United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701

July 27, 2016

Memorandum

To: Chief, Marine Mammals Management, Region 7

From: Field Supervisor, Fairbanks Fish and Wildlife Field Office

Subject: Biological Opinion for Polar Bears and Conference Opinion for Pacific Walrus on the proposed issuance of 2016-2021 Beaufort Sea Incidental Take Regulations

This document transmits the U.S. Fish and Wildlife Service's (Service) – Fairbanks Fish and Wildlife Field Office (FFWFO) final biological opinion in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*), regarding effects to polar bears (*Ursus maritimus*) of the Service's proposed issuance of Incidental Take Regulations for the Beaufort Sea (ITRs) under section 101(a)(5) of the Marine Mammal Protection Act (MMPA). The Pacific walrus (*Odobenus rosmarus divergens*; walrus) is a candidate species under the ESA. Therefore, the Service has evaluated the effects of the Proposed Action on Pacific walrus and this document also serves as a Conference Opinion for that species.

The proposed Beaufort Sea ITRs would be in effect from 2016-2021 and pertain to oil and gas exploration, development, and production in the Beaufort Sea and adjacent coastal areas of northern Alaska. A description of the Regulations and the types of activities to which they apply is provided in section 2 of this document (*Proposed Action*), and the area within which the Regulations would be in effect is described in section 3 (*Action Area*).

Section 7(a)(2) of the ESA states that Federal agencies must ensure that their activities are not likely to:

- Jeopardize the continued existence of any listed species, or
- Result in the destruction or adverse modification of designated critical habitat.

On October 29, 2009, the Service proposed critical habitat for polar bears (74 FR 56058). A final rule designating critical habitat was issued on December 7, 2010 (75 FR 76086) however, on January 11, 2013, the final rule was vacated and remanded to the Service by the U.S. District for the District of Alaska in *Alaska Oil and Gas Association et al. v. Salazar, et al.* (D. Alaska) (3:11-cv-00025-RRB). On February 29, 2016 the Ninth Circuit Court of Appeals upheld the final polar bear critical habitat rule on all points. Therefore, the Service has evaluated the

potential effects of the Proposed Action to Polar Bear Critical Habitat as it was designated in the final rule (74 FR 56058) and concluded the proposed Beaufort Sea ITRs are not likely to adversely affect designated polar bear critical habitat. Therefore, polar bear critical habitat is not discussed further herein.

The Service has determined the proposed Beaufort Sea ITRs are unlikely to violate section 7(a)(2) of the ESA. Following review of the status and environmental baseline of polar bears and Pacific walrus, and analysis of potential effects of the proposed action on these species, the Service has concluded the proposed action is not likely to jeopardize the continued existence of polar bears or Pacific walrus.

A complete administrative record of this consultation is on file at the FFWFO, 101 12th Avenue, Fairbanks, Alaska, 99701. If you have comments or concerns regarding this BO, please contact Sarah Conn, Field Supervisor, Fairbanks Fish and Wildlife Field Office at (907) 456-0499.

Intra-Service Biological Opinion
for Issuance of
2016-2021 Beaufort Sea Incidental Take Regulations

Prepared by:
U.S. Fish and Wildlife Service
Fairbanks Fish and Wildlife Field Office
110 12th Ave, Room 110
Fairbanks, Alaska 99701

July 27, 2016

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List of Abbreviations

AOGA = Alaska Oil & Gas Association
BLM = Bureau of Land Management
BO = biological opinion
BOEM = Bureau of Ocean Energy Management
BOP = blowout preventer
BPXA = BP Exploration (Alaska), Inc.
CFR = Code of Federal Regulations
COE = U.S. Army Corps of Engineers
CS = Chukchi Sea polar bear population
DLP = defense of life & property
EA = Environmental Assessment
EIS = Environmental Impact Statement
ESA = Endangered Species Act of 1973, as amended
FFWFO = Fairbanks Fish & Wildlife Field Office (of the Service, Fairbanks, AK)
FLIR = Forward Looking Infrared imagery
FR = Federal Register
Industry = oil and gas industry
ITS = Incidental Take Statement
ITRs = Incidental Take Regulations
IUCN = International Union for the Conservation of Nature
LOA = Letter of Authorization (under 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 (now BOEM)
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
PVA = population viability analysis
Regulations = incidental take regulations for oil and gas exploration activities in the Beaufort Sea and adjacent northern coast of Alaska
SBS = Southern Beaufort Sea polar bear population
SDC = steel drilling caisson
Secretary = Secretary of the Department of the Interior
Service = U.S. Fish and Wildlife Service
USGS = U.S. Geological Survey

1. INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq*., ESA), regarding effects to polar bears (*Ursus maritimus*) of the Service's proposed issuance of Incidental Take Regulations for the Beaufort Sea (Regulations) under section 101(a)(5) of the Marine Mammal Protection Act (MMPA).

The Regulations would be in effect from 2016-2021 and pertain to oil and gas exploration, development, and production in the Beaufort Sea and adjacent coastal areas of northern Alaska. A description of the Regulations and the types of activities to which they apply is provided in section 2 of this document (Proposed Action), and the area within which the Regulations would be in effect is described in section 3 (Action Area).

The Pacific walrus (*Odobenus rosmarus divergens*; walrus) is a candidate species under the ESA. Therefore, the Service has evaluated the effects of the Proposed Action on Pacific walrus and this document also serves as a Conference Opinion for that species. We hereafter refer to the Biological Opinion and Conference Opinion collectively as the "BO."

