental to otherwise lawful activities that have Federal involvement or control. If a marine mammal species is listed as endangered or threatened under the ESA, the requirements of both MMPA and ESA must be met before the incidental take can be authorized.

For the Service to consider allowing incidental take under MMPA, a written request for specific regulations must be submitted to the Service containing detailed information on the activity as a

whole and impacts of the total potential take. The Service evaluates the impacts resulting from all persons conducting the specified activity, not just the impacts from one entity's activities. If the Service finds total taking expected from the specified activity will have a *negligible impact* on the species or stock and will not have an *unmitigable adverse impact* on the availability of the species or stock for subsistence uses, specific regulations will be issued that establish permissible methods of taking and other means of affecting the least practicable adverse impact on the species. After regulations are issued, individual Letters of Authorization (LOA) must be obtained from the Service by those conducting the activity (50 CFR 18.27(f)). LOAs may contain activity-specific conservation measures and expire after one year.

For the Service to exempt incidental take under ESA, the Service must conclude that the take associated with a Federal action (1) is not likely to jeopardize listed species, or destroy or adversely modify designated critical habitat, (2) results from an otherwise lawful activity, and (3) is incidental to the purpose of the action. Further, the exemption provided as a result of formal consultation must include measures to minimize take. Therefore, consistent with ESA and regulations at 50 CFR §402.14(i), incidental take statements for marine mammals are not included in formal consultations until regulations, authorizations, or permits under MMPA 101(a)(5) are in effect.

Generally, if an action meets the MMPA standard of negligible impact in a specified geographic area of consideration, there should be little potential for the action to jeopardize the species. Indeed, during early conference discussions, the Service concluded that the proposed Regulations are not likely to pose jeopardy to polar bears under ESA, particularly because the species was proposed range wide, and the negligible impact determination for the proposed Regulations was made at the affected stock level (i.e., the Chukchi Sea and Beaufort Sea stocks). See Appendix 1 for a summary of consultation activities.

Definitions of key terms used in the Regulations and this BO are listed below. Additional definitions for MMPA terms can be found in 50 CFR Part 18; additional definitions for ESA terms can be found at 50 CFR §402. An administrative record of this consultation is on file at the FFWFO in Fairbanks, AK.

MMPA Terms:
Incidental, but not intentional, taking - take events that are infrequent, unavoidable, or accidental. It does not mean that the taking must be unexpected.

Negligible impact - 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 – refers to a portion of a marine mammal species or stock whose taking would have a negligible impact on that species or stock.

Take - to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. For activities other than military readiness activities or scientific research conducted by or on behalf of the Federal government, the MMPA defines harassment as any act of pursuit, torment, or annoyance which: (1) has the potential to injure a marine mammal or marine mammal

stock in the wild (the MMPA calls this Level A harassment); or (2) 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).

Unmitigable adverse impact - is 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.

ESA Terms:
Incidental take – take of listed fish or wildlife species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by a Federal agency or applicant.

Jeopardize the continued existence - to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

Listed species – any species of fish, wildlife or plant which has been determined to be endangered or threatened under section 4 of the ESA.

May affect - the appropriate conclusion when a proposed action may pose any effects on listed species or designated critical habitat.

Take - to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct. Harm is further defined by the Service as an act which actually kills or injures wildlife, and may include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering.

Threatened species – any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

2. Description of the Action

This section provides a description of the proposed Federal action. In this case, the action under consideration is the Service's proposed Chukchi Sea Incidental Take Regulations under section 101(a)(5) of the MMPA, not the Industry activities themselves (although those activities are described herein). Neither the proposed action nor this programmatic BO provides authorization for the actual activities associated with oil and gas exploration or production. Industry activities

included in the Chukchi Sea Regulations will need to acquire all appropriate Federal and/or State permits in order to legally proceed.

The Service will conduct separate consultations as needed on other agency actions and Industry activities in the Chukchi Sea, as they are proposed. For example, the Service notified Minerals Management Service (MMS) that incremental actions associated with Lease Sale 193 in the Chukchi Sea will require a polar bear ESA consultation if the species is listed (USFWS 2007), as would oil and gas development within the National Petroleum Reserve–Alaska (NPR–A). However, although subsequent federal approvals (such as MMS issuing an exploration permit) would require consultation, we would expect such subsequent consultations to be greatly streamlined as long as the action is fully consistent with the Chukchi Sea MMPA Regulations.

This description of the action is based upon the proposed Chukchi Sea Incidental Take Regulations (72 FR 30670, June 1, 2007), draft Final Rule Chukchi Sea Incidental Take Regulations (dated March 13, 2008, provided by MMM), and the Final Environmental Assessment (EA) of the Final Rule (dated March 19, 2008). The action proposes Regulations for walruses and polar bears, both of which are presented here for completeness because they are frequently inter-related. However, this BO only considered effects of the Regulations on the polar bear.

Summary of Proposed Regulations

The Service proposed Regulations that would authorize the non-lethal, incidental, unintentional take of small numbers of walruses and polar bears during year-round oil and gas industry (Industry) exploration activities in the Chukchi Sea and adjacent western coast of Alaska. The rule would be effective for up to five years from the date of issuance. The Regulations include permissible methods of non-lethal taking, measures to ensure the least practicable adverse impact on the species and the availability of these species for subsistence uses, and requirements for monitoring and reporting. The proposed action also includes subsequent issuance by the Service of LOAs to conduct activities under the provisions of these regulations when requested by citizens of the United States. In the proposed Regulations, the Service finds the total expected takings of walruses and polar bears during Industry exploration activities will have a negligible impact on these species and will not have an unmitigable adverse impact on the availability of these species for subsistence use by Alaska Natives.

History of Marine Mammal Incidental Take Regulations in Alaska

Industry conducts activities, such as oil and gas exploration, in marine mammal habitat that could result in the taking of marine mammals. Although Industry is under no legal requirement to obtain incidental take authorization, since 1991, Industry has requested, and we have issued regulations for, incidental take authorization for conducting activities in areas of walrus and polar bear habitat. Incidental take regulations for walruses and polar bears in the Chukchi Sea were issued previously for the period 1991–1996 (56 FR 27443; June 14, 1991). In the adjacent Beaufort Sea, incidental take regulations have been issued previously from 1993 to present: November 16, 1993 (58 FR 60402); August 17, 1995 (60 FR 42805); January 28, 1999 (64 FR 4328); February 3, 2000 (65 FR 5275); March 30, 2000 (65 FR 16828); November 28, 2003 (68 FR 66744); and August 2, 2006 (71 FR 43926).

Current Industry Incidental Take Regulation Request

On August 5, 2005, the Alaska Oil and Gas Association (AOGA), on behalf of its members, (Agrium Kenai Nitrogen Operations, Alyeska Pipeline Service Company, Anadarko Petroleum Corporation, BP Exploration (Alaska) Inc., Chevron, Eni Petroleum, ExxonMobil Production Company, Flint Hills Resources, Alaska, Forest Oil Corporation, Marathon Oil Company, Petro-Canada (Alaska) Inc., Petro Star Inc., Pioneer Natural Resources Alaska, Inc., Shell Exploration & Production Company, Tesoro Alaska Company, and XTO Energy, Inc.) requested that the Service promulgate regulations to allow the non-lethal, incidental take of small numbers of walruses and polar bears in the Chukchi Sea for a period of five years.

On January 2, 2007, AOGA, on behalf of its members, also provided an addendum to its original petition referencing a Draft Environmental Impact Statement prepared by the Minerals Management Service (MMS) for the Chukchi Sea Planning Area: Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea (Chukchi Sea DEIS). The Chukchi Sea DEIS included estimates of all reasonably foreseeable oil and gas activities associated with proposed Outer Continental Shelf (OCS) lease sales in the Chukchi Sea Planning Area. The AOGA petition requested that the Service consider activities described in the Chukchi Sea DEIS for the period 2007–2012. On January 2, 2007, ConocoPhillips Alaska, Inc. (CPAI), also provided an addendum to the original AOGA petition describing CPAI's projected activities from 2007–2012. The petition and addendums are available at: (http://alaska.fws.gov/fisheries/mmm/itr.htm). The Chukchi Sea DEIS, referenced in the AOGA petition, has subsequently been finalized and is available at http://www.mms.gov/alaska/ref/EIS%20EA/Chukchi_feis_Sale193/feis_193.htm (OCS EIS/EA MMS 2007-026).

The combined requests are for regulations to allow the incidental, non-lethal take of small numbers of walruses and polar bears in association with oil and gas activities in the Chukchi Sea and adjacent coastline projected out to the year 2012. The information provided by the petitioners indicates that projected oil and gas activities over this timeframe will be limited to offshore and onshore exploration activities. Development and production activities were not considered in the requests. The petitioners have also specifically requested that these regulations be issued for non-lethal take. Industry has indicated that, through implementation of the mitigation measures, it is confident a lethal take will not occur.

Description of Geographic Region

The Regulations would allow Industry to incidentally take small numbers of walruses and polar bears within the same area, hereafter referred to as the Chukchi Sea Region (Figure 1). The geographic area covered by the request is the continental shelf of the Arctic Ocean adjacent to western Alaska. This area includes the waters (State of Alaska and OCS waters) and seabed of the Chukchi Sea, which encompasses all waters north and west of Point Hope (68°20'20" N, -166 °50'40 W, BGN 1947) to the U.S.– Russia Convention Line of 1867, west of a north–south line through Point Barrow (71°23'29" N, -156 °28'30 W, BGN 1944), and up to 200 miles north of Point Barrow. The region also includes the terrestrial coastal land 25 miles inland between the western boundary of NPR–A near Icy Cape (70°20'00" N, 148 °12'00W) and the north–south line from Point Barrow. The geographic region encompasses an area of approximately 90,000 square miles. This terrestrial region encompasses a portion of the Northwest and South Planning Areas of

the NPR–A. It is noteworthy that the north–south line at Point Barrow is the western border of the geographic region in the Beaufort Sea incidental take regulations (71 FR 43926; August 2, 2006).

The area described above also constitutes the "action area" for the purposes of this BO. The "action area" is the area that encompasses all direct and indirect effects of a proposed action.

Description of Industry Activities

This section briefly describes the types and scale of oil and gas activities projected to occur in the Chukchi Sea Region over the specified time period (2008–2012). This information is based upon information provided by the petitioners and referenced in the Chukchi Sea EIS. The Service has used these descriptions of activity as a basis for its findings. If requests for LOAs exceed the projected scope of activity analyzed under the Regulations, the Service would reevaluate its findings to determine if they continue to be appropriate before further LOAs are issued.

The Service does not know the specific locations where oil and gas exploration will occur over the proposed regulatory period. The location and scope of the specific activities will be determined based on a variety of factors, including the outcome of future Federal and State oil and gas lease sales and information gathered through subsequent rounds of exploration discovery. The information provided by the petitioners indicates that offshore exploration activities will be carried out during open water season to avoid seasonal ice pack. Onshore exploration activities are not expected to occur in the vicinity of known polar bear denning areas or coastal walrus haulouts.

Incidental take regulations do not authorize the placement and location of Industry activities; they can only authorize incidental take of walruses and polar bears. Allowing the activity at particular locations is part of the permitting process which is authorized by the lead permitting agency, such as MMS, Army Corps of Engineers (COE), or Bureau of Land Management (BLM). The specific dates and durations of the individual operations and their geographic locations will be provided to the Service in detail when requests for LOAs are submitted.

Oil and gas activities anticipated and considered in the analysis of the Chukchi Sea Regulations include: (1) marine-streamer 3D and 2D seismic surveys; (2) high-resolution site-clearance surveys; (3) offshore exploration drilling; (4) onshore seismic exploration and exploratory drilling; and the associated support activities for the afore-mentioned activities. These activities are detailed in Appendix 2.

Marine Streamer 3D and 2D Seismic Surveys. The Industry conducts marine seismic surveys to locate geological structures potentially capable of containing petroleum accumulations. Air guns are the typical acoustic (sound) source for 2-dimensional and 3-dimensional (2D and 3D) seismic surveys. A group of air guns is usually deployed in an array to produce a more downward-focused sound signal. The air guns are fired at short, regular intervals, so the arrays emit pulsed rather than continuous sound. While most of the energy is focused downward and the short duration of each pulse limits the total energy into the water column, the sound can propagate horizontally for several kilometers. The size of the source-array can vary during the seismic survey. Vessels usually tow up to three source arrays, depending on the survey-design specifications. Most operations use a single source vessel; however, in a few instances, more than one source vessel is used. Typically, data are only collected between 25 and 30 percent of the time (or 6-8 hours a day) because of

equipment or weather problems. The MMS estimates that individual surveys could last 20-30 days (with downtime) to cover a 322 km^2 (200 mi^2) area. Marine-streamer surveys require a largely ice-free environment to allow effective operation and maneuvering of the air gun arrays and long streamers. Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, the Service estimates that in any given year within the timeframe of the Regulations, up to four seismic survey vessels could be operating simultaneously in the Chukchi Sea Region during the open water season.

High-Resolution Site-Clearance Surveys. Based on data received from 2D and 3D seismic surveys, several test wells may be proposed. Prior to drilling deep test wells, high-resolution site clearance seismic surveys and geotechnical studies will be necessary to examine the proposed exploration drilling locations for geologic hazards, archeological features, and biological populations. Site clearance surveys and studies required for exploration will be conducted during the open water season before a drill rig is mobilized to the site. A typical operation consists of a vessel towing an acoustic source (air gun) about 25 m behind the ship and a 600-m streamer cable with a tail buoy. The source array usually is a single array composed of one or more air guns. Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, the Service estimates that as many as six high resolution site surveys may be carried out in any given year, with a majority of the site surveys occurring during the latter part of the regulatory time period.

Offshore Drilling Operations. Drilling operations are likely to employ drill-ships with ice-breaker support vessels. Water depths greater than 30 m (100 ft) and possible pack-ice incursions during the open water season will preclude the use of bottom-founded platforms as exploration drilling rigs. Using drill-ships allows the operator to temporarily move off the drill site, if sea or ice conditions require it, and the suspended well is controlled by blowout-prevention equipment installed on wellheads on the seabed. Drilling operations are expected to range between 30 and 90 days at different well sites. Drill ships operate only during the open-water season, and drifting ice can prevent their operation.

Upon reaching a drill site, the drillship is secured over the location by deploying anchors on as many as 10 to 12 mooring lines. The blowout preventer (BOP) is typically located at the seabed in a hole dug below the ice-scour depth, and enables the drill ship to shut down operations and get underway rapidly without exposing the well. One or more ice management vessels (icebreakers) generally support drill ships to ensure ice does not encroach on operations. A barge and tug typically accompany the vessels to provide a standby safety vessel, oil spill response capabilities, and refueling support. Most supplies, including fuel, necessary to complete drilling activities are stored on the drill ship and support vessels. Helicopter servicing of drill ships can occur as frequently as 1-2 times/day. If exploratory wells are not successful, wells are permanently plugged, wellhead equipment removed, and the seafloor is restored as much as practicable. Post-abandonment surveys are conducted to confirm that no debris remains following abandonment or those materials remain at the lease tract.

Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, the Service estimates that as many as three drill ships could be operating in the Chukchi Sea Region in any given year during the specified time frame (2008–2012). Each drill

ship could drill up to four exploratory or delineation wells per season. Each drill ship is likely to be supported by one to two ice breakers, a barge and tug, one to two helicopter flights per day, and one to two supply ships per week. The operating season is expected to be limited to the open water season July 1 to November 30.

Onshore seismic exploration and drilling. The CPAI petition describes conducting onshore seismic exploration and drilling over the next five years, including geotechnical site investigations, vibroseis, construction of ice pads, roads, and islands, and exploratory drilling. Geotechnical site investigations include shallow cores and soil borings to investigate soil conditions and stratigraphy. Vibroseis seismic operations are conducted both onshore and on nearshore ice using large trucks with vibrators that systematically put variable frequency energy into the earth. Multiple vehicles are normally associated with a typical vibroseis operation. One or two vehicles with survey crews move ahead of the operation and mark the source receiver points. Occasionally, bulldozers are needed to build snow ramps on the steep terrain or to smooth offshore rough ice within the site. A typical wintertime exploration seismic crew consists of 40–140 personnel.

On Federal lands, CPAI estimates drilling three to six onshore wells within the next five years. Drilling will likely include both well testing and vertical seismic profiles (VSPs). Three onshore wells were proposed for the 2007/2008 season. Drilling operations will require an estimated 32 to 161 km (20 to 100 mi) of ice roads, 32 to 480 km (20 to 300 mi) of rolligon trails, one to four airfields approximately 1,500 m (5,000 ft) in length on lakes or tundra, rig storage on gravel, possibly at new sites in Northwest NPR-A, one to five camps, and one to three rigs operating in a given year.

Existing Mitigation Measures for Oil and Gas Exploration Activities

Measures to mitigate potential effects of oil and gas exploration activities on marine mammal resources and subsistence use of those resources have been identified and developed through previous MMS lease sale National Environmental Policy Act (NEPA) review and analysis processes. The Chukchi Sea Final EIS (CS FEIS) (http://www.mms.gov/alaska/ref/EIS%20EA/Chukchi_feis_Sale193/feis_193.htm (OCS EIS/EA MMS 2007-026)) identifies several existing measures designed to mitigate potential effects of oil and gas exploration activities on marine mammal resources and subsistence use of those resources (CS FEIS, Sections II.B.3; II-B.5-24). All plans for OCS exploration activities will go through an MMS review and approval to ensure compliance with established laws and regulations. Operational compliance is enforced through the MMS on-site inspection program. The following MMS lease sale stipulations and mitigation measures will be applied to all exploration activities in the Chukchi Lease Sale Planning Area and the geographic region of the Chukchi Sea Regulations. The Service has incorporated these MMS Lease sale mitigation measures into their analysis of impacts to Pacific walruses and polar bears in the Chukchi Sea.

MMS lease sale stipulations that will help minimize Industry impacts to Pacific walruses and polar bears include:

Oil Spill Prevention and Response:
In compliance with 30 CFR 254, Oil-Spill-Prevention and Response Plans and contingency actions must be prepared by lessees to address the prevention, detection, and cleanup of fuel and oil spills associated with exploration operations.

Site-Specific Monitoring Program for Marine Mammal Subsistence Resources
A lessee proposing to conduct exploration operations within traditional subsistence use areas will be required to conduct a site-specific monitoring program designed to assess when walruses and polar bears are present in the vicinity of lease operations and the extent of behavioral effects on these marine mammals due to their operations. This stipulation applies specifically to the communities of Barrow, Wainwright, Point Lay, and Point Hope.

Site-specific monitoring programs will provide information about the seasonal distributions of walruses and polar bears. The information can be used to improve evaluations of the threat of harm to the species and provides immediate information about their activities and their response to specific events. This stipulation is expected to reduce the potential effects of exploration activities on walruses, polar bears, and the subsistence use of these resources. This stipulation also contributes important information to ongoing walrus and polar bear research and monitoring efforts.

Conflict Avoidance Mechanisms to Protect Subsistence-Harvesting Activities
Through consultation with potentially affected communities, the lessee shall make every reasonable effort to assure that their proposed activities are compatible with marine mammal subsistence hunting activities and will not result in unreasonable interference with subsistence harvests. In the event that no agreement is reached between the parties, the lessee, the appropriate management agencies and co-management organizations, and any communities that could be directly affected by the proposed activity may request that the MMS assemble a group consisting of representatives from the parties specifically to address the conflict and attempt to resolve the issues before the MMS makes a final determination on the adequacy of the measures taken to prevent unreasonable conflicts with subsistence harvests.

This lease stipulation will help reduce potential conflicts between subsistence hunters and proposed oil and gas exploration activities. This stipulation will help reduce noise and disturbance conflicts from oil and gas operations during specific periods, such as peak hunting seasons. It requires that the lessee meet with local communities and subsistence groups to resolve potential conflicts. The consultations required by this stipulation ensure that the lessee, including contractors, consult and coordinate both the timing and sighting of events with subsistence users. This stipulation has proven to be effective in the Beaufort Sea Planning Area in mitigating offshore exploration activities through the development of annual agreements between the Alaska Eskimo Whaling Commission and participating oil companies.

Measures to Mitigate Seismic-Surveying Effects
The measures summarized below are based on the protective measures in MMS' most recent marine seismic survey exploration permits and the recently completed *Programmatic Environmental Assessment of Arctic Ocean OCS Seismic Surveys—2006* (http://www.mms.gov/alaska/ref/pea_be.htm). As stated in the MMS Programmatic Environmental

Assessment, these protective measures will be incorporated in all MMS-permitted seismic activities.

1. Spacing of Seismic Surveys—Operators must maintain a minimum spacing of 15 miles between the seismic-source vessels for separate simultaneous operations.

2. Exclusion Zone—A 180/190-decibel (dB) isopleth-exclusion zone (also called a safety zone) from the seismic-survey-sound source shall be free of marine mammals, including walruses and polar bears, before the survey can begin and must remain free of mammals during the survey. The purpose of the exclusion zone is to protect marine mammals from Level A harassment. The 180-dB (Level A harassment injury) applies to cetaceans and walruses, and the 190-dB (Level A harassment-injury) applies to pinnipeds (other than walruses) and polar bears.

3. Monitoring of the Exclusion Zone—Trained marine mammal observers (MMOs) shall monitor the area around the survey for the presence of marine mammals to maintain a marine mammal-free exclusion zone and monitor for avoidance or take behaviors. Visual observers monitor the exclusion zone to ensure that marine mammals do not enter the exclusion zone for at least 30 minutes prior to ramp up, during the conduct of the survey, or before resuming seismic survey work after a shut down.

Shut Down – The survey shall be suspended until the exclusion/safety zone is free of marine mammals. All observers shall have the authority to, and shall instruct the vessel operators to, immediately stop or de-energize the airgun array whenever a marine mammal is seen within the zone. If the airgun array is completely shut down for any reason during nighttime or poor sighting conditions, it shall not be re-energized until daylight or whenever sighting conditions allow for the zone to be effectively monitored from the source vessel and/or through other passive acoustic, aerial, or vessel-based monitoring.

Ramp Up – Ramp up is the gradual introduction of sound from airguns to deter marine mammals from potentially damaging sound intensities and from approaching the specified zone. This technique involves the gradual increase (usually 5-6 dB per 5-minute increment) in emitted sound levels, beginning with firing a single airgun and gradually adding airguns over a period of at least 20-40 minutes, until the desired operating level of the full array is obtained. Ramp-up procedures may begin after observers ensure the absence of marine mammals for at least 30 minutes. Ramp-up procedures shall not be initiated at night or when monitoring the zone is not possible. A single airgun operating at a minimum source level can be maintained for routine activities, such as making a turn between line transects, for maintenance needs or during periods of impaired visibility (e.g., darkness, fog, high sea states), and does not require a 30-minute clearance of the zone before the airgun array is again ramped up to full output.

Field Verification – Before conducting the survey, the operator shall verify the radii of the exclusion/safety zones within real-time conditions in the field. This provides for more accurate radii rather than relying on modeling techniques before entering the field. Field-verification techniques must use valid techniques for determining propagation loss. When moving a seismic-survey operation into a new area, the operator shall verify the new radii of the zones by applying a sound-propagation series.

4. Monitoring of the Seismic-Survey Area—Aerial-monitoring surveys or an equivalent monitoring program acceptable to the Service will be required through the LOA authorization process. Field verification of the effectiveness of any monitoring techniques may be required by the Service.

5. Reporting Requirements—Reporting requirements provide regulatory agencies with specific information on the monitoring techniques to be implemented and how any observed impacts to marine mammals will be recorded. In addition, operators must immediately report to Federal regulators any shut downs due to a marine mammal entering the exclusion zones and provide the regulating agencies with information on the frequency of occurrence and the types and behaviors of marine mammals (if possible to ascertain) entering the exclusion zones.

6. Temporal/Spatial/Operational Restrictions—Seismic-survey and associated support vessels shall observe a 805–m (0.5–mi) safety radius around walruses hauled-out onto land or ice. Aircraft shall be required to maintain a 305–m (1,000–ft) minimum altitude within 805 m (0.5 mi) of hauled-out walruses.

7. Seismic-survey operators shall notify MMS immediately in the event of any loss of cable, streamer, or other equipment that could pose a danger to marine mammals.

These seismic mitigation measures will help reduce the potential for Level A Harassment of walruses and polar bears during seismic operations. The spatial separation of seismic operations will also reduce potential cumulative effects of simultaneous operations. The monitoring and reporting requirements will provide location-specific information about the seasonal distributions of walruses and polar bears. The additional information can be used to evaluate the future threat of harm to the species and also provides immediate information about their activities, and their response to specific events.

Additional Letter of Authority-Specific Measures
Additional mitigation, monitoring and reporting measures are generally required by the Service for each LOA issued under incidental take regulations. Accordingly, the following will also be required under the Chukchi Sea Regulations (§18.118):

(a) Mitigation. Holders of a LOA must use methods and conduct activities in a manner that minimizes to the greatest extent practicable adverse impacts on walruses and polar bears, their habitat, and on the availability of these marine mammals for subsistence uses. Dynamic management approaches, such as temporal or spatial limitations in response to the presence of marine mammals in a particular place or time or the occurrence of marine mammals engaged in a particularly sensitive activity (such as feeding), must be used to avoid or minimize interactions with polar bears, walruses, and subsistence users of these resources.

(1) Operating conditions for operational and support vessels.
(i) Operational and support vessels must be staffed with dedicated marine mammal observers to alert crew of the presence of walruses and polar bears and initiate adaptive mitigation responses.

(ii) At all times, vessels must maintain the maximum distance possible from concentrations of walruses or polar bears. Under no circumstances, other than an emergency, should any vessel approach within an 805-m (0.5-mi) radius of walruses or polar bears observed on land or ice.

(iii) Vessel operators must take every precaution to avoid harassment of concentrations of feeding walruses when a vessel is operating near these animals. Vessels should reduce speed and maintain a minimum 805-m (0.5-mi) operational exclusion zone around feeding walrus groups. Vessels may not be operated in such a way as to separate members of a group of walruses from other members of the group. When weather conditions require, such as when visibility drops, vessels should adjust speed accordingly to avoid the likelihood of injury to walruses.

(iv) The transit of operational and support vessels through the specified geographic region is not authorized prior to July 1. This operating condition is intended to allow walruses the opportunity to disperse from the confines of the spring lead system and minimize interactions with subsistence walrus hunters. Exemption waivers to this operating condition may be issued by the Service on a case-by-case basis, based upon a review of seasonal ice conditions and available information on walrus and polar bear distributions in the area of interest.

(v) All vessels must avoid areas of active or anticipated subsistence hunting for walrus or polar bear as determined through community consultations.

(2) Operating conditions for aircraft.

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

(ii) Under no circumstances, other than an emergency, should aircraft operate at an altitude lower than 305 m (1,000 ft) within 805 m (0.5 mi) of walruses or polar bears observed on ice or land. Helicopters may not hover or circle above such areas or within 805 m (0.5 mile) of such areas. When weather conditions do not allow a 305-m (1,000-ft) flying altitude, such as during severe storms or when cloud cover is low, aircraft may be operated below the 305-m (1,000-ft) altitude stipulated above. However, when aircraft are operated at altitudes below 305 m (1,000 ft) because of weather conditions, the operator must avoid areas of known walrus and polar bear concentrations and should take precautions to avoid flying directly over or within 805 m (0.5 mile) of these areas.

(iii) Plan all aircraft routes to minimize any potential conflict with active or anticipated walrus or polar bear hunting activity as determined through community consultations.

(3) Additional mitigation measures for offshore exploration activities.

(i) Offshore exploration activities will be authorized only during the open-water season, defined as the period July 1 to November 30. Exemption waivers to the specified open-water season may be issued by the Service on a case-by-case basis, based upon a review of seasonal ice conditions and available information on walrus and polar bear distributions in the area of interest.

(ii) To avoid significant additive and synergistic effects from multiple oil and gas exploration activities on foraging or migrating walruses, operators must maintain a minimum spacing of 24 km (15 mi) between all active seismic-source vessels and/or exploratory drilling operations. No more than four simultaneous seismic operations will be authorized in the Chukchi Sea region at any time.

(iii) No offshore exploration activities will be authorized within a 64-km (40-mi) radius of the communities of Barrow, Wainwright, Point Lay, or Point Hope, unless provided for in a Service-approved, site-specific Plan of Cooperation as described in paragraph (a)(6) of this section.

(iv) Aerial monitoring surveys or an equivalent monitoring program acceptable to the Service will be required to estimate the number of walruses and polar bears in a proposed project area.

(4) Additional mitigation measures for offshore seismic surveys. Any offshore exploration activity expected to include the production of pulsed underwater sounds with sound source levels ≥160 dB re 1 μPa will be required to establish and monitor acoustic exclusion and disturbance zones and implement adaptive mitigation measures as follows:

(i) Monitor zones. Establish and monitor with trained marine mammal observers an acoustically verified exclusion zone for walruses surrounding seismic airgun arrays where the received level would be ≥ 180 dB re 1 μPa; an acoustically verified exclusion zone for polar bear surrounding seismic airgun arrays where the received level would be ≥ 190 dB re 1 μPa; and an acoustically verified walrus disturbance zone ahead of and perpendicular to the seismic vessel track where the received level would be ≥ 160 dB re 1 μPa.

(ii) Ramp-up procedures. For all seismic surveys, including airgun testing, use the following ramp-up procedures to allow marine mammals to depart the exclusion zone before seismic surveying begins:

(A) Visually monitor the exclusion zone and adjacent waters for the absence of polar bears and walruses for at least 30 minutes before initiating ramp-up procedures. If no polar bears or walruses are detected, you may initiate ramp-up procedures. Do not initiate ramp-up procedures at night or when you cannot visually monitor the exclusion zone for marine mammals.

(B) Initiate ramp-up procedures by firing a single airgun. The preferred airgun to begin with should be the smallest airgun, in terms of energy output (dB) and volume (in^3).

(C) Continue ramp-up by gradually activating additional airguns over a period of at least 20 minutes, but no longer than 40 minutes, until the desired operating level of the airgun array is obtained.

(iii) Power down/Shut down.—Immediately power down or shut down the seismic airgun array and/or other acoustic sources whenever any walruses are sighted approaching close to or within the area delineated by the 180-dB re 1 μPa walrus exclusion zone, or polar bears are sighted approaching close to or within the area delineated by the 190-dB re 1 μPa polar bear exclusion zone. If the power down operation cannot reduce the received sound pressure level to 180-dB re 1 μPa (walrus) or 190-dB re 1 μPa (polar bears), the operator must immediately shut down the seismic airgun array and/or other acoustic sources.

(iv) Emergency shut down.—If observations are made or credible reports are received that one or more walruses and/or polar bears are within the area of the seismic survey and are in an injured or mortal state, or are indicating acute distress due to seismic noise, the seismic airgun array will be immediately shut down and the Service contacted. The airgun array will not be restarted until review and approval has been given by the Service. The ramp-up procedures provided in paragraph (a)(4)(ii) of this section must be followed when restarting.

(v) Adaptive response for walrus aggregations.—Whenever an aggregation of 12 or more walruses are detected within an acoustically verified 160-dB re 1 μPa disturbance zone ahead of or perpendicular to the seismic vessel track, the holder of the LOA must:

(A) Immediately power down or shut down the seismic airgun array and/or other acoustic sources to ensure sound pressure levels at the shortest distance to the aggregation do not exceed 160–dB re 1 μPa; and

(B) Not proceed with powering up the seismic airgun array until it can be established that there are no walrus aggregations within the 160-dB zone based upon ship course, direction, and distance from last sighting. If shut down was required, the ramp-up procedures provided in paragraph (a)(4)(ii) of this section must be followed when restarting.

(5) Additional mitigation measures for onshore exploration activities.

(i) Polar bear interaction plan.—Holders of LOAs will be required to develop and implement a Service-approved, site-specific polar bear interaction plan. Polar bear awareness training will also be required of certain personnel. Polar bear interaction plans will include:

(A) A description of the locations and types of activities to be conducted, i.e., a plan of operation;

(B) A food and waste management plan;

(C) Personnel training materials and procedures;

(D) Site at-risk locations and situations;

(E) A snow management plan;

(F) Polar bear observation and reporting procedures; and

(G) Polar bear avoidance and encounter procedures.

(ii) Polar bear monitors.—If deemed appropriate by the Service, holders of a LOA will be required to hire and train polar bear monitors to alert crew of the presence of polar bears and initiate adaptive mitigation responses.

(iii) Efforts to minimize disturbance around known polar bear dens.—Holders of a LOA must take efforts to limit disturbance around known polar bear dens.

(A) Efforts to locate polar bear dens.—Holders of a LOA seeking to carry out onshore exploration activities in known or suspected polar bear denning habitat during the denning season (November–April) must make efforts to locate occupied polar bear dens within and near proposed areas of operation, utilizing appropriate tools, such as forward looking infrared (FLIR) imagery and/or polar bear scent-trained dogs. All observed or suspected polar bear dens must be reported to the Service prior to the initiation of exploration activities.

(B) Exclusion zone around known polar bear dens.—Operators must observe a 1-mile operational exclusion zone around all known polar bear dens during the denning season (November–April, or until the female and cubs leave the areas). Should previously unknown occupied dens be discovered within 1 mile of activities, work in the immediate area must cease and the Service contacted for guidance. 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, and the holder of the authorization must comply with any additional measures specified.

(6) Mitigation measures for the subsistence use of walruses and polar bears.—Holders of LOAs must conduct their activities in a manner that, to the greatest extent practicable, minimizes adverse impacts on the availability of Pacific walruses and polar bears for subsistence uses.

(i) Community Consultation.—Prior to receipt of a LOA, applicants must consult with potentially affected communities and appropriate subsistence user organizations to discuss potential conflicts with subsistence hunting of walrus and polar bear caused by the location, timing, and methods of proposed operations and support activities (see §18.114(c)(4) for details). If community concerns suggest that the proposed activities may have an adverse impact on the

subsistence uses of these species, the applicant must address conflict avoidance issues through a Plan of Cooperation as described below.

(ii) Plan of Cooperation (POC).—Where prescribed, holders of LOAs will be required to develop and implement a Service-approved POC. The POC must include:

(A) A description of the procedures by which the holder of the LOA will work and consult with potentially affected subsistence hunters; and

(B) A description of specific measures that have been or will be taken to avoid or minimize interference with subsistence hunting of walruses and polar bears and to ensure continued availability of the species for subsistence use.

(C) The Service will review the POC to ensure that any potential adverse effects on the availability of the animals are minimized. The Service will reject POCs if they do not provide adequate safeguards to ensure the least practicable adverse impact on the availability of walruses and polar bears for subsistence use.

(b) Monitoring. Depending on the siting, timing, and nature of proposed activities, holders of LOAs will be required to:

(1) Maintain trained, Service-approved, on-site observers to carry out monitoring programs for polar bears and walruses necessary for initiating adaptive mitigation responses.

(i) Marine Mammal Observers (MMOs) will be required on board all operational and support vessels to alert crew of the presence of walruses and polar bears and initiate adaptive mitigation responses identified in paragraph (a) of this section, and to carry out specified monitoring activities identified in the marine mammal monitoring and mitigation plan (see paragraph(b)(2) of this section) necessary to evaluate the impact of authorized activities on walruses, polar bears, and the subsistence use of these subsistence resources. The MMOs must have completed a marine mammal observer training course approved by the Service.

(ii) Polar bear monitors.—Polar bear monitors will be required under the monitoring plan if polar bears are known to frequent the area or known polar bear dens are present in the area. Monitors will act as an early detection system in regard to proximate bear activity to Industry facilities.

(2) Develop and implement a site-specific, Service-approved marine mammal monitoring and mitigation plan to monitor and evaluate the effects of authorized activities on polar bears, walruses, and the subsistence use of these resources.

(i) The marine mammal monitoring and mitigation plan must enumerate the number of walruses and polar bears encountered during specified exploration activities, estimate the number of incidental takes that occurred during specified exploration activities, and evaluate the effectiveness of prescribed mitigation measures.

(ii) Applicants must fund an independent peer review of proposed monitoring plans and draft reports of monitoring results. This peer review will consist of independent reviewers who have knowledge and experience in statistics, marine mammal behavior, and the type and extent of the proposed operations. The applicant will provide the results of these peer reviews to the Service for consideration in final approval of monitoring plans and final reports. The Service will distribute copies of monitoring reports to appropriate resource management agencies and co-management organizations.

(3) Cooperate with the Service and other designated Federal, State, and local agencies to monitor the impacts of oil and gas exploration activities in the Chukchi Sea on walruses or polar bears. Where insufficient information exists to evaluate the potential effects of proposed activities on walruses, polar bears, and the subsistence use of these resources, holders of LOAs may be required to participate in joint monitoring and/or research efforts to address these information needs and insure the least practicable impact to these resources. Information needs in the Chukchi Sea include, but are not limited to:

(i) Distribution, abundance, and habitat use patterns of walruses and polar bears in offshore environments; and

(ii) Cumulative effects of multiple simultaneous operations on walruses and polar bears.

(c) Reporting requirements. Holders of LOAs must report the results of specified monitoring activities to the Service's Alaska Regional Director (see 50 CFR 2.2 for address).

(1) In-season monitoring reports.