1.1 Background on Section 101(a)(5) of MMPA

The Service has responsibility for managing take of polar bears and walruses under the MMPA and ESA. Section 101(a)(5) of MMPA (16 U.S.C. § 1371(a)(5)(A)) allows for regulations to be promulgated for up to a 5-year period for the nonlethal, unintentional incidental take of small numbers of marine mammals in certain circumstances. Specifically, for the Service to consider issuing such regulations to allow incidental take under the MMPA, a written request by U.S. citizens engaged in a specified activity (other than commercial fishing) in a specified geographic region must be submitted to the Service with information on the activity as a whole and impacts of the potential take of marine mammals from them. The Service evaluates the potential impacts resulting from these activities. If the Service finds the total taking expected from the activities (in this case, all oil and gas exploration, production, and development activities in the Beaufort Sea and on the adjacent terrestrial area of northern Alaska during the duration of the Regulations) will: (1) impact only small numbers of animals, (2) have a negligible impact on these species, and (3) will not have an unmitigable adverse impact on the availability of these species for subsistence use by Alaska Natives, the regulations may be issued that establish permissible methods of taking and other means of having the least practicable adverse impact on the species.

1.2 Background on the Proposed Regulations

Incidental take regulations for the Beaufort Sea and adjacent northern coast of Alaska have been in place almost continuously since 1993 (58 FR 60402; 60 FR 42805; 64 FR 4328; 65 FR 5275; 65 FR 16828; 68 FR 66744; 71 FR 43926; and 68 FR 66744). These regulations provided oil and gas entities (Industry) the ability to obtain letters of authorization (LOAs) for the nonlethal, incidental take of polar bears and walrus.

On May 5, 2014 the Service received a petition from the Alaska Oil and Gas Association (AOGA) submitted on behalf of its members and other participating companies requesting the Service promulgate regulations for the nonlethal incidental take of small numbers (as defined in §18.121 of the proposed ITRs) of walruses and polar bears from oil and gas exploration, development and production activities in the Beaufort Sea and adjacent areas for a period of five years (2016-2021). The petition is available at www.regulations.gov at Docket No. FWS-R7-ES-2016-0060.

The Service's Marine Mammals Management Office (MMM Office) reviewed AOGA's application and concluded the included activities may result in the take small numbers of Pacific walrus and polar bears, and that no lethal take is anticipated. Specifically, the MMM Office anticipates the non-lethal unintentional take (as defined in the MMPA) of up to 340 polar bears and 50 Pacific walrus over the 5-year period covered by the proposed regulations (81 FR 36663:36701). Therefore, the MMM Office concluded that the above-mentioned activities, within the specified geographical region, will have a negligible impact on these species and the total expected takings will not have an unmitigable adverse impact on the availability of walrus and polar bears for subsistence use by Alaska Natives.

The Regulations as proposed would require oil and gas industry operators to obtain individual Letters of Authorization (LOAs) from the Service for specific oil and gas exploration, development, and production activities. The LOAs would contain project-specific mitigation measures as appropriate; LOAs for exploration and development projects would be valid for a specified period not to exceed one year. LOAs for production would require annual monitoring reports to be provided and would be valid for the duration of the Regulations.

1.3 Relationship of ESA to MMPA

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 under the ESA can be authorized. For the Service to exempt incidental take under ESA, the Service must conclude that the 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.

The proposed Regulations would allow LOAs under the MMPA to be issued for the nonlethal, unintentional incidental take of small numbers of Pacific walruses and polar bears for activities associated with oil and gas exploration in the Beaufort Sea and adjacent coastal areas.

1.4 Definitions of MMPA and ESA Terms:

Definitions of key terms used in 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.

1.4.1 MMPA Definitions

Incidental, but not intentional, take - take which is infrequent, unavoidable, or accidental. This 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.

Take – 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).

Unmitigatable adverse impact - means 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.

1.4.2 ESA Definitions

Incidental take – take that result from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the 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 Act. Listed species are found in 50 CFR. 17.11-17.12.

May affect – the appropriate conclusion when a proposed action may pose any effects on listed species.

Take – harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct. Harm is further defined 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 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 that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

2. DESCRIPTION OF THE PROPOSED ACTION

This section provides a description of the proposed Action evaluated in this BO. The Action under consideration is the issuance of Incidental Take Regulations for the Beaufort Sea region (Regulations) under section 101(a)(5) of the MMPA. These Regulations would be in effect from 2016 – 2021. The proposed action describes these Regulations, and oil and gas exploration, development and production activities in the Beaufort Sea Regulation area (as described in Section 3 of this document) for which Letters of Authorization (LOA) may be issued, pursuant to these Regulations, for the non-lethal, unintentional incidental take of polar bears and Pacific walruses. Activities authorized by the LOAs must meet the requirements specified in the Regulations and summarized later in this section, including: 1) permissible methods by which polar bears and walruses may be incidentally taken, 2) mitigation measures to ensure the least practicable adverse impact on the species, 3) the continued availability of these species for subsistence uses, and 4) requirements for monitoring and reporting. The proposed Action evaluated in this BO includes consideration of these mitigation measures and other requirements.

While the proposed Action would authorize the incidental take of polar bears and walruses, the Action would not permit, fund, or otherwise authorize any individual oil and gas activities. Individual oil and gas activities will require all appropriate Federal and/or State permits before they may proceed. For example, permits or other authorizations from federal agencies as the Bureau of Ocean Energy Management (BOEM), the U.S. Army Corps of Engineers (USACE), the Bureau of Land Management (BLM), or the Environmental Protection Agency (EPA) may be required. As such, the Service will conduct separate section 7 consultations on these individual Industry activities as they are proposed and authorized by federal agencies. To the extent that proposed future individual oil and gas activities fall within the scope of and are fully consistent with the proposed Action evaluated in this BO, additional consultation for these activities may not be needed. If other federal agencies' actions fall outside the scope of the proposed Action, those actions will need to be consulted on separately.