(i) Activity progress reports.—Operators must keep the Service informed on the progress of authorized activities by:

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

(B) Providing weekly progress reports of authorized activities noting any significant changes in operating state and or location; and

(C) Notifying the Service within 48 hours of ending activity.

(ii) Walrus observation reports.—The operator must report, on a weekly basis, all observations of walruses during any Industry operation. Information within the observation report will include, but is not limited to:

(A) Date, time, and location of each walrus sighting;

(B) Number of walruses: sex and age;

(C) Observer name and contact information;

(D) Weather, visibility, and ice conditions at the time of observation;

(E) Estimated range at closest approach;

(F) Industry activity at time of sighting;

(G) Behavior of animals sighted;

(H) Description of the encounter;

(I) Duration of the encounter; and

(J) Actions taken.

(iii) Polar bear observation reports.—The operator must report, within 24 hours, all observations of polar bears during any Industry operation. Information within the observation report will include, but is not limited to:

(A) Date, time, and location of observation;

(B) Number of bears: sex and age;

(C) Observer name and contact information;

(D) Weather, visibility, and ice conditions at the time of observation;

(E) Estimated closest point of approach for bears from personnel and facilities;

(F) Industry activity at time of sighting, possible attractants present;

(G) Bear behavior;

(H) Description of the encounter;

(I) Duration of the encounter; and

(J) Actions taken.

(iv) Notification of incident report.—Reports should include all information specified under the species observation report, as well as a full written description of the encounter and actions taken by the operator. The operator must report to the Service within 24 hours:

(A) Any incidental lethal take or injury of a polar bear or walrus; and

(B) Observations of walruses or polar bears within prescribed mitigation-monitoring zones.

(2) After-action monitoring reports.

The results of monitoring efforts identified in the marine mammal monitoring and mitigation plan must be submitted to the Service for review within 90 days of completing the year's activities. Results must include, but are not limited to, the following information:

(i) A summary of monitoring effort including: total hours, total distances, and distribution through study period;

(ii) Analysis of factors affecting the visibility and detectability of walruses and polar bears by specified monitoring;

(iii) Analysis of the distribution, abundance, and behavior of walrus and polar bear sightings in relation to date, location, ice conditions, and operational state; and

(iv) Estimates of take based on density estimates derived from monitoring and survey efforts

Summary of Take Estimates and Conclusions under MMPA

The Service's conclusions regarding the amount of incidental take anticipated for polar bears (and walruses) and impacts on the species under the Regulations are as follows (summarized from draft Final Rule Chukchi Sea Incidental Take Regulations, March 2008):

Small Numbers Determination

The dynamic nature of sea ice habitats and its influence on the seasonal and annual distribution and abundance of polar bears and walruses in the specified geographical region (eastern Chukchi Sea), limits the Service's ability to provide *a priori* numerical estimates of the number of Pacific walruses and polar bears that might potentially be impacted in any given year. For small take analysis, the MMPA's statutory and legislative history do not require a specific numbers analysis, leaving the determination of "small" to the agency's discretion.

In the proposed Regulations, the Service finds that any incidental take reasonably likely to result from the effects of the proposed activities, as mitigated through this regulatory process, will be limited to small numbers of walruses and polar bears. In making this finding the Service developed a "small numbers" analysis based on: (a) the seasonal distributions and habitat use patterns of walruses and polar bears in the Chukchi Sea; (b) the timing, scale, and habitats associated with the proposed activities and the limited potential area of impact in open water habitats, and (c) monitoring requirements and mitigation measures designed to limit interactions with, and impacts to, polar bears and walruses. The Service concluded that: (a) The number of walruses and polar bears utilizing open water habitats during offshore exploration operations is expected to be small relative to the number of animals utilizing pack ice habitats or coastal areas outside the areas of operation (for example, coastal areas of Chukotka Russia); b) The footprint of authorized projects is expected to be small relative to the range of polar bear and walrus populations. Walruses and polar bears are expected to be broadly distributed across the Chukchi Sea, the Eastern Siberian Sea

(walruses), and the Beaufort Sea (polar bears) during the operating season; and c) Monitoring requirements and adaptive mitigation measures such as operational exclusion zones near observed animals and seasonal restrictions on offshore activities are expected to significantly limit the number of incidental takes to animals.

Impact on Species

In the proposed Regulations, the Service finds that any incidental take reasonably likely to result from the effects of oil and gas related exploration activities during the period of the rule, in the Chukchi Sea and adjacent western coast of Alaska will have no more than a negligible effect on the rates of recruitment and survival of polar bears and Pacific walruses in the Chukchi Sea Region. In making this finding, we considered the best scientific information available, such as: (1) the biological and behavioral characteristics of the species, where the behavior and distribution of walruses and polar bears utilizing areas which overlap with Industry is expected to limit the amount of interactions between walruses, polar bears, and Industry; (2) the nature of proposed oil and gas industry activities; (3) the potential effects of Industry activities on the species; (4) the documented impacts of Industry activities on the species, where nonlethal, temporary, passive takes of animals occur, taking into consideration cumulative effects; (5) potential impacts of climate change, where both walruses and polar bears can potentially be displaced from the areas of Industry activity due to their fidelity to sea ice; (6) mitigation measures that will minimize Industry impacts through adaptive management; and (7) other data provided by monitoring programs in the Beaufort Sea (1993–2006) and historically in the Chukchi Sea (1991–1996).

The Service's finding of ''negligible impact'' in the proposed Regulations applies to incidental take associated with proposed oil and gas exploration activities as mitigated through the regulatory process, including subsequent issuance of LOAs to qualifying activities. The regulations establish monitoring and reporting requirements to evaluate the potential impacts of authorized activities, as well as mitigation measures designed to minimize interactions with and impacts to walruses and polar bears. MMM will evaluate each request for an LOA based on the specific activity and the specific geographic location where the proposed activities will occur to ensure that the level of activity and potential take is consistent with our finding of negligible impact. Depending on the results of the evaluation, we may grant the authorization, add further operating restrictions, or deny the authorization.

3. Status of Species

This section presents biological and ecological information relevant to formation of the BO. Appropriate information on the polar bear's life history, habitat and distribution, and description of other factors necessary for their survival is included for analysis in later sections. The Range-wide Status Review of the Polar Bear (Schleibe et al. 2006), final rule listing the polar bear as a threatened species (73 FR 28211, May 15, 2008), USGS Administrative Reports, other agency reports, published literature, and personal communication with species experts were utilized in preparing this section.

Description and Ecological Adaptations

Polar bears are the largest of the living bear species (DeMaster and Stirling 1981) and occur throughout portions of the Northern Hemisphere where the sea is ice-covered for all or much of the year (Amstrup 2003). Polar bears depend upon sea ice for access to their prey and for other aspects of their life history (Stirling and Øritsland 1995; Stirling and Lunn 1997; Amstrup 2003). Because the principle habitat of polar bears is sea ice, it is considered a marine mammal, and was included in those species covered under the MMPA of 1972.

Polar bears are characterized by a large stocky body, with a longer neck and proportionately smaller head than other members of the bear family, although without the distinct shoulder hump common to brown bears (*Ursus arctos*). Polar bears exhibit sexual dimorphism, with female body length, skull size, and body mass considerably less than males (Derocher et al. 2005). Adult males have been recorded weighing 654 kilograms (1,440 pounds) (Kolenosky et al. 1992), with some individuals estimated at 800 kg (1,760 pounds), but too large for weighing equipment (DeMaster and Stirling 1981). Adult females weigh 181 to 317 kg (400 to 700 pounds). Polar bear fur color varies between white, yellow, gray, and brown, and is affected by oxidation or exposure to air, light conditions, and staining due to contact with fats from prey items. The nose, lips, and skin of polar bears is black (DeMaster and Stirling 1981, Amstrup 2003).

Polar bear genetics indicate the species branched off from brown bears and occupied an open niche on the surface of the sea ice during maximal extent of the continental ice sheets in the late Pleistocene; based upon molecular genetic techniques, this could have occurred as long as 250,000 years ago (Amstrup 2003). Subsequent behavioral and physical adaptations have allowed polar bears to increasingly specialize at hunting seals from the surface of the ice (Stirling 1974, Smith 1980, Stirling and Øritsland 1995).

Physical adaptations to life on sea ice include the whitish pelage with water repellent guard hairs and dense underfur, a short furred snout, and small ears. Polar bear teeth have become very specialized for a carnivorous diet, rather than the omnivorous diet of the brown bear (Amstrup 2003). Their teeth are well suited to grab prey and eat fat from the meat and hide and less well suited for grinding grasses or other vegetation (Amstrup 2003). Polar bear feet have hair on the bottoms and are large and paddle-like (Stirling 1988). That adaptation probably assists in swimming and also helps disperse weight and avoid breaking through when walking on thin ice (Stirling 1988). Polar bear claws are shorter and more strongly curved than those of brown bears, and larger and heavier than those of black bears (*Ursus americanus*), and appear to be well adapted to traveling over blocks of ice and snow and to securely gripping prey animals (Amstrup 2003).

Polar bears are well adapted for thermoregulation in the extreme cold conditions of the Arctic (Schliebe et al 2006). Normal body temperature of a resting polar bear is 37.0º Celsius (98.6º Fahrenheit), similar to other mammals (Best 1982, Stirling 1988). A combination of fur and hide properties, and up to 11 centimeters (4.5 inches) of blubber serve as excellent insulators and maintain body temperatures and metabolic rates at near normal levels at environmental temperatures of -37º C (-34.6º F) (Stirling 1988). However, polar bears are susceptible to overheating (Best 1982, Stirling 1988). Polar bears radiate heat from their muzzle, nose, ears, footpads, insides of the thighs, and blood vessels in the shoulder region near the skin (Stirling 1988). Polar bears can cool by swimming, because water conducts heat approximately 20 times

more efficiently than air (Stirling 1988). Young cubs, however, can become chilled by swimming if it cools the body too much (Blix and Lentfer 1979, Stirling 1988). Polar bears also conserve energy by curling into a ball when exposed to extreme cold, windy weather, or sprawl out to keep cool on warm days (Stirling 1988). Bears in warm areas like Hudson Bay also move very little in summer in order to stay cool and conserve energy (Knudsen 1978, Derocher and Stirling 1990).

Unlike other species of bears where both sexes may hibernate, only pregnant female polar bears hibernate through the winter (Stirling 1988, Amstrup 2000). This is specialized winter dormancy, and not true hibernation. It is typified by a slightly depressed heart rate and temperature, during which time the bear does not feed and lives off accumulated fat stores (Stirling 1988, Amstrup 2003). Polar bears can also enter a hibernation-like state facultatively, as needed (Derocher et al. 2004). This allow polar bears to feed hyperphagically (dramatically increase food intake to be stored as fat), both seasonally and when an unpredictable opportunity presents itself, and then slow down their metabolism to make stored fat reserves last longer during periods of food shortage (Derocher et al 1990, Ramsay et al 1991, Stirling and Øritsland 1995). Their metabolic flexibility, and ability to digest fat with 98 percent efficiency, are important adaptations to the arctic environment, and probably what allows polar bears to fast the summer months on shore in Hudson Bay (Schliebe et al. 2006).

Distribution

Polar bears are distributed throughout regions of the arctic and subarctic waters where the sea is ice-covered for large portions of the year. Patterns in spatial segregation suggested by telemetry data, along with information from surveys, marking studies, and traditional knowledge, resulted in recognition of 19 partially discrete polar bear groups by the International Union for the Conservation of Nature (IUCN) Polar Bear Specialist Group (PBSG) for the purposes of management [the distribution of the subgroups is illustrated in the final rule listing the polar bear (73 FR 28212, May 15, 2008; page 28216)]. There is considerable overlap in areas occupied by members of these groups (Amstrup et al. 2005) and the boundaries have been adjusted as new data are collected.

Two of these populations (Southern Beaufort Sea and Chukchi Sea) occur in Alaska, with an area of seasonal intermingling of both populations that roughly overlaps with the geographic boundaries of the proposed Chukchi Sea ITRs (USFWS 2008).

Polar Bear Movements

Information from telemetry studies indicate polar bear movements are not random, nor do they passively follow ocean currents on the ice as previously thought (Pedersen 1945, Mauritzen et al. 2003.). Movement data come almost exclusively from adult female polar bears because male anatomy (their neck is larger than their skull) will not accommodate radio collars. Movements of seven male polar bears surgically implanted with transmitters in 1996 and 1997 were compared to movements of 104 females between 1985 and 1995 (Amstrup et al. 2001), which indicated males and females had similar activity areas on a monthly basis, but males traveled farther each month (Amstrup et al. 2000b). Activity areas have not been determined for many of the populations, and what information is available reflects movement data collected prior to the recent changes of

retreating ice conditions. In the Beaufort Sea, annual activity areas for individually monitored female bears averaged 149,000 km^2 (57,529 mi^2), ranging from 13,000 km^2 to 597,000 km^2 (5,019 mi^2 to 230,503 mi^2) (Amstrup et al. 2000b.). Total annual movements by female bears in the Beaufort Sea averaged 3,415 km (2,122 mi) and ranged up to 6,200 km (3,853 mi), with movements rate of >4.0 km/hr (2.5 mi/hr) sometimes sustained for long periods, and movements of >50 km/day (31 mi/day) observed (Amstrup et al. 2000b). The mean activity area in the Chukchi Sea, characterized by highly dynamic ice conditions, was 244,463 km^2 (94,388 mi^2) (Garner et al. 1990). The average annual distance moved by Chukchi Sea female bears was 5,542 km (3,444 mi).

Telemetry data from radio-collared females indicates some individuals occupy home ranges (or "multi-annual activity areas") which they seldom leave (Amstrup 2003). The size of a polar bear's home range is determined, in part, by the annual pattern of freeze-up and break-up of sea ice, and therefore by the distance a bear must travel to obtain access to prey (Stirling 1988, Durner et al. 2004). A bear that has consistent access to ice, leads (narrow, linear cracks in the ice that form when ice floes diverge or shear as they move parallel to each other), and seals may have a relatively small home range, while bears in areas such as the Barents, Greenland, Chukchi, Bering or Baffin seas may have to move many hundreds of kilometers each year to remain in contact with sea ice from which they can hunt (Born et al. 1997, Mauritzen et al. 2001, Ferguson et al. 2001, Amstrup 2003, Wiig et al. 2003).

Feeding Habits

Polar bears derive essentially all their sustenance from marine mammal prey and have evolved a strategy that utilizes the high fat content of marine mammals (Best 1985, Amstrup et al. 2007). Over half the caloric content of a seal carcass is located in the layer of fat between the skin and under laying muscle (Stirling and McEwan 1975). Polar bears show their preference for fat by quickly removing the fat layer from beneath the skin after they catch a seal. High fat intake that can be achieved by specializing on marine mammal prey allows polar bears to thrive in the harsh Arctic environment (Stirling and Derocher 1990, Amstrup 2003).

Over much of their range, polar bears are dependent on one species of seal, the ringed seal (*Phoca hispida*). Polar bears occasionally catch belugas (*Delphinapterus leucas*), narwhals (*Monodon monocerus*), walrus, and harbor seals (*Phoca vitulina*) (Smith 1985, Calvert and Stirling 1990, Smith and Sjare 1990, Stirling and Øritsland 1995, Derocher et al. 2002). Where common, bearded seals (*Erignathus barbatus*) can be a large part of polar bear diets, and are probably the second most common prey item (Derocher et al. 2002). Walruses can be seasonally important in some parts of the polar bear range (Parovshchikov 1965, Ovsyanikov 1996). However, throughout most of their range, polar bears are most dependent upon ringed seals (Smith and Stirling 1975, Smith 1980), and the relationship between ringed seals and polar bears is so close that the abundance of ringed seals in some areas appears to regulate the density of polar bears, while polar bear predation in turn, regulates density and reproductive success of ringed seals (Hammill and Smith 1991, Stirling and Øritsland 1995).

Polar bears can rarely catch seals on land or in open water (Furnell and Oolooyuk 1980); rather they consistently catch seals and other marine mammals at the air-ice-water interface, where aquatic mammals come to breathe (Amstrup et al. 2007). Although there are local exceptions, it

appears that polar bears gain little overall benefit from alternate foods (Amstrup et al. 2007). Even in Hudson Bay where polar bears are forced onto land for extended periods with access to a variety of foods including human refuse, little terrestrial food is incorporated into polar bear tissues (Ramsay and Hobson 1991). Therefore, maintenance of polar bear populations is dependent upon marine prey, largely ringed seals, and polar bears are tied to the surface of the ice for effective access to that prey (Amstrup et al. 2007).

Breeding Biology

Polar bears have an intrinsically low reproductive rate characterized by late age of sexual maturity, small litter sizes, and extended parental investment in raising young. Female polar bears enter a prolonged estrus between March and June, when breeding occurs. Ovulation is thought to be induced by mating (Wimsatt 1963, Ramsay and Dunbrack 1986, Derocher and Stirling 1992). Implantation is delayed until autumn, and gestation is 195 to 265 days (Uspenski 1977), with active development of the fetus suspended for most of that time. The timing of implantation, and therefore the timing of birth, is likely dependent upon body condition of the female, which in turn is dependent upon a variety of environmental factors (Schliebe et al. 2006). Derocher et al. (1992) documented Hudson Bay polar bear births occurred from mid-November through mid- December. In the Beaufort Sea many pregnant females did not enter dens until late November or early December (Amstrup and Gardner 1994), and a later date of birth is assumed.

Throughout their range, most pregnant female polar bears excavate dens in snow located on land during September through November after drifts large enough to excavate a snow cave have formed (Ramsay and Stirling 1990, Amstrup and Gardner 1994). The only known exceptions are in Western and southern Hudson Bay where polar bears excavate earthen dens and later reposition into adjacent snow drifts (Jonkel et al. 1972, Richardson et al. 2005), and in the southern Beaufort Sea where a portion of the population dens in snow caves located on pack and shorefast ice. Successful denning by polar bears requires an accumulation of sufficient snow combined with winds to cause snow accumulation leeward of topographic features that create denning habitat (Harington 1968). The common characteristic of all denning habitat is topographic features that catch snow in the autumn and early winter (Durner et al. 2003).

Polar bear denning habitat in Alaska includes areas of low relief topography characterized by tundra with riverine banks within approximately 50 km (31 mi) of the coast (Amstrup 1993, Amstrup and Gardner 1994, Durner et al. 2001, 2003), and offshore pack ice pressure ridge habitat. The northern Alaskan coast receives minimal snow fall, but because the landscape is flat, snow is blown throughout winter creating drifts in areas of relief. Insufficient data exist to accurately quantify polar bear denning along the Alaskan Chukchi Sea coast; however dens in the area are less concentrated than other areas in the Arctic. The majority of denning of Chukchi Sea polar bears occurs on Wrangel Island, Herald Island, and certain locations on the northern Chukotka coast of Russia.

Fidelity to denning locales was investigated by Amstrup and Gardner (1994), in which 27 females were located at up to four successive maternity dens. Bears that denned once on pack ice were more likely to den on pack ice than on land in subsequent years. Similarly, bears were faithful to general geographic areas – those that denned once in the eastern half of the Alaska coast were more

likely to den there than to the west in subsequent years. Annual variations in weather, ice conditions, prey availability, and the long-distance movements of polar bears (Amstrup et al. 1986, Amstrup et al. 2000b, Garner et al. 1990) make recurrence of exact denning locations unlikely.

Chronology of denning varies between polar bear populations. Satellite telemetry studies determined mean dates of den entry in the Beaufort Sea were 11 and 22 November for land (n = 20) and pack ice (n = 16), respectively (Amstrup and Gardner 1994). Female bears were foraging right up to the time of den entry, and then denned nearby. The mean date of emergence was 26 March for pack ice dens (n = 10) and 5 April for land dens (n = 18). Messier et al. (1994) reported mean date of den entry and exit varied among years depending upon sea ice, snow, and weather conditions; mean entry into maternal dens in the Canadian Arctic was 17 September and mean emergence was 21 March, with females and cubs remaining near dens for a mean 13 (SE = 13) days post emergence. Ferguson et al. (2000) observed that bears denning at higher latitudes entered dens a bit later than those to the south, but that exit times did not differ by latitude; they reported a mean den entry of 15 September (1 September to 7 October), a mean exit of 20 March (15 to 28 March), with a mean 180 days in dens (163 to 200 days). For bears denning on sea ice or moving from sea ice to land denning habitat, time of sea ice consolidation can alter the onset of denning. Sea ice dens must be in ice stable enough to stay intact for up to 164 days while possibly moving hundreds of kilometers by currents (Amstrup 2003, Wiig 1998).

Polar bears are largely food deprived while on land in the ice-free period and survive by mobilizing fat during that time. Pregnant females that spend the late summer on land then go into dens and may not feed for eight months (Watts and Hansen 1987, Ramsay and Stirling 1988). This may be the longest period of food deprivation of any mammal, and it occurs when the female could be gestating and lactating.

Polar bears give birth in the dens during mid-winter (Kostyan 1954, Harington 1968, Ramsay and Dunbrack 1986). Survival and growth of the cubs depends on the warmth and stable environment within the maternal den (Blix and Lentfer 1979). Family groups emerge from dens in March and April when cubs are about three months old and able to survive in the outside weather conditions (Blix and Lentfer 1979, Amstrup 1995).

Newborn polar bears are very small, weighing only approximately 0.6 kg (1.3 pounds) (Blix and Lentfer 1979), and nurse from their hibernating mothers. Cubs grow very quickly and may weigh 10 to 12 kg (22 to 26.4 pounds) by the time they emerge from the den about three months later. Young bears stay with their mothers until weaned, which occurs most commonly in early spring when the cubs are 2.3 years of age. Female polar bears are available to breed again after the cubs are weaned. Therefore, in most areas, the minimum successful reproductive interval for polar bears is 3 years (Schliebe et al. 2006).

Age of maturation of mammals is often associated with a threshold body mass (Sadleir 1969), and in polar bear populations it appears to be largely dependent on numbers and productivity of ringed seals. In the Beaufort Sea, ringed seal densities are lower in some areas of the Canadian High Arctic and Hudson Bay. As a possible consequence, female polar bears in the Beaufort Sea usually do not breed for the first time until they are 5 years of age (Stirling et al. 1976, Lentfer and Hensel 1980). This means they give birth for the first time at 6 years of age. In contrast, many of the

Canada females reach maturity at age 4 and produce their first young at age 5 (Stirling et al. 1977, 1980, 1984; Ramsay and Stirling 1982, 1988; Furnell and Schweinsburg 1984). Derocher et al. (1992) calculated average age of first breeding in the Hudson Bay area of 4.1 years, and cub production (assessed by estimated pregnancy rates) remained high between 5 and 20 years of age and declined thereafter.

Litter size and production rates vary by geographic area and may change in response to hunting pressure, environmental factors, and other population perturbations. Litters of two cubs are common (Schliebe et al. 2006), with litters of three cubs occurring sporadically across the Arctic and most commonly reported in the Hudson Bay region (Stirling et al. 1977, Ramsay and Stirling 1988, Derocher and Stirling 1992). Average litter size across the species range varied from 1.4 to 1.8 cubs (Schliebe et al. 2006), and several studies have linked reproduction to availability of seal prey, especially in the northern portion of their range. Body weights of mother polar bears and their cubs decreased markedly in the mid-1970s in the Beaufort Sea following a decline in ringed and bearded seal pup production (Stirling et al. 1976, 1977, Kingsley 1979, DeMaster et al. 1980, Stirling et al. 1982, Amstrup et al. 1986). Declines in reproductive parameters varied by region and year with the severity of ice conditions and corresponding reduction in numbers and productivity of seals (Amstrup et al. 1986). In the Beaufort Sea, females produce a litter of cubs at an annual rate of 0.25 litters per adult female (Amstrup 1995). Annual litter production rate in Hudson Bay region declined from 0.45 litters/female in the period 1965-1979 to 0.35 litters/female during 1985-1990 (Derocher and Stirling 1992).

Polar bear reproduction lends itself to early termination without extensive energetic investment on the female (Ramsay and Dunbrack 1986, Derocher and Stirling 1992). Female polar bears may defer reproduction in favor of survival when foraging conditions are difficult (Derocher et al. 1992). Persistent deferral of reproduction could cause a declining population trend in populations with an intrinsically low rate of growth (Schliebe et al. 2006).

Survival

Polar bears are long-lived animals; the oldest known female polar bear in the wild was 32 years of age and the oldest known male was 28, although few bears in the wild live beyond 20 years (Stirling 1990). Survival rates increase up to a certain age, with cubs-of –the-year having the lowest rates and prime age adults (between 5 and 20 years of age) having survival rates that can exceed 90 percent (Schliebe et al. 2006; Taylor et al. unpublished data). Amstrup and Durner (1995) report that high survival rates (exceeding 90% for adult females) are essential to sustain populations.

Survival of cubs is dependent upon their weight when they exit maternity dens (Derocher and Stirling 1992), and most cub mortality occurred early in the period after emergence from the den (Amstrup and Durner 1995, Derocher and Stirling 1996), with early age mortality generally associated with starvation (Derocher and Stirling 1996). Survival of cubs to weaning stage (generally 27-28 months) is generally estimated to range from 15 to 56 percent of births (Schliebe et al. 2006). Subadult survival rates are poorly understood because collars cannot be used on these rapidly growing individuals.

Population age structure data indicate subadults 2 to 5 years survive at lower rates than adults (Amstrup 1995), probably because their hunting and survival skills are not fully developed (Stirling and Latour 1978). Eberhardt (1985) hypothesized adult survival rates must be in the upper 90 percent range to sustain polar bear populations. Studies using telemetry monitoring of individual animals (Amstrup and Durner 1995) estimated adult female survival in prime age groups may exceed 96 percent, and survival estimates are a reflection of the characteristics and qualities of an ecosystem to maintain the health of individual bears (Schliebe et al. 2006). Polar bears that avoid serious injury may become too old and feeble to hunt efficiently and most are generally believed to die of old age. Local and widespread climatic phenomena that have the potential to make seals less abundant or less available can significantly affect polar bear populations through survival or production (Kingsley 1979, DeMaster et al 1980, Amstrup et al. 1986, Stirling 2002).

Population Status

The total number of polar bears worldwide is estimated to be 20,000 to 25,000 bears (Aars et al. 2006). Worldwide population summaries were derived from information presented at the IUCN/PBSG meeting held in Seattle, Washington in June 2005, and updated with results available in October 2006 (Aars et al. 2006). Information presented for each population is based upon status reports and revisions given by each nation. Population sizes and associated uncertainty in estimates, historical and predicted human-caused mortality, population trends, and rationale for determination of status are presented (Aars et al. 2006).

Chukchi Sea

The Chukchi Sea (CS) population is widely distributed on the pack ice of the northern Bering, Chukchi, and eastern portions of the Eastern Siberian seas (Garner et al. 1990, Garner et al. 1994, Garner et al. 1995). Polar bears are seasonably abundant in the Chukchi Sea and the action area of the proposed Regulations and their distribution is influenced by the movement of the seasonal pack ice. Polar bears in the Chukchi and Bering Seas move south with the advancing ice during fall and winter and move north in advance of the receding ice in late spring and early summer (Garner et al. 1990). In May and June polar bears are likely to be encountered in the action area as they move northward from the northern Bering Sea. During fall/early winter polar bears are likely to be encountered in the action area during their southward migration in late October and November. Polar bears are dependent upon the sea ice for foraging and the most productive areas seem to be near the ice edge, leads, or polynyas (irregularly shaped areas of persistent open water that are sustained by winds or ocean heat) where the ocean depth is minimal (Durner et al. 2004). In addition polar bears could be present along the shoreline in this area as they opportunistically scavenge on marine mammal carcasses along the shoreline (Kalxdorff and Fischbach 1998).

The current CS population size is not precisely known, but an estimate of approximately 2,000 was made in 1993 (Aars et al. 2006, Schliebe et al. 2006). The size of the population was derived from observations of dens, and aerial surveys (Chelintsev 1977, Stishov 1991, Stishov et al. 1991); but the estimates have wide ranges (about 200 to 500 animals), so are considered of little use for management. Reliable estimates of population size based upon mark and recapture studies are not available for this region, and measuring the population size is a research challenge. It is believed the status of the CS population increased after the harvest was reduced in 1972, but the status and trend cannot yet be determined for this population (73 FR 28212, May 15, 2008; page 28217).

The CS population is subject to subsistence hunting in Alaska where average annual harvest levels declined about 50 percent between the 1980s and 1990s (Schliebe et al. 1998) and have remained at low levels in recent years. No hunting quota is set for Alaska; in 2004/2005, 32 bears were harvested in Alaska. There is believed to be a substantial illegal harvest in Russia where a minimum of 100 bears are thought to be harvested annually, and in some years the estimates have exceeded 200 animals killed in Russia (Schliebe et al. 2006). Currently the combined Alaska-Chukotka polar bear harvest is believed to exceed sustainable levels, and the CS polar bear population is considered uncertain or declining (Aars et al. 2006).

Southern Beaufort Sea

The Southern Beaufort Sea (SB) population occurs between Icy Cape, Alaska on the western boundary and Pearce Point, Northwest Territory (NWT), Canada (Amstrup et al. 1986, Amstrup and DeMaster 1988, Stirling et al. 1988). The size of the SB population was estimated to be approximately 1,800 animals in 1986 (Amstrup et al. 1986). A new population assessment derived from capture-recapture data collected during 2001 to 2006 estimated 1,526 (95 percent CI = 1,211 - 1,841) polar bears in the region in 2006 (Regehr et al. 2006). Because the precision of the earlier estimate was low, the two estimates cannot be statistically differentiated. The harvest of polar bears in the SB region is shared between Canada and the United States and since 1988 has been managed under the "Polar Bear Management Agreement for the Southern Beaufort Sea" by the Inuvialuit Game Council of Canada, and the North Slope Borough of Alaska. The harvest quota for the SB is 80 animals (40 for Alaska and 40 for NWT). In 2004/2005 the joint harvest was 46 bears (Schliebe et al. 2006, Branigan et al. 2006). The status of the SB population is designated as reduced (73 FR 28212, May 15, 2008; page 28217) and the predicted trend is declining (Aars et al. 2006).

Northern Beaufort Sea

The Northern Beaufort (NB) population of polar bears generally inhabits the eastern and northern Beaufort Sea in the Canadian region where sea ice converges on shorelines throughout most of the year. Population estimates based upon open population capture-recapture models indicate the current NB population is 980 (±155, 95 percent CI) and is not significantly different than earlier estimates for the periods of 745 (± 246, 95 percent CI) for 1972 to 1975, and 867 (±141, 95 percent CI) for 1985 to 1987 (Stirling et al 2007). This population of polar bears currently is considered stable, and the status is believed to not be reduced (73 FR 28212, May 15, 2008; page 28217).

Boundaries and population estimates of these three populations are of particular interest for U.S.–based activities and management considerations because there is potential overlap of bears in some areas. Stirling (2002) reviewed the ecology of polar bears and seals in the Canadian sector of the Beaufort Sea from 1970 to 2000, and recent analyses of the radio-telemetry data in the SB suggest some boundary realignments (Amstrup et al. 2004, Amstrup et al 2005). It is thought that nearly all bears in the central coastal region of the Beaufort Sea are from the SB population, and that proportional representation of SB bears decreases to both the west and east. For example, only 50 percent of polar bears occurring in Barrow, Alaska and Tuktoyaktuk, NWT are SB bears, with the remainder being from the CS and NB populations. Assignment of new boundaries may be suggested in the future that reflect improved understanding of the spatial and temporal use patterns of bears in the SB region (Amstrup et al. 2005). Presumably new population estimates would be derived for any new defined boundary areas, but the population estimates presented above (Aars et

al. 2006, Schliebe et al. 2006, Regehr et al. 2006) reflect the use of the previously-published boundaries for the SB stock of polar bears.

4. Environmental Baseline

The environmental baseline is the current status of listed species and their habitats, and the current status of critical habitat (if applicable), as a result of past and ongoing human and natural factors in the area of the proposed action. Also included in the environmental baseline are the anticipated impacts of other proposed Federal projects in the action area.

The polar bear is listed as a threatened species throughout its range. The total number of polar bears worldwide is estimated to be 20,000 to 25,000 bears (Schliebe et al. 2006). Abundance estimates for the Alaska subpopulations under consideration in this BO are approximately 1,500 bears in the SB population, approximately 2,000 bears in the CS population, with unknown, but presumably limited, amount of co-mingling from the NB population of about 980 animals.

The primary habitat of polar bears is sea ice, from which they hunt, feed, seek mates and breed, den, and rest when traveling long distances. Most polar bears remain on the sea ice year-round or spend only limited time on land. No polar bear critical habitat has been proposed for designation at this time.

Current threats to polar bears range-wide were described in the Status Review (Schliebe et al. 2006) and the final listing rule (73 FR 28212, May 15, 2008). Loss of sea ice habitat due to climate change was identified as the primary threat to polar bears range-wide. Other threats evaluated included hunting, oil and gas development, human-bear interactions, environmental contaminants, disease, and predation. Whereas loss of sea ice habitat is considered the principle threat to polar bears, each of the other threats could become more significant in the future in combination with effects of climate change (Schliebe et al. 2006). The documented or anticipated effect of each threat is described below.

Loss of Sea Ice and Climate Change

The final listing rule summarizes many of the observed changes in Arctic sea ice that are of particular importance to the status of polar bears including reductions in the extent of both summer and winter ice, length of the melt period, and reduction in sea ice thickness (73 FR 28212, May 15, 2008 pages 28219-28224). Recent years have seen record low September Arctic sea ice extent, and the shallow continental shelf waters of the Chukchi Sea experienced a rapid and complete retreat of sea ice during the summer of 2007 (National Snow and Ice Data Center 2007). The 4th Assessment Report of the IPCC (IPCC 2007; http://www.ipcc.ch/ipccreports/ar4-syr.htm) observed that decreases in snow and ice extent are consistent with climate warming, and that satellite data since 1978 show that annual average Arctic ice extent has shrunk by 2.7 percent (90 percent CI = 2.1 to 3.3 percent) per decade, with larger decreases in summer of 7.4 percent (90 percent CI = 5.0 to 9.8 percent) per decade.

Polar bear studies in the SB region began in 1967 and constitute the longest and most consistent dataset on polar bears. Regehr et al. (2007) reviewed recent survival and breeding of polar bears in the SB relative to sea ice conditions observed in 2001 though 2006. The SB population of polar bears occurs in the divergent ice ecoregions of the polar basin, where polar bears have historically remained on multiyear sea ice as it retreats toward the center of the polar basin during the summer (Amstrup 2003, Amstrup et al. 2007). Rates of decline in sea ice extent in this ecoregion have been among the highest in the Arctic (Meier et al. 2007). Declining sea ice extent and degrading ice in the SB have been associated with a shift toward more land-based denning and less denning in regions with higher rates of ice degradation (Fischbach et al. 2007), declines in cub survival (Regehr et al. 2006), and observations of drowned, emaciated, and cannibalized polar bears (Amstrup et al. 2006, Monnett and Gleason 2006, Stirling et al. 2008). Regehr et al. (2007) concluded that in 2002, the ice-free period over the continental shelf in the SB region was relatively short (mean 92 days) and survival of adults female polar bears was high (approximately 0.99, 90 percent CI = 0.10 to 1.0). In 2004 and 2005, the ice-free period was longer (mean 135 days) and survival of adult female polar bears was lower (approximately 0.77, 90 percent CI = 0.53 to 0.94). Breeding and cub-of-the-year litter survival also declined from high rates to lower rates in latter years of the study. Regehr et al. (2007) further concluded that although the precision of estimated vital rates was low, subsequent analysis (Hunter et al. 2007) indicated the declines in vital rates associated with longer ice-free periods have ramification for the probability of persistence of the SB population of polar bears. Further, the results by Regher et al. (2007) are relevant to over one-third of the world's polar bears that inhabit regions of the polar basin with sea ice dynamics similar to the SB and have already experienced more severe ice changes than the SB. Because Regehr et al.'s analysis of the SB population dynamics was short in duration relative to the life history of polar bears, continued monitoring is recommended to further elucidate the relationship between declining sea ice and polar bear population metrics.

Effects of sea ice loss on polar bear populations range wide have been considered by the Service based upon recent information. In 2007, a USGS science team released 9 reports (highlighted below) to the Service that included (1) new observational data on polar bears, including updated information on the current status of 3 of the world's 19 subpopulations of polar bears, and (2) projections of the future distribution and abundance of polar bears in the rest of the 21st century, given changes expected in future sea ice conditions. The reports are available at: http://www.usgs.gov/newsroom/special/polar_bears/.

The overall conclusion of the USGS research effort was that if projected changes in future sea ice conditions are realized, approximately two-thirds of the world's current polar bear population will be lost by the mid-21st century. Because the observed trajectory of Arctic sea ice decline appears to be underestimated by currently available models, this assessment of future polar bear status may be conservative (Amstrup et al. 2007).

Below are key USGS findings:

1. The range of the polar bear was divided into 4 ecoregions based on major differences in current and projected sea ice conditions (Amstrup et al. 2007). These ecoregions were the:
    - Seasonal Ice Ecoregion which includes Hudson Bay, and occurs mainly at the southern extreme of the polar bear range,

- Archipelagic Ecoregion of the Canadian Arctic,
- Polar Basin Divergent Ecoregion where ice is formed and then drawn away from near-shore areas, especially during the summer minimum ice season (it includes the southern Beaufort, Chukchi, East Siberian-Laptev, Kara, and Barents seas), and
- Polar Basin Convergent Ecoregion where sea ice formed elsewhere tends to collect against the shore.