The description of the proposed Action includes information from the proposed Regulations (81 FR 36663, June 7, 2016), the Draft Environmental Assessment: Proposed Rule to Authorize the Incidental Take of Small Numbers of Polar Bear (*Ursus maritimus*) and Pacific Walrus (*Odobenus rosmarus divergens*) During Oil and Gas Activities in the Beaufort Sea and Adjacent Coastal Alaska (dated April 14, 2016), and other communications.

Information Required to Obtain a Letter of Authorization

If the Service issues Regulations, Industry operators would have to apply for LOAs to receive incidental take authorization for polar bears and Pacific walruses. To obtain an LOA, an applicant must provide specific information to the Service, including:

1) A description of the activity, dates and duration of the activity, the specific location, and the estimated area affected by the activity (i.e., a Plan of Operations);

2) A site-specific plan to monitor and mitigate the effects of the activity on polar bears and Pacific walruses that may be present during activities (i.e., marine mammal monitoring and mitigation plan). The monitoring program must document effects to these marine mammals and estimate the actual level and type of take. Monitoring requirements provided by the Service will vary depending on the activity, location, and time of year;
3) A site-specific polar bear and/or walrus awareness and interaction plan. A project specific plan for each operation will outline steps the applicant will take to limit animal-human interactions, increase safety, and minimize impacts to marine mammals;
4) When appropriate, or as required by MMM, an applicant will provide a record of community consultation or Plan of Cooperation (POC) to mitigate potential conflicts between the proposed activity and subsistence hunting; and
5) Applicants must consult with potentially affected subsistence communities along the Beaufort Sea coast (Barrow, Nuiqsut, and Kaktovik) and as appropriate, with the Eskimo Walrus Commission, the Alaska Nanuuq Commission, and the North Slope Borough to discuss the location, timing, proposed methods of operations and support activities, and identify any potential conflicts with subsistence walrus and polar bear hunting activities in these communities. Applications for LOAs must include documentation of all consultations with potentially affected user groups and a record of community consultation. Documentation must include a summary of any concerns identified by community members and hunter organizations, and the applicant's responses to identified concerns. Mitigation measures are described in § 18.118.

Letter of Authorization - Specific Measures

Measures to mitigate potential effects of oil and gas activities on polar bear and walrus resources and subsistence use of those resources have been identified and developed under previous ITRs and implemented through stipulations in individual LOAs. Mitigation measures will vary depending upon the type of industry activity, the location, time of year, and other factors. Mitigation measures would apply in addition to those required by other permitting agencies such as the State of Alaska, BLM, or BOEM. The following measures are required, if applicable to a project.

(a) Mitigation measures for all LOAs: Holders of an LOA must utilize policies and procedures to conduct activities in a manner that minimizes to the greatest extent practicable adverse impacts on polar bears and/or Pacific walruses, their habitat, and the availability of these marine mammals for subsistence uses. Adaptive management practices, such as temporal or spatial activity restrictions in response to the presence of marine mammals in a particular place or time or the occurrence of polar bears and/or Pacific walruses engaged in a biologically important activity (e.g., resting, feeding, denning, or nursing, among others) must be used to avoid interactions with and minimize impacts to these animals and their availability for subsistence uses.

(1) All holders of an LOA must:

(i) Cooperate with the Service's Marine Mammals Management Office and other designated Federal, state, and local agencies to monitor and mitigate the impacts of their activities on polar bears and Pacific walruses.
(ii) Designate trained and qualified personnel to monitor for the presence of polar bears and/or Pacific walruses, initiate mitigation measures, and monitor, record, and report the effects of their activities on polar bears and/or Pacific walruses.
(iii) Have an approved polar bear and/or Pacific walrus safety, awareness, and interaction plan on file with the Service's Marine Mammals Management Office and available onsite have key personnel undergo polar bear awareness training. Interaction plans must include:
(A) The type of activity and, where and when the activity will occur (i.e., a summary of the plan of operation);
(B) A food, waste, and other "bear attractants" management plan;
(C) Personnel training procedures, procedures, and materials;
(D) Site specific polar bear and/or walrus interaction risk evaluation and mitigation measures;
(E) Polar bear and walrus avoidance and encounter procedures; and
(F) Polar bear and walrus observation and reporting procedures.

(2) All LOA applicants must contact affected subsistence communities and hunter organizations to discuss potential conflicts caused by the proposed activities and provide the Service documentation of communications as described in 50 CFR 18.124.

(b) Mitigation measures for onshore activities. Efforts to minimize disturbance around known polar bear dens: holders of an LOA must take efforts to limit disturbance around known polar bear dens.

(1) Efforts to locate polar bear dens. Holders of an LOA seeking to carry out onshore 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 FLIR surveys 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 activities.
(2) Exclusion zone around known polar bear dens. Operators must observe a 1.6-km (1-mi) 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 1.6 km (1 mi) of activities, work 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.

(3) The use of den habitat map developed by the USGS. A map of potential coastal polar bear denning habitat can be found at: *http://alaska.usgs.gov/science/biology/polar_bears/pubs.html*. This measure ensures the location of potential polar bear dens is considered when conducting activities in the coastal areas of the Beaufort Sea.
(4) Restrict the timing of the activity to limit disturbance around dens.

(c) Mitigation measures for operational and support vessels.