Dividing the range of the polar bear into these 4 ecoregions allowed inferences from available knowledge about subpopulations in each ecoregion to the entire ecoregion.

2. Projections were made of future sea ice in each ecoregion, based on 10 general circulation models, chosen from among 20 available (DeWeaver 2007). These 10 models did the best job of simulating current ice conditions and thus could be expected to do the best job of simulating future ice conditions. Outputs for "business as usual" greenhouse gas forcing (known as the SRES-A1B scenario) were used for most analyses.

3. An important conclusion from a review of current knowledge about sea ice and sea ice modeling is that Arctic sea ice decline is likely underestimated by the available models (DeWeaver 2007).

4. Based on new findings from the Northern Beaufort subpopulation, polar bear subpopulations in the convergent ice ecoregion of the polar basin are likely currently stable; most available information about the status of populations living in the archipelagic ecoregion, suggests relative stability (Stirling et al. 2007).

5. For two subpopulations of polar bears, Western Hudson Bay in the seasonal sea ice ecoregion, and Southern Beaufort Sea in the divergent ecoregion, it is now possible to relate declines in the availability of sea ice to declines in metrics of population status (Rode et al. 2007, Regehr et al. 2006, Regehr et al. 2007, Obbard et al. 2007).

6. Knowledge of how polar bear population growth rates relate to specific changes in sea ice (e.g., length of the ice-free season) provides a mechanism for developing projections of future populations under different sea ice scenarios (Regehr et al. 2007).

7. Under a range of future sea ice scenarios for the 21st century and modeling approaches, the Southern Beaufort Sea subpopulation of polar bears is projected to decline severely by the end of the century, and in many scenarios, by mid-century (Amstrup et al. 2007).

8. Polar bears primarily use sea ice over the continental shelf. They also prefer ice that is greater than 50 percent in concentration. Taking these habitat features into account, USGS projected future polar bear habitat within the polar basin for the divergent and convergent ice ecoregions using the available sea ice models. USGS evaluated how availability of polar bear habitat in the polar basin has changed in recent years.

9. Optimal habitat in the polar basin (including both the divergent and convergent ice ecoregions) declined between the early (1985-1995) and latter decades (1996-2006) of the observational record of sea ice (based on passive microwave data). Most pronounced polar bear habitat loss in the past decade has occurred in peripheral seas of the Arctic Ocean - the Chukchi Sea and Barents/Greenland Seas (Amstrup et al. 2007).

10. Similarly, losses of polar bear habitat within the polar basin are projected to be greatest for the peripheral seas of the polar basin (e.g., the Chukchi Sea and Barents Sea) (Amstrup et al. 2007).

11. The largest reductions in habitat in the polar basin are predicted for spring and summer. Sea ice will reform each winter, but the large retreats of sea ice in summer may ultimately preclude bears from returning to onshore denning habitat. Low productivity of the polar basin appears to preclude bears from adapting a seasonal ice lifestyle here (Amstrup et al. 2007).

12. A 42 percent loss of optimal polar bear habitat during summer in the polar basin is predicted by mid century (Amstrup et al. 2007).

13. Due to unavailability of telemetry data showing habitats chosen by polar bears in the archipelagic and seasonal sea ice ecoregions, it is not possible to project habitat changes in these ecoregions for this analysis. Using a simple deterministic model of future carrying capacity for polar bears, it is forecast that polar bears could be extirpated in the divergent ice ecoregion within 75 years, assuming that sea ice decline follows the mean trajectory predicted by the 10 models used. If sea ice decline follows the minimum trajectory predicted, extirpation in this ecoregion could occur by year 45 (Amstrup et al. 2007).

15. Using the carrying capacity model, population declines of polar bears are projected in all other ecoregions at all time steps, with severity of decline dependent upon whether minimum, maximum, or mean ice projections were used. The only exception was a slight, temporary, increase in the polar basin convergent ice ecoregion for the 45 year timestep and the maximum ice scenario (Amstrup et al. 2007).

16. Based on a first-generation Bayesian Network model[1] incorporating a range of factors affecting polar bears, USGS forecasted extirpation of polar bear populations in the seasonal sea ice and the polar basin divergent ecoregions by 45 years from present (Amstrup et al. 2007).

17. Extirpation of polar bear populations in the polar basin convergent ecoregion is predicted by 75 years from present. In the archipelagic ecoregion, polar bears could

[1] Bayesian Network models represent a set of interacting variables that are linked by probabilities. They provide an efficient way to represent and summarize understanding of a system, and can combine empirical data and expert knowledge into the same modeling structure. They are also particularly useful in synthesizing large amounts of quantitative and qualitative information to answer "what if" kinds of questions.

occur through the end of the century, but in smaller numbers than now (Amstrup et al. 2007).

18. Sea ice conditions would have to be substantially better than even the most conservative general circulation model projections to result in qualitatively different outcomes for polar bears in any of the ecoregions (Amstrup et al. 2007).

The populations of polar bears under consideration in this BO, primarily the CS and SB stocks, inhabit the Polar Basin Divergent Ecoregion, an area documented to be undergoing the most dramatic and rapid reduction in seasonal sea ice, and accordingly are predicted to undergo the most rapid population declines.

Hunting

Prior to the 1950s most polar bear hunting was conducted by indigenous people for subsistence purposes. Population declines due to sport hunting became an increasing international concern during the 1950s and 1960s. In 1968, the IUCN/PBSG was formed and developed the *1973 International Agreement on the Conservation of Polar Bears,* which called for international management of polar bear populations based on sound conservation practices. It prohibits polar bear hunting except by local people using traditional methods, calls for protection of females and denning bears, and bans use of aircraft and large motorized vessels to hunt polar bears. The PBSG meets every 3 to 5 years to review all aspects of polar bears science and management, including harvest management. At present, concern exists for potential over-harvest of several populations of polar bears, including the CS populations (Schliebe et al. 2006).

Oil and Gas Development

Each of the Parties to the Agreement on the Conservation of Polar Bears has developed detailed regulations pertaining to the extraction of oil and gas within their countries. Most oil and gas activity within polar bear habitat is currently occurring in the U.S. (Alaska). Documented impacts on polar bears by the oil and gas industry in the U.S. during the past 30 years are minimal. Polar bears spend a limited amount of time on land, coming ashore to feed, den, or move to other areas. At times, fall storms deposit bears along the coastline where bears remain until the ice returns. For this reason, polar bears have mainly been encountered at or near most coastal and offshore production facilities, or along the roads and causeways that link these facilities to the mainland. During those periods, the likelihood of interactions between polar bears and industry activities increases. The Service's MMM has found that the polar bear interaction planning and training requirements set forth in the proposed Chuck chi Sea Regulations and required through the LOA process have increased polar bear awareness and minimized these encounters. LOA requirements have also increased the Service's knowledge of polar bear activity in the developed areas.

No lethal take associated with the oil and gas industry has occurred during the period covered by incidental take regulations in either the Chukchi or Beaufort Seas, 1991 through 1996 and 1993 to present, respectively. Prior to issuance of regulations, lethal takes by industry were rare. Since 1968, there have been two documented cases of lethal take of polar bears associated with oil and gas activities. In both instances, the lethal take was reported to be in defense of human life. In the winter of 1968–1969, an industry employee shot and killed a polar bear. In 1990, a female polar bear was killed at a drill site on the west side of Camden Bay. In contrast, 33 polar bears were

killed in the Canadian NWT from 1976 to 1986 due to encounters with industry. Since the beginning of the incidental take program, which includes measures that minimize impacts to the species, no polar bears are known to have been killed due to encounters associated with the current industry activities on the North Slope of Alaska.

Bear-Human Interactions

Polar bears come into conflict with humans partly because they will scavenge for food at sites of human habitation and also because they may occasionally prey or attempt to prey upon humans (Stirling 1988). "Problem bears" are most often sub-adults, because they are inexperienced hunters and have the most difficulty hunting, and because their feeding habits include more scavenging than adult bears (Stirling 1988). In the NWT, a preliminary study found that 36 of 44 "problem bears" killed between 1972 and 1999 were less than five years of age (Lunn et al. 2002). In the Canadian Beaufort Sea, 12 of the 16 "problem bears" killed from 1973 to 1983 whose ages were determined were 5 years of age or less, with an average age of 2.25 years (Stirling 1988). After sub-adults, females with cubs are the most likely type of bear to interact with humans, because females with cubs are likely to be thinner and hungrier than single adult bears and starving bears will risk death in an attempt to obtain food (Stirling 1988).

Adult male polar bears, unlike adult black or grizzly bears, are less likely to frequent areas of human habitation, presumably because adult male polar bears are usually in better physical condition than other sex or age classes (Stirling 1988). In the Beaufort Sea adult males were present for protracted periods of time near settlements feeding on bowhead whale remains during the fall period of 2002 to 2005 (Miller et al. 2006). The reason for the unusual presence of adult males near a North Slope village is unknown but suggests that these animals were attracted by the presence of the carcasses and may have been nutritionally stressed.

In Nunavut, Canada details from 618 polar bear defense of life and property (DLP) kills that occurred from 1970 to 2000 were analyzed (Dyck 2006). The study found that most bears killed were less than 6 years of age (73 percent), the majority of bears were males (71 percent), and most interactions occurred at Native hunting camps (74 percent). Sources of food were believed to be a contributing factor in many instances but other possible reasons were an increase in land use activities, or the number of camps, increased human populations in areas of high polar bear activity, increased polar bear population size, and climatic warming related to earlier departure from ice habitat to terrestrial habitats. The implementation of a DLP monitoring program in 1980 resulted in a decrease in the number of kills. Although recently increased levels of DLP have been reported (Dowsley 2005, Dyck 2006).

Some experts predict that the number of interactions and DLP kills will increase as climate change continues (Derocher et al. 2004). Amstrup (2000) observed that direct interactions between people and bears in Alaska have increased markedly in recent years, and that this trend is expected to continue. Schliebe et al. (2006) confirmed this observation with data from hunter-harvested polar bears in Alaska. The number of bears taken for safety reasons, based on three-year running averages, increased steadily from about 3 per year in 1993, to about 12 in 1998, and has averaged about 10 per year recently. There are several plausible explanations for this increase. First it could be an artifact of increased reporting by the hunters, or of an increased polar bear population and corresponding increased probability of interactions with humans. Alternatively or in combination,

polar bears from the SB and CS populations typically move from the pack ice to the near shore environment in the fall to take advantage of the higher productivity of ice seals over the continental shelf. In the 1980s and early 1990s the near shore environment would have been frozen by early or mid October, allowing polar bears to effectively access seals in the area. Since the late 1990s, the timing of ice formation in the fall has occurred later in November or early December, resulting in an increased amount of time that the area was not accessible to polar bears. Consequently, bears spent a greater amount of time on land and not feeding. The later formation of near-shore ice increases the probability of bear-human interactions occurring in coastal villages (Schliebe et al. 2006).

The increased use of coastal habitats by polar bears during the fall in recent years is further supported by data from aerial surveys along the coast and barrier islands from Barrow to the Canadian border and from information from local residents in coastal villages in northern and western Alaska. The number of bears using coastal habitats has been relatively stable in the most recent years possibly explaining why DLP kills have stabilized.

Environmental Contaminants

Three main types of contaminants in the Arctic are thought to present the greatest potential threat to polar bears and other marine mammals: petroleum hydrocarbons, persistent organic pollutants (POPS), and heavy metals.

Petroleum Hydrocarbons

Potential exposure of polar bears to petroleum hydrocarbons comes from direct contact and ingestion of crude oil and refined products from acute and chronic oil spills. Polar bear range overlaps with many active and planned oil and gas operations within 40 km (25 mi) of the coast or offshore (Schliebe et al. 2006). To date, no major oil spills have occurred in the Alaska marine environment within the range of polar bears.

Polar bears could come in contact with oil spilled in the marine or land environment, or by ingesting contaminated prey (Neff 1990). Polar bears groom themselves regularly as a means to maintain the insulating properties of their fur, so oil ingestion would also be likely during grooming behavior by a fouled bear (Neff 1990). Some direct information on oiled polar bears comes from an experimental study (St. Aubin 1990) in which two polar bears were involuntarily forced into a pool of oil for 15 minutes and then observed. The animals immediately attempted to clean the oil from their paws and forelegs by licking, and continued grooming trying to clean their fur for five days. After 26 days one bear died of liver and kidney failure and the other bear was euthanized at day 29. Gastrointestinal fungus-containing ulcers, degenerated kidney tubules, low-grade liver lesions, and depressed lymphoid activity were found during necropsy (St. Aubin 1990). Other effects included loss of hair (Derocher and Stirling 1991), anemia, anorexia, and stress (St. Aubin 1990).

Additionally, polar bears are curious and are likely to investigate oil spills and oil contaminated wildlife. Although it is not known whether healthy polar bears in their natural environment would avoid oil spills and contaminated seals, bears that are hungry are likely to scavenge contaminated seals, as they have shown no aversion to eating and ingesting oil (St. Aubin 1990, Derocher and Stirling 1991).

Due to the seasonal distribution of polar bears, the times of greatest impact from an oil spill are summer and autumn (Amstrup et al. 2000a). This is important because distributions of polar bears are not uniform through time. In fact, near-shore densities of polar bears are two to five times greater in autumn than in summer (Durner et al. 2000), and polar bear use of coastal areas during the fall open water period has increased in recent years in the Beaufort Sea. Though there is a low probability that a large number of bears (i.e., 25 to 60) might be affected by a large oil spill, the impact of a large spill, particularly during the broken ice period, could be significant to the polar bear population (71 FR 43926, USFWS 2006). The number of polar bears affected by an oil spill could be substantially higher if the spill spread to areas of seasonal polar bear concentrations, such as the area near Kaktovik, in the fall, and could have a significant impact to the SB polar bear population.

Industrial development in polar bear habitat may also expose individuals to other hazardous substances through improper storage or spills. For example, one polar bear died in Alaska from consuming ethylene glycol in 1988 (Amstrup et al. 1989).

Contamination of the Arctic and sub-Arctic regions through long-range transport of pollutants has been recognized for over 30 years (Bowes and Jonkel 1975, deMarch et al. 1998, Proshutinsky and Johnson 2001, MacDonald et al. 2003, Lie et al. 2003). The Arctic ecosystem is particularly sensitive to environmental contamination due to the slower rate of breakdown of POPs, including organochlorine compounds (OCs), relatively simple food chains, and the presence of long-lived organisms with low rates of reproduction and high lipid levels. The persistence and lipophilic nature of organochlorines increase the potential for bioaccumulation and biomagnification at higher trophic levels (Fisk et al. 2001). The highest concentrations of OCs have been found in species at the top of the marine food chains such as glaucous gulls which scavenge on marine mammals and polar bears which feed primarily on seals (Braune et al. 2005). Consistent patterns between OC and mercury contamination and trophic status have been documented in Arctic marine food webs (Braune et al. 2005). The southern Beaufort Sea polar bear populations may have concentrations of mercury close to the biological threshold levels of 60 micrograms wet weight reported for marine mammals (AMAP 2005).

Contaminant concentrations in most polar bear populations are presently not thought to have population level effects. However, contaminant exposure in combination with other factors, such as loss of sea ice habitat and decreased prey availability, which have the potential to influence the recruitment or survival rates, could ultimately have population-level effects.

Increases in Arctic oil and gas development and trans-Arctic shipping will increase the probability of an oil spill and release of contaminants. The Service believes a marine oil spill would cause polar bear mortality, and may result in population-level effects.

Disease

Except for the presence of *Trichinella* larvae, the occurrence of diseases and parasites in polar bears is relatively rare compared to other bears. Polar bears feed primarily on fat which is relatively free of parasites, except for *Trichinella* (Rogers and Rogers 1976, Forbes 2000). It is unknown whether polar bears are more susceptible to new pathogens due to their lack of previous

exposure to diseases and parasites. Many different pathogens and viruses have been found in seal species that are polar bear prey (Duignan et al. 1997, Measures and Olson 1999, Dubey et al. 2003, Hughes-Hanks et al. 2005), so the potential exists for transmission of these diseases to polar bears. As polar bears become more stressed they may eat more of the intestines and internal organs than they do presently, thus increasing their potential exposure to parasites and viruses (Derocher et al. 2004, Amstrup et al. 2006).

Predation

Polar bears have no predators but man and other polar bears (see Hunting, above). Intraspecific killing has been reported among all North American bear species. Reasons for intraspecific predation in bears species is poorly understood but thought to include population regulation, nutrition, and enhanced breeding opportunities in the case of predation of cubs. Although infanticide by male polar bears has been well documented (Hannsson and Thomassen 1983, Larsen 1985, Taylor et al. 1985, Derocher and Wiig 1999), it is thought that this activity does not account for large percentage of the cub mortality. A potential reason for infanticide relates to density dependent mechanisms of population control as this behavior seems to occur more frequently with increasing population size (Derocher and Wiig 1999).

Cannibalism has been recently documented in polar bears (Derocher and Wiig 1999, Amstrup et al. 2006). Amstrup et al. (2006) observed three instances of intraspecific predation and cannibalism in the southern Beaufort Sea during the spring of 2004. The first was the first documented predation of an adult female in a den, the second was of a female and newly emerged cub from a den, and the third involved a yearling male. In a combined 58 years of research by the senior investigators similar observations had not taken place. Active stalking or hunting preceded the attacks and the killed bears were eaten. Adult males were believed to be the predator in the attacks. Amstrup et al. (2006) indicated that in general a greater portion of polar bears in the area where the predation occurred were in poor physical condition compared to other years. The authors hypothesized that adult males may be the first to show the effects of nutritional stress caused by significant ice retreat in this area (Skinner et al. 1998, Comiso and Parkinson 2004, Stroeve et al. 2005) because they feed less during the spring mating season and enter the summer in poorer condition than other sex/age classes. Derocher and Wiig (1999) documented a similar intraspecific killing and consumption of another polar bear in Svalbard, Norway, which was attributed to relatively high population densities and food shortages. Taylor et al. (1985) documented that a malnourished female killed and consumed her own cubs, and Lunn and Stenhouse (1985) found an emaciated male consuming an adult female polar bear. The potential importance of cannibalism and infanticide for population regulation is unknown. Given our current knowledge of disease and predation, we do not believe that these factors currently are having population level effects. However, increased cannibalism in polar bears was postulated and thought to be a result of nutritional stress brought on by climate change (Derocher et al. 2004).

5. Effects of the Action on the Species

The effects analysis for the proposed Regulations focused on whether the incidental take permitted in the Regulations, as proposed, is likely to jeopardize the continued existence of polar bears or is likely to adversely modify critical habitat. Because the proposed Regulations are addressing take

of polar bears incidental to Industrial activities associated with oil and gas industrial exploration activities in the Chukchi Sea, the effects analysis is organized around the potential effects of those activities. Whereas the proposed Regulations would permit some non-lethal incidental take of polar bears, the Regulations would require mitigation measures designed to avoid or minimize foreseeable adverse effects of Industry exploration activities on polar bears, and require monitoring to document the effectiveness of these measures as well as document incidental take of polar bears. Therefore, the proposed Regulations would also have direct benefits to polar bears, as well as provide a means for obtaining information useful for future management of polar bears in the Chukchi Sea.

In general, polar bears are likely to have a limited presence during Industry marine exploration operations because they tend to move to the northwestern portion of the Chukchi Sea during the open-water season. This physical separation at that time of year greatly limits the chances of direct impacts on polar bears from Industry marine exploration activities. However, polar bears have been occasionally documented in open-water, miles from the ice edge or ice floes. Therefore, a limited number of polar bears may encounter Industry exploration activities in the Chukchi Sea. No lethal take is anticipated; only non-lethal incidental take is under consideration.

Potential direct and indirect effects of Industry exploration activities on polar bears are described below and include: noise from seismic activity; disturbance from vessels and aircrafts; disturbance from offshore and onshore exploratory drilling; disturbance from human activity, oil and fuel spills, and some limited impacts on the physical environment. In some cases, the Service has information about the response of polar bears to similar activities. This polar bear response information is relevant because it was largely obtained from the monitoring programs in place under previous or existing ITRs in the Chukchi and Beaufort Seas.

Noise from Seismic Activity

Little information is available about the effects of noise on polar bears, nor the potential for seismic survey sounds to cause auditory impairment or other physical effects in polar bears. Between September 2and October 3 2006, four polar bears were sighted during three oil and gas seismic surveys (but no bears were observed from active seismic vessels); three of the four bears were observed walking on ice, and one animal was observed swimming; two of the four reacted to the vessel by distancing itself from the vessel.

Five polar bear observations (11 individuals) were recorded during the University of Texas at Austin's marine geophysical survey performed by the U.S. Coast Guard (USCG) Cutter *Healy* in 2006. This survey was located in the northern Chukchi Sea and Arctic Ocean. All bears were observed on the ice between July 21 and August 19. No polar bears were in the water where they could have been subject to appreciable noise levels from operating airguns. The closest point of approach distances of bears from the *Healy* ranged from 780 m to 2.5 km (0.48 mi to 1.6 mi). One bear was observed approximately 575 m (0.36 mi) from a helicopter conducting ice reconnaissance. Four of the groups exhibited possible reactions to the helicopter or vessel, suggesting that disturbances from seismic operations can be short-term and limited to minor changes in behavior.

Polar bears are curious and tend to investigate novel sights, smells, and possibly noises. Noise produced by seismic activities could elicit several different responses in polar bears. Noise may act

as a deterrent to bears entering the area of operation, or the noise could potentially attract curious bears. Available data suggest that such effects, if they occur at all, would be limited to short distances and probably to projects involving large airgun arrays. There is no evidence that airgun pulses can cause serious injury, or death, even in the case of large airgun arrays. Marine mammals that show behavioral avoidance of seismic vessels are especially unlikely to incur auditory impairment or other physical effects. Polar bears normally swim with their heads above the surface, where underwater noises are weak or undetectable. Furthermore, inclusion of the mitigation measures described as part of the proposed action (see "2. Description of the Proposed Action"), such as power-down or shut-down of airguns if bears enter the 190 db ensonification zone, reduces the likelihood that adverse effects might occur. Therefore, the Service concludes that it is unlikely that any single bear would be exposed to strong underwater seismic sounds long enough for significant disturbance to develop.

Disturbance from Vessels/Aircraft

Ships and ice breakers may act as physical obstructions, altering or intercepting bear movements in the spring during the start-up period for exploration if they transit through a restricted lead system, such as the Chukchi Polynya. Polynyas are important habitat for marine mammals, which makes them important hunting areas for polar bears. A similar situation could occur in the fall when the pack ice begins to expand. Noise, sights and smells produced by exploration activities may repel or attract bears, either disrupting their natural behavior or endangering them by threatening the safety of seismic personnel.

Polar bears are known to run from sources of noise and the sight of vessels or icebreakers and aircraft, especially helicopters. The effects of fleeing from aircraft may be minimal if the event is short and the animal is otherwise unstressed. Likewise, fleeing from a working icebreaker may have minimal effects for a healthy animal on a cool day. However, on a warm spring or summer day, a short run may be enough to overheat a well insulated polar bear.

Seismic activities avoid ice floes and the pack ice edge; however, they may contact bears in open water. Polar bears spend the majority of their time on pack ice during the open-water season in the Chukchi Sea, this limits the chance of impacts from human and industry activities. Consequently, it is unlikely that seismic exploration activities would result in more than temporary behavioral disturbance to polar bears.

However, with the amount of ice cover changing rapidly due to climate change, more bears may encounter Industry activities being conducted in open water. Researchers have observed that in some cases bears swim long distances during the open water period seeking either ice or land and may become vulnerable to exhaustion and storms with large waves because ice floes are dissipating and unavailable or unsuitable for use as haul outs or resting platforms. In the fall of 2004, four drowned polar bears were observed in the Beaufort Sea during a MMS coastal aerial survey program (Monnett and Gleason 2006).

Vessel traffic could result in short-term behavioral disturbance to polar bears. If a ship is surrounded by ice it is more likely that curious bears will approach. Any on-ice activities required by exploration activities create the opportunity for bear-human interactions. In relatively ice-free waters, polar bears are less likely to approach ships, although they may be encountered on ice floes.

For example, during the late 1980s, at the Belcher exploration drilling site, in the Beaufort Sea, in a period of little ice, a large floe threatened the drill rig at the site. After the floe was moved by an icebreaker, workers noticed a female bear with a cub-of-the-year and a lone adult swimming nearby. It was assumed these bears had been disturbed from the ice floe.

Routine aircraft traffic should have little to no effect on polar bears; however, extensive or repeated overflights of fixed-wing aircraft for monitoring purposes or helicopters used for re-supply of Industry operations could disturb polar bears. Behavioral reactions of non-denning polar bears should be limited to short-term changes in behavior and would have no long-term impact on individuals and no impacts on the polar bear population. In contrast, denning bears may abandon or depart their dens early in response to repeated noise such as that produced by extensive aircraft overflights.

The mitigation measures described as part of the proposed action (see "2. Description of the Proposed Action"), specify that routine, non-emergency, operation of vessels and aircraft occur in a manner that minimizes to the greatest extent possible adverse impacts on polar bears and their habitat. In brief, these measures require onboard marine-mammal observers to alert vessels to the presence of polar bears, that vessels remain at least ½ mile from polar bears observed on land or ice, and that aircraft activities should be conducted at maximum distance possible and with minimum flight elevations from polar bears on ice or land or dens. Adoption of such mitigation measures will reduce the likelihood that polar bears are disturbed by vessels or aircraft.

Disturbance from Offshore/Onshore Drilling and other Human Activity

Onshore activities have the potential to affect polar bears particularly during fall and ice-covered season when bears come ashore to feed, den, or travel. Noise produced by Industry activities during open-water and ice-covered seasons could potentially disturb polar bears at onshore activities. During the ice-covered season, denning female bears, as well as mobile, non-denning bears, could be exposed to oil and gas activities, such as seismic exploration or exploratory drilling facilities, and potentially affected in different ways.

Some information is available from monitoring polar bears during previous offshore drilling operations. In 1990, in conjunction with the Shell Western E&P, Inc. walrus monitoring program, a total of 25 polar bears were observed on the pack ice between June 29, and August 11, 1990. Seventeen bears were encountered by the support vessel, *Robert LeMeur*, during an ice reconnaissance survey before drilling began at the prospects. During drilling operations, four bears were observed near (<9 km or 5 nautical mi) active prospects, and the remainder were considerably beyond (15 to 40 km or 8 to 22 nautical mi). These bears responded to the drilling or icebreaking operations by approaching (two bears), watching (nine bears), slowly moving away (seven bears), or ignoring (five bears) the activities; response was not evaluated for two bears. The period of exposure to the operations was generally short because precautions were taken to minimize disturbances, including adjusting cruise courses away from bears. Similar precautions were followed in 1989 when 18 bears were sighted in the pack ice during the monitoring program. The results of the 1990 monitoring program concluded that: (1) polar bear distributions were closely linked to the pack ice; (2) the pack ice was near the active prospects for a relatively brief time; and (3) the ice passing near active prospects contained relatively few animals.

Noise disturbance can originate from stationary or mobile sources. Noise produced by stationary Industry activities could elicit several different responses in polar bears. The noise may act as a deterrent to bears entering the area or potentially attract bears. Attracting bears to these facilities, especially exploration facilities in the coastal or nearshore environment, could result in human–bear encounters, which could result in unintentional harassment, lethal take, or intentional hazing (under separate authorization) of the bear.

During the ice-covered season, noise and vibration from exploratory drilling facilities may deter females from denning in the surrounding area, even though polar bears have been known to den near industrial activities without any observed impact to the polar bears. For example, in 1991 two maternity dens were located on the south shore of a barrier island within 2.8 km (1.7 mi) of a production facility. During the ice-covered seasons of 2000-2001 and 2001-2002active dens were located within approximately 0.4 km and 0.8 km (0.25 mi and 0.5 mi) of remediation activities on Flaxman Island in the Beaufort Sea with no observed impact to the polar bears.

In other cases, polar bears may have abandoned dens as a result of human disturbance. For example, in January 1985, a female polar bear may have abandoned her den due to rolligon traffic, which occurred between 250 m and 500 m (820 ft and 1,640 ft) from the den site. Researcher disturbance created by nearby camp and associated noise, which occurred during a den emergence study in 2002 on the North Slope, may have caused a female bear and her cub(s) to abandon their den and move to the ice sooner than necessary. The female was observed later without the cub(s). Available information indicates such events have been infrequent and isolated.

In addition, polar bears exposed to routine industrial noises may acclimate to those noises and show less vigilance than bears not exposed to such stimuli. This implication came from a study that occurred in conjunction with industrial activities performed on Flaxman Island in 2002 and a study of undisturbed dens in 2002 and 2003 (n = 8). Researchers assessed vigilant behavior with two potential measures of disturbance: (1) proportion of time scanning their surroundings and (2) the frequency of observable vigilant behaviors. Bears exposed to industrial activity spent less time scanning their surroundings than bears in undisturbed areas and engaged in vigilant behavior significantly less often.

In 2007, at the Intrepid exploration site, located on the Chukchi Sea coast south of Barrow, a female bear and her cub were observed approximately 100 meters from a pad. The bear did not appear concerned about the activity and after being observed by a bear monitor the female changed her direction of movement and left the area. This is another example of a polar bear showing minimal behavior change due to an interaction with Industry and it is similar to encounters between polar bears and Industry that have been documented in the Beaufort Sea.

Additional information exists on Industry and polar bear encounters in the Beaufort Sea. Documented impacts on polar bears by the oil and gas industry in the Beaufort Sea during the past 30 years are minimal. Polar bears spend time on land, coming ashore to feed, den, or move to other areas. Recent observations suggest that bears are increasing time on land, perhaps in response to changing ice conditions. Annual monitoring reports from Industry activities and community observations indicate that fall storms force bears to concentrate along the coastline where bears remain until the ice returns. For this reason, polar bears have been encountered at or near most

coastal and offshore production facilities, or along roads and causeways that link these facilities to the mainland. During those periods, the likelihood of interactions between polar bears and Industry activities increases. Most bears are observed within 1.6 km (1.0 mi) of the coastline. Similarly, we expect intermittent periods with high concentrations of bears in the coastal habitat to occur along the Chukchi Sea coastline where Industry activity is operating.

The majority of actual impacts on polar bears in the Beaufort Sea have resulted from direct human–bear encounters. Monitoring efforts by Industry required under Beaufort Sea regulations for the incidental take of polar bears resulted in the documentation of various types of interactions between polar bears and Industry. A total of 269 LOAs have been issued for incidental (unintentional) take of polar bears in regard to oil and gas activities from 1993 to 2005; approximately 76 percent were for exploration activities.

In 2004, the most recent year in which records are complete, the oil and gas industry reported 89 polar bear sightings involving 113 individual bears. Polar bears were more frequently sighted from August to January. Seventy-four sightings were of single bears and 15 sightings consisted of family groups. Offshore oil facilities, Northstar and Endicott, accounted for 63 percent of all polar bear sightings, 42 percent and 21 percent, respectively. This shows that Industry activities that occur on or near the Beaufort Sea coast have a greater possibility for encountering polar bears than Industry activities occurring inland. Fifty-nine percent (n = 53) of polar bear sightings consisted of observations of polar bears traveling through or resting near the monitored areas without a perceived reaction to human presence. Forty-one percent (n = 36) of polar bear sightings involved Level B harassment, where bears were deterred from industrial areas with no injury.

The Service expects similar trends in the Chukchi Sea. These include: a higher frequency of polar bears observed on land during fall and early winter months; single bears seen more frequently than family groups; and a higher percentage of bears observed passing through Industry areas than the percentage of bears involved in interactions.

Noise and vibrations produced by vibroseis activities during the ice-covered season could potentially result in impacts on polar bears. During this time of year, denning female bears as well as mobile, non-denning bears could be exposed to and affected differently by potential impacts from seismic activities. The best available scientific information indicates that female polar bears entering dens, or females in dens with cubs, are more sensitive than other age and sex groups to noises. Standardized mitigation measures will be implemented to limit or minimize disturbance to denning females. These Industry mitigation measures are currently in place and are implemented when necessary through LOAs in the Beaufort Sea.

Adoption of the following measures that are required by the proposed Regulations, will reduce potential impacts from drilling and human-induced disturbance: (1) development of a polar bear interaction plan; (2) maintenance of a 1.6-km (1.0-mi) buffer between industry activities and known denning sites to limit disturbance to the bear; (3) avoidance of work in known denning habitat until bears have left their dens; (4) conducting research to enable accurate detection of active polar bear dens through the use of FLIR imagery; (4) use of FLIR technology, coupled with trained dogs, to locate or verify occupied polar bear dens; (5) conducting research that evaluates transmission of noise and vibration through the ground, snow, ice, and air and the received levels

of noise and vibration in polar bear dens. Furthermore, as part of the LOA application for seismic surveys during denning season, Industry provides the proposed seismic survey routes. To minimize the likelihood of disturbance to denning females, the Service evaluates these routes along with information about known polar bear dens, historic denning sites, and delineated denning habitat.

Human encounters can be dangerous for both the polar bear and the human. These can occur during an onshore vibroseis program or at a drilling facility. Whenever humans work in the habitat of the animal, there is a chance of an encounter, even though, historically, such encounters have been uncommon in association with Industry. Depending upon the circumstances, bears can be either repelled from or attracted to sounds, smells, or sights associated with onshore Industry activities. Adoption of mitigation measures to reduce these encounters include: (1) use of bear monitors, motion and infrared detection systems; (2) use of safety gates and fences; (3) development of a polar bear interaction plan for each operation that outlines steps the applicant will take, such as garbage disposal and snow management procedures; (4) outline the chain of command for responding to a polar bear sighting; (5) requirement that personnel participate in polar bear interaction training.

Prior to issuance of regulations, lethal takes by Industry were rare. Since 1968, there have been only two documented cases of lethal take of polar bears associated with oil and gas activities. In both instances, the lethal take was reported to be in defense of human life. In winter 1968–1969, an Industry employee shot and killed a polar bear. In 1990, a female polar bear was killed at an exploratory drill site on the west side of Camden Bay. In contrast, 33 polar bears were killed in the Canadian NWT from 1976 to 1986 due to encounters with Industry. Since the beginning of the U.S. incidental take program, which includes measures that minimize impacts to the species, no polar bears have been killed due to encounters associated with Industry activities on the North Slope. For this reason, Industry has requested that these regulations cover only non-lethal, incidental take. Based upon the demonstrated effectiveness of the mitigation measures put in place by these Regulations, the Service anticipates that Industry exploration activities will result in non-lethal disturbance of polar bears

In summary, inclusion of the above mitigation requirements, as well as other measures described that may be required in individual LOAs, the Service concludes in the Regulations that only small numbers of polar bears would be potentially taken by harassment (as defined by the MMPA) from drilling and human-induced disturbance.

Oil and Fuel Spills

There is the potential for polar bears to be affected by Industry activities through refined product discharge and oil spills. Spills are unintentional releases of oil or petroleum products and it is not legal to discharge oil into the environment. However, accidental spills of oil and refined products may occur in association with Industry exploration activities, so their potential occurrence and impacts to polar bears are described. MMS describes the history of oil spills associated with the oil and gas industry in Northern Alaska (OCS EIS/EA MMS 2007-026, http://www.mms.gov/alaska/ref/EIS%20EA/Chukchi_FEIS_193/feis_193.htm).

A reporting system requires operators to report spills in accordance with the National Pollutant Discharge Elimination System Permit Program, and all North Slope oil companies must prepared and submit an oil spill contingency plan. According to MMS, 35 exploratory wells have been drilled on the Beaufort and Chukchi OCS, during which 35 small spills occurred totaling 26.7 barrels (1,120 gallons), of which approximately 24 barrels were recovered or cleaned up. By Industry standards, small spills are <50 barrels while large spills are ≥500 barrels. There is potential for refined product spills from marine vessels during exploration activities and the industry history indicates the likelihood is most will be localized and relatively small. Spills in the offshore or onshore environments classified as minor could occur during normal operations (e.g., transfer of fuel, handling of lubricants and liquid products, and general maintenance of equipment).

The more serious potential oil spill in exploratory activities is a blowout, an uncontrolled release of oil or gas from an exploratory well. To date, no major exploratory offshore oil spills have occurred on the North Slope in either the Beaufort or Chukchi Seas. Blowout prevention technology and well control procedures are designed to minimize risk of a blowout, and such prevention technology will be required for all exploratory drilling operations in the Chukchi Sea by the permitting agencies, therefore the MMS considers the likelihood of a blowout occurring during exploratory drilling in the Chukchi Sea as negligible (OCS EIS/EA MMS 2007-026, http://www.mms.gov/alaska/ref/EIS%20EA/Chukchi_FEIS_193/feis_193.htm).

Larger spills associated with Alaskan oil and gas activities on the North Slope have been production–related, and have occurred at production facility or pipeline connecting wells to the Trans-Alaska Pipeline System, but such activities are not covered by the proposed regulations. During the history of Industry operation activities on the North Slope (1985-2006), six large terrestrial spills occurred that posed minimal risk to polar bears (USFWS 2008).