(1) Operational and support vessels must have dedicated marine mammal observers on board to alert crew of the presence of polar bears and walruses and initiate adaptive mitigation responses.
(2) At all times, vessels must maintain the maximum distance possible from concentrations of polar bears or walruses. Under no circumstances, other than an emergency, should any vessel approach within an 805-m (0.5-mi) radius of polar bears or walruses observed on land or ice.
(3) 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.
(4) Vessels bound for the Beaufort Sea ITR Region may not transit through the Chukchi Sea prior to July 1. This operating condition is intended to allow walruses the opportunity to move through the Bering Strait and disperse from the confines of the spring lead system into the Chukchi Sea with minimal disturbance. It is also intended to minimize vessel impacts upon the availability of walruses for Alaska Native subsistence hunters. Exemption waivers to this operating condition may be issued by the Service on a case-by-case basis, based on a review of seasonal ice conditions and available information on walrus and polar bear distributions in the area of interest.
(5) All vessels shall avoid areas of active or anticipated polar bear or walrus subsistence hunting activity as determined through community consultations.
(6) The use of trained marine mammal monitors associated with marine activities. We may require a monitor on the site of the activity or on board drill ships, drill rigs, aircraft, icebreakers, or other support vessels or vehicles to monitor the impacts of Industry's activity on polar bear and Pacific walruses.

(d) Mitigation measures for aircraft.

(1) Operators of support aircraft should, at all times, conduct their activities at the maximum distance possible from concentrations of polar bears or walruses.
(2) Under no circumstances, other than an emergency, should aircraft operate at an altitude lower than 457 m (1,500 ft) within 805 m (0.5 mi) of polar bears or walruses observed on ice or land. Helicopters may not hover or circle above such areas or within 805 m (0.5 mi) of such areas. When weather conditions do not allow a 457 m

(1,500 ft) flying altitude, such as during severe storms or when cloud cover is low, aircraft may be operated below 457 m (1,500 ft). However, when aircraft are operated at altitudes below 457 m (1,500 ft) the operator must avoid areas of known polar bear and walrus concentrations and should take precautions to avoid flying directly over or within 805 m (0.5 mi) of these areas.

(3) Plan all aircraft routes to minimize any potential conflict with active or anticipated polar bear or walrus hunting activity as determined through discussions with local communities.

(e) Mitigation measures for sound producing offshore activities. Any offshore activity expected to produce constant or pulsed underwater sounds with received sound levels ≥160 dB re 1 μPa will be required to establish and monitor acoustically verified mitigation zones surrounding the sound source and implement adaptive mitigation measures as follows:

(1) Mitigation zones.

(i) A walrus mitigation zone where the pulsed or constant received sound level would be ≥ 160 dB re 1 μPa;

(ii) A walrus mitigation zone where the received pulsed sound level would be ≥ 180 dB re 1 μPa; and

(iii) A polar bear or walrus mitigation zone where the received pulsed sound level would be ≥ 190 dB re 1 μPa.

(2) Adaptive mitigation measures.

(i) Ramp-up procedures. For all sound sources, including sound source testing, the following sound ramp-up procedures must be used to allow polar bears and walruses to depart the mitigation zones:

(A) Visually monitor the mitigation zones and adjacent waters for polar bears and walruses for at least 30 minutes before initiating ramp-up procedures. If no polar bears or walruses are detected, ramp-up procedures may begin. Do not initiate ramp-up procedures when mitigation zones are not observable (e.g., at night, in fog, during storms or high sea states, etc.).

(B) Initiate ramp-up procedures by activating a single, or least powerful, sound source, in terms of energy output and/or volume capacity.

(C) Continue ramp-up by gradually increasing sound output over a period of at least 20 minutes, but no longer than 40 minutes, until the desired operating level of the sound source is obtained.

(ii) Power down. Immediately power down a sound source when:

(A) One or more walruses is observed or detected within the area delineated by the constant sound ≥ 160 dB re 1 μPa walrus mitigation zone;

(B) One or more walruses is observed or detected within the area delineated by the pulsed sound ≥ 180 dB re 1 μPa walrus mitigation zone; and

(C) One or more polar bear or walruses are observed or detected within the area delineated by the pulsed sound ≥ 190 dB re 1 μPa polar bear or walrus mitigation zone.

(iii) Shut down when:

(A) If the power down operation cannot reduce the received constant sound level to < 160 dB re 1 μPa (walrus) or received pulsed sound level to < 180 dB re 1 μPa (walrus) or < 190 dB re 1 μPa (walrus or polar bear), the operator must immediately shut down the sound source.

(B) If observations are made or credible reports are received that one or more polar bears or walruses within the area of the sound source activity are believed to be in an injured or mortal state, or are indicating acute distress due to received sound, the sound source must be immediately shut down and the Service contacted. The sound source will not be restarted until review and approval has been given by the Service. The ramp-up procedures must be followed when restarting.

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

(1) Community Consultation. Prior to receipt of an LOA, applicants must consult with potentially affected communities and appropriate subsistence user organizations to discuss potential conflicts with subsistence polar bear and walrus hunting caused by the location, timing, and methods of proposed operations and support activities (see §18.124 for details). If community concerns suggest 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.

(2) Plan of Cooperation (POC). When appropriate, holders of LOAs will be required to develop and implement a Service-approved POC. The POC must include:

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

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

(3) 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 polar bears and walruses for subsistence use.

(g) Monitoring requirements. Holders of an LOA will be required to:

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

(2) Provide trained, qualified, and Service-approved on-site observers to carry out monitoring and mitigation activities identified in the marine mammal monitoring and mitigation plan.

(3) For offshore activities, provide trained, qualified, and Service-approved observers on board all operational and support vessels to carry out monitoring and mitigation activities identified in the marine mammal monitoring and mitigation plan. Offshore observers may be required to complete a marine mammal observer training course approved by the Service.

(4) Cooperate with the Service and other designated Federal, state, and local agencies to monitor the impacts of oil and gas activities on polar bears and walruses. Where insufficient information exists to evaluate the potential effects of proposed activities on polar bears, walruses, and the subsistence use of these species, holders of an LOA 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.