Based upon the reported effects of crude oil exposure on polar bears (*Section 4. Environmental Baseline - Environmental Contaminants*), the Service believes an oil spill or refined product discharge contacting a polar bear probably would result in its death. However, few polar bears are likely to be in close proximity of exploratory activities when they are occurring (because the species generally moves to the northwestern portion of the Chukchi Sea during the open-water season, and the spatial separation between bears and vessels required by the Regulations during exploration activities).

Because of the limited nature of the activities covered by these Regulations (i.e., exploration only), the existing Federal and State requirements for oil spill prevention and clean-up plans, the use of technologies such as blow-out prevention to prevent and/or minimize the effects of a spill, and the historical evidence indicating that most spills, when they do occur, are small size and located in terrestrial environments, the Service concludes that any impacts associated with oil or refined product spills are likely to be limited to a small number of polar bears.

Impacts on the Physical Environment

The proposed project area is limited to the Chukchi Sea. The proposed activities would: (1) use acoustic energy to study the substrate; (2) allow offshore drilling activities with stipulations that require plugging and capping of drill holes and recontouring the drill site as much as practicable; (3) onshore drilling, which could result in construction of ice pads, roads, and islands; and (4)

vessels, ice breakers, and land transportation vehicles. A thorough discussion of impacts on the physical environment is found in the Chukchi Sea EIS (http://www.mms.gov/alaska/ref/EIS%20EA/Chukchi_feis_Sale193/feis_193.htm).

Once an Industry project has been permitted by the responsible agency, the Service will evaluate the project in regards to polar bears through a requested incidental take authorization, i.e., the LOA process provided by these regulations. With inclusion of all appropriate mitigation measures, plus any other measures incorporated into an LOA, the Service has determined that the proposed action would result in no measurable impacts of the physical environment.

Interdependent and Interrelated Actions

Interdependent actions are defined as actions having no independent utility apart for the proposed action, while interrelated actions are defined as actions that are part of a larger action and depend upon the larger action for their justification (50 CFR §402.02). The Service has not identified any activities that are interdependent or interrelated with the proposed Regulations.

6. Cumulative Effects

Under the ESA, cumulative effects are the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation under the ESA. Analysis of the following threats was provided in Schliebe et al. (2006), and the Final EA Chukchi Sea Incidental Take Regulations (USFWS March 2008).

Subsistence Harvest

The most significant source of polar bear mortality is man. Before MMPA was enacted in 1972, polar bears were taken by sport hunters and residents. Between 1925 and 1972, the mean reported harvest in Alaska was 186 bears per year. Seventy-five percent of these were males, as cubs and females with cubs were protected. Since 1972, only Alaska Natives from coastal Alaskan villages have been allowed to hunt polar bears for their subsistence uses or for handicraft and clothing items for sale. The Native hunt occurs without restrictions on sex, age, or number provided that the population is not determined to be depleted. From 1980 to 2005, the total annual harvest for Alaska averaged 101 bears: 64 percent from the Chukchi Sea and 36 percent from the Beaufort Sea. Other sources of mortality related to human activities include bears killed during research activities, euthanasia of sick and or injured bears, and defense of life kills by non-Natives (Brower et al. 2002). A management concern is the possible inadvertent over-harvest of the Chukchi or Southern Beaufort Sea stocks particularly if they become increasingly nutritionally-stressed or populations decline due to the combination of the threats due to loss of sea ice, increased atmospheric and oceanic transport of contaminants into the region, increases in both expanse and duration of open water in summer and fall; human activities, including hydrocarbon exploration and development within the near-shore environment.

Marine Vessel Traffic

Polar bears spend the majority of their time on pack ice during the open-water season, which limits their interaction with fishing vessels and barge traffic. However, polar bears are known to run from

sources of noise and the sight of vessels. The effects of fleeing may be minimal if the event is short and the animal is otherwise unstressed, but a short run on a warm spring or summer day could overheat a polar bear. If predictions for the decrease in the temporal and seasonal extent of the sea ice are realized, more vessels may transit the area encountering polar bears more frequently. Researchers have observed bears may swim long distances during the open water period seeking either ice or land. With diminished ice, swimming bears may become vulnerable to exhaustion and storms because ice floes are dissipating and unavailable or unsuitable for use as haul outs or resting platforms.

As discussed in the section above entitled "Results of Previous Polar Bear Monitoring Studies," observation of polar bear reactions to industry or military vessels indicates polar bear reactions tend to be short-term and limited to minor changes in behavior.

Summary of Cumulative Effects

Hunting pressure, loss of sea ice and climate change (see 4. Environmental Baseline), and the expansion of commercial activities into polar bear habitat have potential to impact polar bears. Combined, these factors could present significant challenges to future conservation and management efforts. The success of future management efforts will rely in part on continued investments in research investigating population status and trends and habitat use patterns. The effectiveness of various mitigation measures and management actions will need to be continually evaluated through monitoring programs.

7. Conclusion

Service Findings under ESA

After reviewing the current status of the polar bear; the environmental baseline for the Chukchi Sea Regulations action area; the effects of the proposed Regulations; documented impacts of Industry activities on the species; data provided by monitoring programs in the Beaufort Sea (1993–2006) and the Chukchi Sea (1991–1996); and the cumulative effects; it is the Service's biological opinion that the Regulations, as proposed, are not likely to jeopardize the continued existence of the polar bear. Critical habitat has not been designated or proposed for the polar bear; therefore none will be destroyed or adversely modified.

Regulations (50 CFR part 402) that implement section 7(a)(2) of the ESA define "jeopardize the continued existence of" as to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. For the issuance of incidental take regulations under the MMPA, the Service must (1) find, based on the best scientific evidence available, that the total take for the specified time period will have a negligible impact (i.e., an impact 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) on the species or stock and will not have an unmitigable adverse impact on the availability of the species or stock for subsistence uses; (2) prescribe regulations setting forth permissible methods of taking and other means of effecting the least practicable adverse impact on the species and its habitat and on the availability of the species for subsistence uses, and (3) prescribe regulations

pertaining to the monitoring and reporting of such taking (50 CFR 18.27(b)). In making such determinations, the Service must consider information regarding the effects of the activity on the species as described in implementing regulations for section 101(a)(5) of the MMPA (50 CFR 18.27(d)) as well as conduct a NEPA analysis that results in a similar evaluation to that required for making the "jeopardy/no jeopardy" call under section 7 of the ESA.

While there is significant overlap in the information and evaluation required to make the jeopardy and negligible impact determinations, there may be significant differences in (1) the portion of the species' population evaluated (i.e., the listed entity versus the effected stock(s), respectively) and (2) the threshold of the effects that trigger a negative determination (i.e., the action will jeopardize the species, or the action has more than a negligible effect). With regard to the polar bear, the portion of the population evaluated for a jeopardy determination is the range-wide population as the species is listed in its entirety. For the negligible impact determination, however, only those stocks which are potentially affected by the Regulations are evaluated (i.e., Chukchi and Southern Beaufort Sea stocks). Further, the thresholds of the effects of impacts being evaluated are significantly different, essentially the difference between not adversely affecting a species or stock versus jeopardizing the continued existence of the species. It is reasonable to expect that a proposed action being independently evaluated under the MMPA and the ESA would be determined to have more than a negligible impact before, and in some cases well before, a jeopardy determination would be made.

Although Industry activities may adversely affect a small number of polar bears within the action area, mitigating measures included in the proposed action reduce the potential for exposure to adverse effects through temporal and spatial separation between polar bears and Industry activities, and reduce potential adverse effects in cases of unavoidable interactions (e.g., curious bears drawn to the activity) and unintentional consequences of the activities (e.g., oil spills). In addition to these mitigating measures proposed by Industry, other project specific mitigating measures may be required through the issuance of an LOA under the Regulations. The Regulations, while allowing a "small number" of animals to be incidentally taken by harassment, provide a mechanism requiring that mitigating measures are implemented, monitored, and reported on annually. Thus the Regulations contribute to the collection of additional information that will aid in developing and/or further refining mitigating measures for future Industry activities.

Based on the above evaluation and the fact that (1) the Regulations do not authorized lethal take, (2) the Chukchi Sea Regulations will be implemented in a similar manner to the Beaufort Sea Regulations, which have been in place almost continuously since 1993, and (3) few bears are likely to be encountered, and those that are encountered are likely to alter their behavior only temporarily if at all, the Service believes that the promulgation of the proposed Chukchi Sea Incidental Take Regulations under the MMPA will not appreciably reduce the likelihood of survival and recovery of the polar bear, and therefore is not likely to jeopardize their continued existence.

8. Administration of the Programmatic Biological Opinion

This BO is structured in a "programmatic," tiered approach, with this document serving as Tier 1. The Tier 1 BO does the following:

- Evaluates the issuance of the Chukchi Sea Incidental Take Regulations per requirements under section 7 of the ESA and its implementing regulations (50 CFR 402);
- Clarifies the regulatory dependence upon the take analysis required under the MMPA for ESA incidental take evaluation;
- Concludes that the proposed action will not jeopardize the continued existence of the species; and
- Provides the process for conducting Tier 2 consultation (below and Appendix 3).

The Tier 1 BO relies on the negligible impacts and small numbers analysis (see explanation below) in the Incidental Take Regulations to evaluate the projected level of take. Because project-specific information is not known until a request for an LOA is made under the Regulations, the Service defers authorizing incidental take until such requests are made (i.e., Tier 2).

Tier 2 of this programmatic consultation is triggered when Industry requests an LOA from MMM. The request for the LOA will also serve as a request for Tier 2 consultation. A separate Tier 2 consultation will be required for each LOA requested under the Regulations. To track the take projections in the Regulations and in order for the Tier 2 BO to be consistent with the "no jeopardy" conclusion of the Tier 1 BO and an incidental take statement to be issued: (1) the proposed activity must incorporate applicable Industry minimization measures, as described in the proposed activity descriptions of both the Regulations and the Tier 1 BO, (2) the LOA must include any additional minimization measures that the MMM believes appropriate for the specific activity and location, and (3) the MMM must determine that the incidental take for the specific activity will be consistent with the negligible impact finding for the total take allowed under the Regulations.

Upon receipt of the request MMM will:

- Determine whether the request falls within the parameters established in the Chukchi Sea Regulations and the Tier 1 BO
  - If yes, the Tier 2 process will continue.
  - If no, additional evaluation is necessary to determine if LOA/ITS minimization measures will be sufficient to bring the request within the parameters of the Regulations and Tier 1 BO.
    - If additional measures are sufficient and can be implemented by the applicant, the Tier 2 consultation will continue.
    - If additional measures are not sufficient and/or cannot be implemented by the applicant, a separate consultation may be required. It is important to note, however, that an ITS under the ESA cannot be given for a marine mammal if the take is not covered under section 101(a)(5) of the MMPA (i.e., through Regulations/LOA or an IHA).

- For requests that fall within the parameters of the Regulations and Tier 1 BO, issue a combined LOA/ITS (Appendix 3) that will provide incidental take coverage under both Acts. Issuance of the LOA/ITS concludes ESA consultation for that action.
- Each LOA will require a comprehensive final report of all take, which will be provided to the MMM and to the FFWFO. The report will cover required compliance with both the MMPA's the ESA's requirement to monitor take.

The above programmatic approach integrates the ESA with the existing ITR/LOA process that MMM has been conducting since 1991 on oil and gas activities in the Beaufort and Chukchi Seas. The combined LOA/ITS format provided in Appendix 3 is intended to meet the legal requirements of both Acts and provide for the greatest conservation benefits allowable under both Acts. This format reduces duplication of effort by taking advantage of overlapping areas of the Acts, adding only what is uniquely required through section 7 of the ESA.

While the ITS is technically provided to the Service's MMM and the LOA applicant, we anticipate that other Federal agencies involved in permitting the exploration actions covered by the Chukchi Sea ITRs will also seek to fulfill their section 7 responsibilities by seeking consultation with the Service. So long as the activities covered by such consultations comport with the MMPA incidental take regulations, we would expect these consultations to be completed by linking to this intra-Service biological opinion.

9. Incidental Take Statement

By virtue of establishing the special rule for polar bears (73 FR 28306-28318; May 15, 2008) and by virtue of the Service making the appropriate determinations under the MMPA, the activities covered by this consultation are exempt from any take prohibitions that might otherwise apply under the ESA. Section 7(b)(4)(C)(iii) of the ESA, however, requires the issuance of an incidental This incidental take statement replicates, rather than being additive to, any requirements and obligations necessary to comply with the MMPA.

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and will be binding conditions of any permit issued to an LOA applicant for the exemption in section 7(o)(2) of the ESA to apply. MMM will regulate the activity covered by this incidental take statement to ensure the LOA holder adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, so that the protective coverage of section 7(o)(2) does not lapse. In order to monitor the impact of incidental take, the MMM will provide annual monitoring reports to the FFWFO as specified in the incidental take statement. [50 CFR 402.14(i)(3)]

In the accompanying BO, the Service determined that total take anticipated as a result of the issuance of the Regulations under section 101(a)(5)(A) of the MMPA is not likely to result in jeopardy to the polar bear. No lethal take is anticipated. While the Service cannot anticipate the specific amount or extent of other types of take that may result from activities that may be authorized under the Regulations until they are proposed and the specific activities and location is known, the negligible effects finding and the small numbers determination articulates the anticipated amount of take with respect to effect on the population.

The Service believes that mitigating measures required by the Regulations and to be included in site-specific LOAs will provide a thorough and effective mechanism for minimizing potential adverse impacts of oil and gas exploratory activities on polar bears. Because all identified measures to mitigate impacts are included in the Regulations or will be required in LOAs, the Service does not identify additional necessary measures to reduce impacts under the ESA. Therefore, the following measure and its implementing terms and conditions require compliance with mitigating measures provided through the MMPA Regulations and LOA processes. The measure and its implementing terms and conditions are provided in the Tier 1 BO so that MMM may incorporate them into the LOA (Tier 2) process.

10. Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize the impacts of incidental take of polar bears:

1. Reduce adverse impacts to polar bears from oil and gas exploration activities by incorporating all standard mitigation measures identified in the Incidental Take Regulations and all site specific mitigation measures included in individual LOAs.

11. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the MMM must comply with the following terms and conditions, which implement the reasonable and prudent measure described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. MMM shall include any and all appropriate minimization measures in the Letter of Authorization and/or a term and condition requiring the implementation of minimization measures proposed as part of the action by the applicant.

2. LOA monitoring reports will be provided to the MMM upon project conclusion by the Industry operator. Reports shall include, but not be limited to, (1) the amount of take anticipated and type of take authorized in each LOA/ITS, (2) the amount and type of take that actually occurs, and (3) other polar bear observations that did not result in take.

As lethal take is not anticipated, specific procedures for handling or disposing of carcasses (50 CFR 402.14(i)(1)(v)), are not necessary.

12. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service has the following conservation recommendation for this action.

- The status of polar bears in the CS and SB stocks needs to be monitored throughout the duration of these Regulations. The Service has particular concern about the response of polar bears, at the individual and population levels, to the quickly changing environmental conditions in the action area of the Chukchi Sea and coastal northern Alaska. It recommends the Service and its agents in this action (permitting agencies and Industry) promote collection of baseline data to help increase understanding of how the effects of climate change will affect polar bears inhabiting Alaska, (http://alaska.fws.gov/fisheries/mmm/polarbear/issues.htm). For example, ongoing studies include those led by the USGS Alaska Science Center, in cooperation with the Service, to examine polar bear habitat use, reproduction, and survival relative to a changing sea-ice environment. Specific objectives are to evaluate polar bear habitat availability and quality as influenced by ongoing climate changes and response by polar bears; effects of changes in sea-ice environment on condition of adults, numbers and sizes of offspring, and survival of offspring to weaning (recruitment); and population structure.

13. Re-initiation Notice

This concludes formal consultation on effects to polar bears on the promulgation of Chukchi Sea Incidental Take Regulations. As provided in 50 C.F.R. 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

(1) The amount or extent of incidental take is exceeded;

(2) New information reveals effects of the action agency that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion;
(3) The agency action is subsequently modified in a manner that causes an effect to listed or critical habitat not considered in this opinion; and/or
(4) A new species is listed or critical habitat designated that may be affected by the action.

Thank you for your cooperation in the development of this conference opinion. If you have any comments or require additional information, please contact Ted Swem, Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office, 101 12th Ave., Fairbanks, AK, 99701, Telephone: 907/456-0441.

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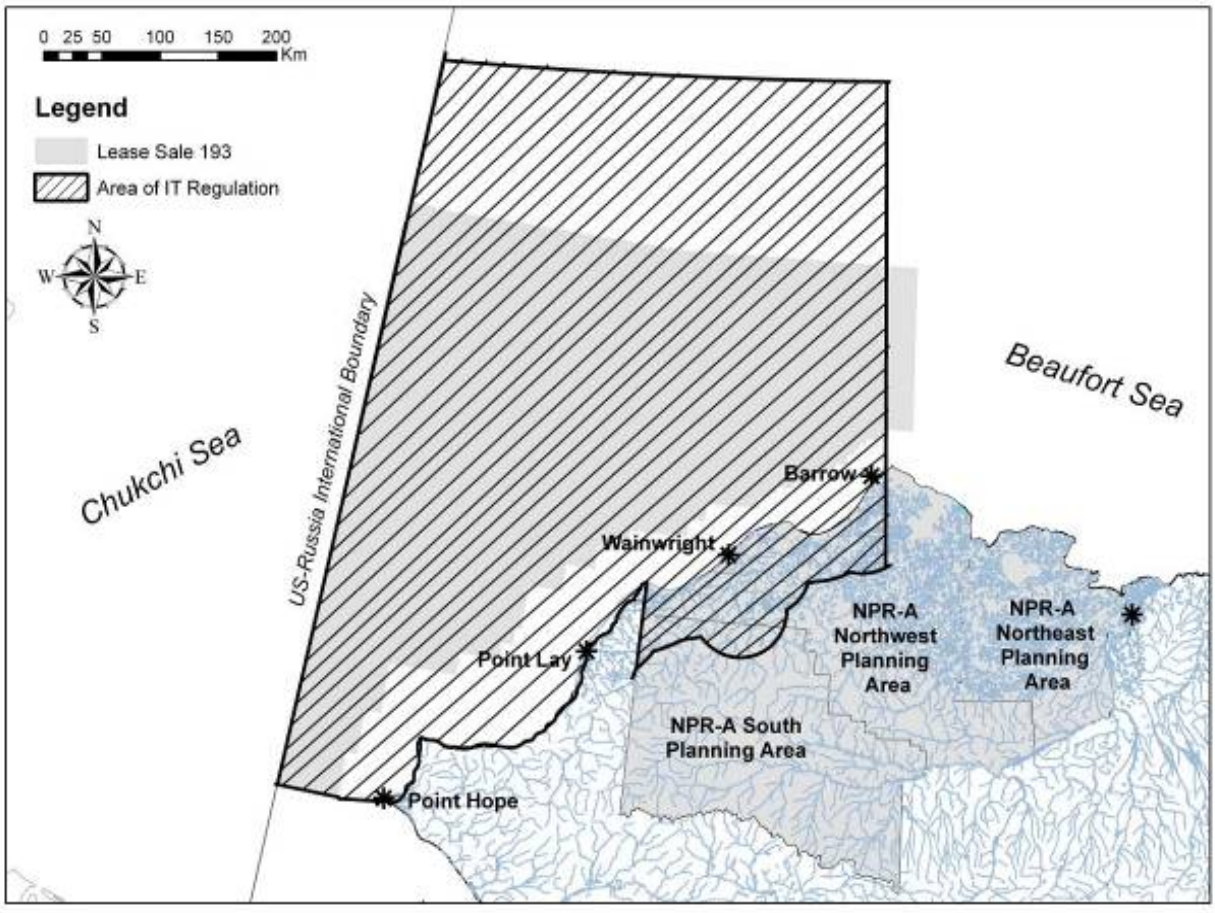

Figure 1. Geographic area covered by the proposed Chukchi Sea incidental take regulations and associated planning areas (USFWS 2008).