(h) Reporting requirements. Holders of an LOA must report the results of monitoring and mitigation activities to the Service's Marine Mammals Management Office via email at: FW7_MMM_REPORTS@FWS.GOV.

(1) In-season monitoring reports.

(i) Activity progress reports. Holders of an LOA must:

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

(B) Provide the Service weekly progress reports of any changes in activities and/or locations; and

(C) Notify the Service within 48 hours after ending of activities.

(ii) Walrus observation reports. Holders of an LOA must report, on a weekly basis, all observations of walruses during their activities. Upon request, monitoring report data must be provided in a common electronic format (to be specified by the Service). Information in the observation report must include, but is not limited to:

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

(B) Number of walruses;

(C) Sex and age (if known);

(D) Observer name and contact information;

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

(F) Estimated range at closest approach;

(G) Industry activity at time of sighting;

(H) Behavior of animals sighted;

(I) Description of the encounter;

(J) Duration of the encounter; and

(K) Mitigation actions taken.

(iii) Polar bear observation reports. Holders of an LOA must report, within 48 hours, all observations of polar bears and potential polar bear dens, during any Industry activity. Upon request, monitoring report data must be provided in a common electronic format (to be specified by the Service). Information in the observation report must include, but is not limited to:

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

(B) Number of bears;

(C) Sex and age (if known);
(D) Observer name and contact information;
(E) Weather, visibility, sea state, and sea-ice conditions at the time of observation;
(F) Estimated closest distance of bears from personnel and facilities;
(G) Industry activity at time of sighting;
(H) Possible attractants present;
(I) Bear behavior;
(J) Description of the encounter;
(K) Duration of the encounter; and
(L) Mitigation actions taken.

(2) Notification of an LOA incident report. Holders of an LOA must report, as soon as possible, but within 48 hours, all LOA incidents during their activities. An LOA incident is any situation when specified activities exceed the authority of an LOA, when a mitigation measure was required but not enacted, or when injury or death of a polar bear or walrus occurs. Reports must include:
(i) All information specified for an observation report;
(ii) A complete detailed description of the incident; and
(iii) Any other actions taken.

(3) Final report. The results of monitoring and mitigation efforts identified in the marine mammal monitoring and mitigation plan must be submitted to the Service for review within 90 days of the expiration of an LOA, or for production LOAs, an annual report by January 15th of each calendar year. Upon request, final report data must be provided in a common electronic format (to be specified by the Service). Information in the final (or annual) report must include, but is not limited to:
(i) Copies of all observation reports submitted under the LOA;
(ii) A summary of the observation reports;
(iii) A summary of monitoring and mitigation effort including areas, total hours, total distances, and distribution;
(iv) Analysis of factors affecting the visibility and detectability of walruses and polar bears during monitoring;
(v) Analysis of the effectiveness of mitigation measures;
(vi) Analysis of the distribution, abundance, and behavior of polar bears and/or walruses observed; and
(vii) Estimates of take in relation to the specified activities.

Other proposed mitigation, monitoring, and reporting requirements are explained on pages 36663 to 36701 of the Proposed Rule (81 FR 36663).

Description of Industry Activities

This section reviews the type and scale of oil and gas activities projected to occur in the Beaufort Sea region over the specified period of the ITRs (2016 to 2021). Year-round onshore and offshore exploration and development activities are anticipated. Planned and potential activities considered in our analysis include activities described by the petitioners (AES Alaska 2015) and other foreseeable oil and gas Industry activities. Throughout the five years the proposed

regulations would be in place, activities are generally expected to be similar in type, timing, and effect to activities that have been evaluated under earlier regulations. Due to the large number of variables affecting Industry activities, prediction of exact dates and locations of operations is not possible. We assume that all proposed activities will occur, though it is possible the actual level of activities will be less. For example, the actual number of offshore seismic projects during the previous ITR regulatory period was less than the amount analyzed. However, operators must provide specific dates and locations of proposed activities prior to receiving an LOA. Additional information on the proposed activities is available in AOGA's petition for ITRs (AES Alaska 2015).

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. Additionally, the Service may re-initiate section 7 consultation on the Regulations in accordance with the applicable standards set forth in 50 CFR Sec. 402.16.

Exploration Activities

In the Beaufort Sea ITR region, oil and gas exploration occurs onshore, in coastal areas, and in the offshore environment (Figure 2.1). Exploration activities may include geological and geophysical surveys consisting of: geotechnical site investigations; reflective seismic exploration; vibratory seismic data collection; airgun and water gun seismic data collection; explosive seismic data collection; vertical seismic profiling; and sub-sea sediment sampling. Onshore and offshore exploratory drilling involves construction and use of drilling structures such as caisson-retained islands, gravel pads, ice pads, ice islands, bottom-supported or bottom-founded structures such as the steel drilling caisson, or floating drill vessels. Exploratory drilling and associated support activities and features may include: transportation to site; setup and relocation of lodging camps and support facilities (such as lights, generators, snow removal, water plants, wastewater plants, dining halls, sleeping quarters, mechanical shops, fuel storage, landing strips, aircraft support, health and safety facilities, data recording facilities, and communication equipment); construction of gravel pads, building gravel islands with sandbag and concrete block protection; construction of ice islands, pads, and ice roads; gravel hauling; gravel mining; road building; road maintenance; operating heavy equipment; digging trenches; burying and covering pipelines; security operations; dredging; moving floating drill units; helicopter support; and conducting ice, water, and flood management. Support facilities include pipelines, electrical lines, water lines, buildings and facilities, sealifts, and large and small vessels. Exploration activities could also include the development of staging facilities, oil spill prevention, response, and cleanup activities, and site restoration and remediation. The level of exploration activities is expected to be similar to the level during the past regulatory periods, although exploration projects may shift to different locations, particularly to the west into National Petroleum Reserve-Alaska (NPR-A). During the regulatory period, exploration activities are also anticipated to occur in the offshore environment and to continue in the existing oil field units.

Bureau of Ocean Energy Management Outer Continental Shelf Lease Sales

The Bureau of Ocean Energy Management (BOEM) manages oil and gas leases in the Alaska OCS region which encompasses 600 million acres (242 million ha). Of that acreage, approximately 65 million acres (26 million ha) are within the Beaufort Sea Planning Area, within

the scope of the proposed ITRs. Ten lease sales have been held in this area since 1979, resulting in 147 active leases wherein thirty-two exploratory wells have been drilled. Production has occurred on one joint Federal/state unit, with Federal oil production accounting for more than 28.7 million barrels (bbl; 42 U.S. gal [159 l]) of oil since 2001 (BOEM 2015). Details regarding availability of future leases, locations, and acreages are not yet available, but exploration of the OCS is expected to continue. Lease Sale 242 is planned in the Beaufort Sea during 2017 (BOEM 2012). Beaufort Sea Lease Sale 255 is proposed for the year 2020 (81 FR 14881:14885).

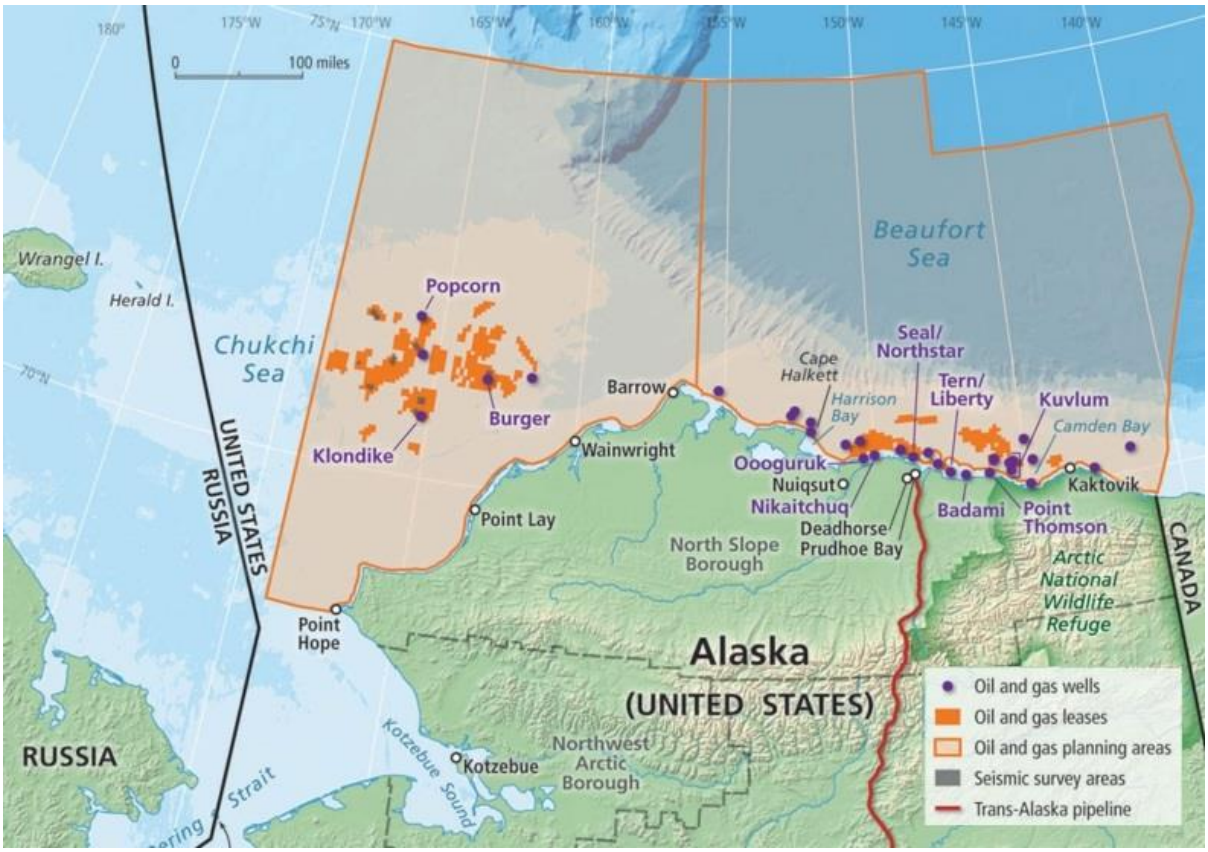

Figure 2.1 Oil and gas exploration and development areas in Northern Alaska (from Natural Research Council, in Fischman 2014).

National Petroleum Reserve – Alaska

The Bureau of Land Management (BLM) manages the 22.8-million acre (9.2 million ha) NPR-A of which 3.2 million acres (1.3 million ha) occur within the Beaufort Sea ITR region. Within this area, the BLM has offered approximately 11.8 million acres (4.7 ha) for oil and gas leasing (BLM 2013a). Between 1999 and 2014, 5.1 million acres (2.1 million ha) were sold in 10 lease sales. As of January 2015, there were 205 leases amounting to over 1.7 million acres (680,000 ha) leased (BLM 2015). From 2000 to 2013, industry drilled 29 wells in federally managed portions of the NPR-A, and three in adjacent Native-owned lands (BLM 2013b). A majority of

the leased acreage is held by Conoco Phillips Alaska Inc. (CPAI). Exploratory efforts are expected to continue, especially seismic work and exploratory drilling within the Greater Mooses Tooth (GMT) and Bear Tooth Units of the NPR-A. Other operators, including Anadarko E&P Onshore LLC and NORDAQ Energy, Inc., also hold leases in the NPR-A. Caelus Energy Alaska, LLC (Caelus) has recently announced acquisition of leases and intentions to pursue exploratory drilling near Smith Bay in the Tulimaniq prospect. The Tulimaniq exploration phase would include construction of ice pads, ice roads, temporary camps, and a temporary ice airstrip. The development phase would include construction of ice roads, gravel roads, gravel pads, and camps.