Appendix 1.
Summary of Conference/Consultation Activities

1/7/08 – FFWFO conference call with RO ES and MMM staff to discuss polar bear conferences. RO identified need for intra-service Sec 7 conference/consultation on Chukchi Sea and Beaufort Sea ITRs. Overall new polar bear workload was discussed.

1/8/08 – Conference call with RO and WO ES staff regarding polar bear consultations. Proposed Chukchi Sea ITRs are scheduled to come out about March 1.

1/16/08 – RO ES requests MMM provide proposed Chukchi Sea ITRS to FFWFO; they are provided on same date.

2/08 – Draft Chukchi Sea Conference Opinions produced and reviewed in FFWFO.

2/11/08 – Polar bear coordination meeting between FFWFO and MMM at Anchorage Regional office; intra-Service conferences on Chukchi and Beaufort ITRs discussed.

2/26/08 – Conference call between FFWFO, MMM, and RO and WO ES, and AK and WO Solicitors to discuss MMPA/ESA coordination issues identified in the Draft Chukchi ITR Conference Opinion.

3/31/08 – A 90-day detailee arrives in FFWFO to work solely on polar bear conference/consultations; Chukchi ITRs are highest priority in detailee's workload.

4/11/08 - At FFWFO's request, MMM provided the final Environmental Assessment for the Chukchi Sea Incidental Take Regulations.

5/1/08 - MMM provided a more current version (March '08) of the draft Final Incidental Take Regulations to FFWFO.

5/13/08 - Draft of "Administration of the Programmatic Biological Opinion," "Incidental Take Statement," and "Appendix 6" sent to RO and MMM for review.

5/15/08 – Polar bear final rule published in federal register; species listed as threatened rangewide.
- Comments received from MMM on "Administration of the Programmatic Biological Opinion," "Incidental Take Statement," and "Appendix 6."
- Full Draft BO sent to RO and MMM for review.

5/16/08 - RO sent draft BO to WO for review and comment.

5/21/08 - Comments received from WO.

5/22/08 – FFWFO, RO and WO ES conference call regarding BO; WO ES describes status and approach of BO to Director.
5/29/08 – FFWFO finalizes BO.

Appendix 2.
Detailed Description of Activities Authorized by the Incidental Take Regulations

(From: Draft Final Incidental Take Regulations dated March 13, 2008)

Marine-Streamer 3D and 2D Seismic Surveys

Marine seismic surveys are conducted to locate geological structures potentially capable of containing petroleum accumulations. Air guns are the typical acoustic (sound) source for 2-dimensional and 3-dimensional (2D and 3D, respectively) seismic surveys. An outgoing sound signal is created by venting high-pressure air from the air guns into the water to produce an air-filled cavity (bubble) that expands and contracts. A group of air guns is usually deployed in an array to produce a downward-focused sound signal. Air gun array volumes for both 2D and 3D seismic surveys are expected to range from 1,800–6,000 cubic inches (in^3). The air guns are fired at short, regular intervals, so the arrays emit pulsed rather than continuous sound. While most of the energy is focused downward and the short duration of each pulse limits the total energy into the water column, the sound can propagate horizontally for several kilometers.

A 3D source array typically consists of two to three sub-arrays of six to nine air guns each, and is about 12.5–18 meters (m) long and 16–36 m wide. The size of the source-array can vary during the seismic survey to optimize the resolution of the geophysical data collected at any particular site. Vessels usually tow up to three source arrays, depending on the survey-design specifications. Most 3D operations use a single source vessel; however, in a few instances, more than one source vessel may be used. The sound-source level (zero-to-peak) associated with typical 3D seismic surveys ranges between 233 and 240 decibels at 1 meter (re 1 μPa at 1 m).

The vessels conducting 3D surveys are generally 70–90 m (330-295 ft) long. Surveys are typically acquired at a vessel speed of approximately 8.3 km/hour (4.5 knots). Source arrays are activated approximately every 10–15 seconds, depending on vessel speed. The timing between outgoing sound signals can vary for different surveys to achieve the desired "shot point" spacing to meet the geological objectives of the survey; typical spacing is 25–37.5 m (27–41 yards) wide. The receiving arrays could include multiple (4–16) streamer-receiver cables towed behind the source array. Streamer cables contain numerous hydrophone elements at fixed distances within each cable. Each streamer can be 3–8 km (2–5 mi) long with an overall array width of up to 1,500 m (1,640 yards) between outermost streamer cables. Biodegradable liquid paraffin is used to fill the streamer and provide buoyancy. Solid/gel streamer cables also are used. The wide extent of this towed equipment limits both the turning speed and the area a vessel covers with a single pass over a geologic target. It is, therefore, common practice to acquire data using an offset racetrack pattern. Adjacent transit lines for a survey generally are spaced several hundred meters apart and are parallel to each other across the survey area. Seismic surveys are conducted day and night when ocean conditions are favorable, and one survey effort may continue for weeks or months, depending on the size of the survey. Data-acquisition is affected by the arrays towed by the survey

vessel and weather conditions. Typically, data are only collected between 25 and 30 percent of the time (or 6–8 hours a day) because of equipment or weather problems. In addition to downtime due to weather, sea conditions, turning between lines, and equipment maintenance, surveys could be suspended to avoid interactions with biological resources. The MMS estimates that individual surveys could last between 20–30 days (with downtime) to cover a 322 km^2 (200 mi^2) area.

Marine-streamer 2D surveys use similar geophysical-survey techniques as 3D surveys, but both the mode of operation and general vessel type used are different. The 2D surveys provide a less-detailed subsurface image because the survey lines are spaced farther apart, but they cover wider areas to image geologic structure on more of a regional basis. Large prospects are easily identified on 2D seismic data, but detailed images of the prospective areas within a large prospect can only be seen using 3D data. The 2D seismic-survey vessels generally are smaller than 3D-survey vessels, although larger 3D-survey vessels are also capable of conducting 2D surveys. The 2D source array typically consists of three or more sub-arrays of six to eight air gun sources each. The sound-source level (zero-to-peak) associated with 2D marine seismic surveys are the same as 3D marine seismic surveys (233–240 dB re 1 μPa at 1 m). Typically, a single hydrophone streamer cable approximately 8–12 km long is towed behind the survey vessel. The 2D surveys acquire data along single track lines that are spread more widely apart (usually several miles) than are track lines for 3D surveys (usually several hundred meters).

Both 3D and 2D marine-streamer surveys require a largely ice-free environment to allow effective operation and maneuvering of the air gun arrays and long streamers. In the Chukchi Sea Region, the timing and areas of the surveys will be dictated by ice conditions. The data-acquisition season in the Chukchi Sea could start sometime in July and end sometime in early November. Even during the short summer season, there are periodic incursions of sea ice, so there is no guarantee that any given location will be ice free throughout the survey.

Approximately 160,934 km (100,000 line-miles) of 2D seismic surveys already have been collected in the Chukchi Sea program area, so the MMS assumes that additional geophysical surveys will be primarily 3D surveys focusing on specific leasing targets surrounding OCS Lease Sale 193. The 3D surveys are likely to continue during the early phase of exploration when wells are drilled; however, the number of surveys is expected to decrease over time as data is collected over the prime prospects and these prospects are tested by drilling.

Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, the Service estimates that, in any given year during the specified timeframe (2008–2012), up to four seismic survey vessels could be operating simultaneously in the Chukchi Sea Region during the open water season. During the 2006 open water season, three seismic surveys were conducted, while only one seismic survey was conducted during the 2007 open-water season. Each seismic vessel is expected to collect between 3,200–14,500 km (2,000–9,000 linear miles) of seismic survey data. Seismic surveys are expected to occur in open water conditions between July 1 and November 30 each year. We estimate that each seismic survey vessel will be

accompanied or serviced by one to three support vessels. Helicopters may also be used, when available, for vessel support and crew changes.

High-Resolution Site-Clearance Surveys

Based on mapping of the subsurface structures using 2D and 3D seismic data, several well locations may be proposed. Prior to drilling deep test wells, high-resolution site clearance seismic surveys and geotechnical studies will be necessary to examine the proposed exploration drilling locations for geologic hazards, archeological features, and biological populations. Site clearance and studies required for exploration will be conducted during the open water season before a drill rig is mobilized to the site. A typical operation consists of a vessel towing an acoustic source (air gun) about 25 m behind the ship and a 600–m streamer cable with a tail buoy. The source array usually is a single array composed of one or more air guns. A 2D high-resolution site-clearance survey usually has a single air gun, while a 3D high-resolution site survey usually tows an array of air guns. The ships travel at 5.6–6.5 km/hour (3–3.5 knots), and the source is activated every 7–8 seconds (or about every 12.5 m). All vessel operations are designed to be ultra-quiet, as the higher frequencies used in high-resolution work are easily masked by the vessel noise. Typical surveys cover one OCS block at a time. MMS regulations require information be gathered on a 300– by 900–m grid, which amounts to about 129 line kilometers of data per lease block. If there is a high probability of archeological resources, the north–south lines are 50 m apart and the 900 m remains the same. Including line turns, the time to survey a lease block is approximately 36 hours. Air gun volumes for high-resolution surveys typically are 90–150 in^3, and the output of a 90-in^3 air gun ranges from 229–233 dB high-resolution re 1μPa at 1m. Air gun pressures typically are 2,000 psi (pounds per square inch), although they can be used at 3,000 psi for higher signal strength to collect data from deep in the subsurface.

Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, we estimate that during the specified timeframe (2008–2012), as many as six high-resolution site surveys may be carried out in any given year, with the majority of site surveys occurring in the latter part of the regulatory time period.

Offshore Drilling Operations

Considering water depth and the remoteness of this area, drilling operations are most likely to employ drill ships with ice-breaker support vessels. Water depths greater than 30 m (100 ft) and possible pack-ice incursions during the open-water season will preclude the use of bottom-founded platforms as exploration drilling rigs. Using drill ships allows the operator to temporarily move off the drill site if sea or ice conditions require it. Drilling operations are expected to range between 30 and 90 days at different well sites, depending on the depth to the target formation, difficulties during drilling, and logging/testing operations. Drill ships will operate only during the open-water season, where drifting ice can prevent their operation.

A drill ship is secured over the drill site by deploying anchors on as many as ten to twelve mooring lines. The drill pipe is encased in a riser that compensates for the vertical wave motion. The blowout preventer (BOP) is typically located at the seabed in a hole dug below the ice-scour depth. BOP placement is an important safety feature enabling the drill ship to shut down operations and

get underway rapidly without exposing the well. One or more ice management vessels (ice breakers) generally support drill ships to ensure ice does not encroach on operations. A barge and tug typically accompany the vessels to provide a standby safety vessel, oil spill response capabilities, and refueling support. Most supplies (including fuel) necessary to complete drilling activities are stored on the drill ship and support vessels. Helicopter servicing of drill ships can occur as frequently as 1–2 times/day. The abandonment phase is initiated if exploratory wells are not successful. In a typical situation, wells are permanently plugged (with cement) and wellhead equipment removed. The seafloor site is restored to some practicable, pre-exploration condition. Post-abandonment surveys are conducted to confirm that no debris remains following abandonment or those materials remain at the lease tract. The casings for delineation wells are either cut mechanically or with explosives during the process of well abandonment. The MMS estimates that exploration wells will average 2,438 m (8,000 ft), will use approximately 475 tons of dry mud, and produce 600 tons of dry rock cuttings. Considering the cost of synthetic drilling fluids now commonly used, the MMS assumes that most of the drilling mud will be reconditioned and reused. All of the rock cuttings will be discharged at the exploration site.

Considering the relatively short open-water season in the Chukchi Sea (July–November), the MMS estimates that up to four wells could be started by one rig each drilling season. However, it is more likely that only one to two wells could be drilled, tested, and abandoned by one drill ship in any given season, leaving work on the other wells to the next summer season. A total of five exploration wells have been drilled on the Chukchi shelf, and the MMS estimates that 7 to 14 additional wells will be needed to discover and delineate a commercial field.

Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, we estimate that as many as three drill ships could be operating in the Chukchi Sea Region in any given year during the specified timeframe (2008–2012), with the majority of exploratory drilling occurring in the latter part of the regulatory time period. Each drill ship could drill up to four exploratory or delineation wells per season. Each drill ship is likely to be supported by one to two ice breakers, a barge and tug, one to two helicopter flights per day, and one to two supply ships per week. The operating season is expected to be limited to the open-water season July 1 to November 30.

Onshore Seismic Exploration and Drilling

CPAI's petition also describes conducting onshore seismic exploration and drilling over the next five years, including geotechnical site investigations, vibroseis, construction of ice pads, roads, and islands, and exploratory drilling. One of these activities is the Intrepid prospect, approximately 32 km (20 mi) south of Barrow.

Geotechnical site investigations include shallow cores and soil borings to investigate soil conditions and stratigraphy. Geotechnical properties at select points may be integrated with seismic data to develop a regional model for predicting soil conditions in areas of interest.

Vibroseis seismic operations are conducted both onshore and on nearshore ice using large trucks with vibrators that systematically put variable frequency energy into the earth. A minimum of 1.2 m (4 ft) of sea ice is required to support heavy vehicles used to transport equipment offshore for exploration activities. These ice conditions generally exist from January 1 until May 31. The exploration techniques are most commonly used on landfast ice, but they can be used in areas of stable offshore pack-ice. Multiple vehicles are normally associated with a typical vibroseis operation. One or two vehicles with survey crews move ahead of the operation and mark the source receiver points. Occasionally, bulldozers are needed to build snow ramps on the steep terrain or to smooth offshore rough ice within the site.

A typical wintertime exploration seismic crew consists of 40–140 personnel. Roughly 75 percent of the personnel routinely work on the active seismic crew, with approximately 50 percent of those working in vehicles and the remainder outside laying and retrieving geophones and cables.

With the vibroseis technique, activity on the surveyed seismic line begins with the placement of sensors. All sensors are connected to the recording vehicle by multi-pair cable sections. The vibrators move to the beginning of the line, and recording begins. The vibrators move along a source line, which is at some angle to the sensor line. The vibrators begin vibrating in synchrony via a simultaneous radio signal to all vehicles. In a typical survey, each vibrator will vibrate four times at each location. The entire formation of vibrators subsequently moves forward to the next energy input point (67 m (220 ft) in most applications) and repeats the process. In a typical 16- to 18-hour day, a survey will complete 6 to 16 linear km (4–10 mi) in a 2D seismic operation and 24 to 64 linear km (15–40 mi) in a 3D seismic operation. CPAI anticipates conducting between one and five vibroseis seismic programs onshore within the northwest NPR–A over the next 5 years.

CPAI also anticipates developing vertical seismic profiles (VSPs) to calibrate seismic and well data. Typically, VSP operations are staffed by less than eight people. Four or five of the operators remain in the vehicles (vibrators) within 1.6 to 3.2 km (1 to 2 mi) of the rig, while the others are located at the rig.

On Federal lands, CPAI estimates drilling three to six onshore wells within the next five years. Drilling will likely include both well testing and VSPs. Three onshore wells are proposed for the 2007/2008 season. Drilling operations will require an estimated 32–161 km (20–100 mi) of ice roads, 32–483 km (20–300 mi) of rolligon trails, one to four airfields approximately 1,500 m (5,000 ft) in length on lakes or tundra, rig storage on gravel, possibly at new sites in the Northwest NPR–A, one to five camps, and one to three rigs operating in a given year.

Appendix 3.
LOA/ITS Content

The Letter of Authorization Cover Letter will include these statements:

> Per the Programmatic Biological Opinion for the Chukchi Sea Incidental Take Regulations for Polar Bear (June 2008), your request also triggers the second of the two-tiered programmatic process.
>
> The LOA also serves as an "Incidental Take Statement" (ITS) required under section 7 of the Endangered Species Act of 1973 (ESA), in order for incidental take of the polar bear to be exempted from the prohibitions of the ESA. Issuance of the LOA/ITS fulfills the requirements for Tier 2 Consultation of the Programmatic Biological Opinion for the activities described in this letter.

The following statement should be included in the body of the Authorization:

INCIDENTAL TAKE STATEMENT
Polar Bear

In the Programmatic Biological Opinion for Polar Bears (*Ursus maritimus*) on Chukchi Sea Incidental Take Regulations" (June 2008; Tier 1 BO), the Service determined that the total take anticipated as a result of the issuance of the Regulations is not likely to result in jeopardy to the polar bear, in accordance with section 7 of the Endangered Species Act of 1973, as amended (ESA). In order for the Tier 2 BO to be consistent with the "no jeopardy" conclusion of the Tier 1 BO and an incidental take statement (ITS) to be provided: (1) the proposed activity must incorporate applicable oil and gas industry minimization measures, as described in the proposed activity descriptions of both the Regulations and the Tier 1 BO, (2) the LOA must include any additional minimization measures that the MMM believes appropriate for the specific activity and location, and (3) the MMM must determine that the incidental take for the specific activity will be consistent with the negligible impact finding for the total take allowed under the Regulations.

A reasonable and prudent measure and implementing terms and conditions were included for MMM in the Tier 1 BO and have been incorporated into the LOA process. Issuance of this ITS with the LOA completes ESA requirements for authorization of incidental take of the polar bear. Compliance with the terms and conditions of the above LOA insures that the LOA holder is also in compliance with the ESA.

Documentation of Take

A requirement of each LOA is to provide observational data of polar bears throughout the project and a complete report of all observations at the conclusion of the project. This final report will be provided to both the MMM and the FFWFO. This report meets the tracking and reporting requirements relative to the documentation of take as required by the MMPA and the ESA.