Areawide Lease Sales

The State of Alaska Department of Natural Resources, Oil and Gas Division, holds annual lease sales of state lands available for oil and gas development. Lease sales are organized by planning area. The approximately 2 million-acre (0.8 million-hectare) Beaufort Sea planning area encompasses coastal land and shallow waters along the shoreline of the North Slope between the NPR-A and the Arctic National Wildlife Refuge (ANWR) (State of Alaska 2015a). It is entirely within the boundary of the Beaufort Sea ITR region. The North Slope planning area includes tracts located to the south and inland from the Beaufort Sea planning area. Of the approximately 5.1 million acres (2.1 million ha), 2 million acres (0.8 million ha) occur within the Beaufort Sea ITR region. As of August 2015, there were 1,253 active leases on the North Slope, encompassing 2.8 million acres (1.1 million ha), and 261 active leases in the state waters of the Beaufort Sea, encompassing 703,452 acres (284,677 ha; State of Alaska 2015b). Number of acres leased has increased by 25 percent in the North Slope and 14 percent in the Beaufort Sea planning areas since 2013. Although most of the existing oil and gas development in the Southern Beaufort ITR region is concentrated in these state planning areas, the increase in leased acreage suggests that exploration on state lands and waters will continue during the 2016-2021 Beaufort ITR Regulation period.

Gas Hydrate Exploration and Research

Interest in methane gas hydrates is expected to increase in the upcoming five years. The USGS has estimated the volume of technically recoverable undiscovered methane gas hydrate on the North Slope is approximately 85 trillion cubic feet (range: 25–158 trillion ft^3; USGS 2013). Recent test wells drilled on the North Slope have confirmed the presence of viable reservoirs and have buoyed interest in long-term testing. International and Gulf of Mexico test well simulations have generated production-level gas yields. Gas hydrate research on the North Slope is supported by Federal funding and state initiatives. In 2013, the State of Alaska temporarily set aside 11 tracts of unleased state lands on the North Slope for methane hydrate research. This support is expected to result in a continued interest in gas hydrates, but development of this nonconventional resource is yet unproven and uncertainties regarding economic feasibility, safety, and environmental impact remain unresolved. For these reasons, a relatively low, but increasing level of gas hydrate exploration and research is expected during the 5-year period of the 2016-2021 Beaufort Sea ITRs.

Development Activities

Industry operations during oil and gas development may include construction of roads, pipelines, waterlines, gravel pads, work camps (personnel, dining, lodging, and maintenance facilities),

water production and wastewater treatment facilities, runways, and other support infrastructure. Activities associated with the development phase include transportation activities (automobile, airplane, and helicopter), installation of electronic equipment, well drilling, drill rig transport, personnel support, demobilization, restoration, and remediation work. Industry development activities are often planned or coordinated by unit. Alaska's North Slope oil and gas units include Prudhoe Bay, Kuparuk River, Greater Point McIntyre, Milne Point, Endicott, Badami, the Alpine oil fields of the Colville River Unit, GMT, Northstar, Oooguruk, Nikaitchuq, and Point Thomson. In addition, some of these fields are associated with satellite oilfields: Tarn, Palm, Tabasco, West Sak, Meltwater, West Beach, North Prudhoe Bay, Niakuk, Western Niakuk, Kuparuk, Schrader Bluff, Sag River, Eider, Sag Delta North, Qannik, and others.

Alpine Satellites and Greater Mooses Tooth

Continued expansion of the existing Alpine oil field within the Colville River Unit is planned for the 2016-2021 ITR period. Three new drill sites, Colville Delta drill site 5 (CD5, also known as Alpine West), GMT-1 (Lookout prospect, formerly CD6), and GMT-2 (Rendezvous prospect, formerly CD7) are located in the Northeast NPR-A. These facilities will connect to existing infrastructure at Alpine via a gravel road and four bridges over the Colville River (BLM 2014). Development of CD5 is currently underway; commercial oil production began at the end of 2015. The GMT-1 project has received permits. Road, pad, pipeline, and facilities construction is anticipated for 2017 through 2018, but due to permitting delays and low oil prices, CPAI has slowed construction plans that would have begun production by late 2017 (CPAI 2015). Permitting for GMT-2 has not yet been completed, but construction and first production is tentatively scheduled for 2019 and 2020. In addition to new drill site development in the NPR-A, expansion of existing drill sites in the Colville River Unit is also being considered, but is uncertain. Additional development infrastructure in the area is planned with construction of the Nuiqsut spur road. Although the road is not specifically designed for oil and gas industry purposes, it will provide access to Alpine workers living in Nuiqsut.

The Colville-Kuparuk Fairway

The region between the Alpine field and the Kuparuk Unit has been called the Colville-Kuparuk Fairway (Fairway; NSB 2014). Within this region, Brooks Range Petroleum Corporation (BRPC) has proposed development of three drill sites by 2020 as part of the 13-well Mustang development. An independent processing center is proposed at the hub of the Mustang Development, but production pipelines will tie into the Kuparuk facilities. Approximately 20 mi (32.2 km) of gravel road and pipeline will need to be constructed to tie in the drill sites back to the Mustang development and provide year-round access. First production of oil is planned for mid-2016. Brooks Range Petroleum Corporation has also proposed development within the Tofkat Unit southeast of the Alpine oilfield for the years 2020 and 2021. If constructed, the Tofkat gravel pad will cover approximately 15 acres (6.07 ha) and will connect to Alpine infrastructure via an 8-km (5-mi) gravel road and pipeline. Caelus has begun development of the Nuna prospect within the Fairway. This project is located at the northeast end, within the Oooguruk Unit. Development activities include seismic surveys, continued exploratory drilling, drilling production wells, and construction of drill pads, roads, and pipeline connections to Kaparuk infrastructure. Spanish oil company, Repsol, has submitted plans for development of five potential well locations beginning in winter 2015 with a three-well exploration program just northwest of the Alpine field. If deemed commercial, a road system expanded from these drill

sites to existing Kuparuk facilities is easily envisaged, along with multiple new drill sites, a centralized processing facility, and a network of flow lines tied into the Alpine Pipeline System.

Kuparuk River

Ongoing infield and peripheral development at the existing Kuparuk River Unit has been conducted by CPAI over the past decade and is likely to continue into the foreseeable future. Efforts have focused on improving technologies, expanding current production, and developing new drill sites. Technological advancements have included hydraulic fracturing, enhanced oil recovery, coil-tube drilling, and 4-D seismic surveys. Two new drill rigs will be brought online in 2016. As of 2015, a new drill site "2S" in the southwest "Shark Tooth" portion of the unit is under construction. It will require approximately 3.2 km (2 mi) of additional gravel road, pipelines, and power lines. Oil production from this well is planned for 2016. The proposed "Northeast West Sak" expansion of the existing "1H" drill site is also underway. The 9.3-acre (3.7-ha) project will accommodate additional wells and is planned to be completed in 2017. Oil from these facilities would be routed through the Kuparuk facilities to the Trans-Alaska pipeline. Other pad expansions and two additional drill sites in the eastern portion of the Kuparuk Unit may be developed later this decade to access additional oil resources.

Prudhoe Bay

New development within the Prudhoe Bay Unit is planned to help offset declining production from older wells. The possibility of development of as many as 200 new wells within the Greater Prudhoe Bay Unit area has been discussed by BP Exploration Alaska (BPXA) during the upcoming decade. Much of this expansion is planned to occur as part of the "West End Development Program." Proposed activities in this program include drilling 16 new wells, improving capacity of existing facilities, adding twenty-five additional miles of pipeline, construction of the first new pad in more than a decade, adding two drill rigs to the fleet, and expanding two additional pads within the unit. This program of development has been underway since 2013 and is expected to be completed in 2017.

Beechey Point / East Shore

The Beechey Point Unit lies immediately north of the Prudhoe Bay Unit near the shore of Gwydyr Bay. The unit operator, BRPC, is planning to produce oil from several relatively small hydrocarbon accumulations in and near this unit as part of the East Shore Development Project. Existing Prudhoe Bay infrastructure will be incorporated with new development to access the estimated 26 million bbl of recoverable reserves in the Central North Slope region. The proposed East Shore pad will cover approximately 15 acres (6.07 ha). An 8.9-km (5.5-mi) gravel road will be constructed to provide year-round access to production facilities. Oil will be transported via a 1.6-km (1-mi) pipeline from the East Shore pad to existing pipelines. Gravel construction is expected to begin in 2018; first oil is planned for 2020.

Liberty

Hilcorp Alaska, LLC (Hilcorp) recently assumed operation of the Liberty Unit, located in nearshore Federal waters in Foggy Island Bay about 17 km (11 mi) west of the Prudhoe Bay Unit. Initial development of the Liberty Unit began in early 2009 but was suspended following changes in production strategy. The current project concept involves production from a gravel island over the reservoir with full on-island processing capacity. Support infrastructure would

include a 12.9-km (8-mi) subsea pipeline connecting to the existing Badami pipeline. Pending permit approvals, first oil production is expected by 2020 or later. This project concept supersedes the cancelled Liberty ultraextended-reach drilling project.

Point Thomson

The Point Thomson Unit is located approximately 25 km (20 mi) east of the Liberty Unit and 97 km (60 mi) east of Prudhoe Bay. The reservoir straddles the coastline of the Beaufort Sea. It consists of a massive gas condensate reservoir containing up to 8 trillion ft^3 of gas and hundreds of millions of barrels of gas liquids and oil. This is an estimated 25 percent of the North Slope's natural gas reserves and is critical to any major gas commercialization project. ExxonMobil is actively pursuing development of a processing facility capable of handling 10,000 bbl per day, a pipeline with a design capacity of 70,000 bbl per day, a camp, an airstrip, and other ancillary facilities. Production is estimated to begin in 2016. All proposed wells and supporting infrastructure will be located onshore. No permanent roads connecting with Prudhoe Bay are currently proposed, but gravel roads will connect the infield facilities. Ice roads and barges will be used seasonally to provide equipment and supplies. Potential full field development may include two satellite drill sites, additional liquids production, and sale of gas. The timing and nature of additional expansion will depend upon initial field performance and potential construction of a gas pipeline to export gas from the North Slope.

Natural Gas Pipeline

Two major proposals currently exist for construction of a natural gas pipeline from the Point Thomson and Prudhoe Bay production fields. The Alaska Liquefied Natural Gas (LNG) project is an industry-sponsored partnership whose members include BP Alaska LNG LLC; ConocoPhillips Alaska LNG Company; and ExxonMobil Alaska LNG LLC. The Alaska LNG project proposes to build a large diameter (45-106 cm [18-42 in]) natural gas pipeline from the North Slope to South-central Alaska. In 2014, the State of Alaska joined in the project as a 25 percent co-investor. Since then, the project has begun the engineering and design phase. The routing of the proposed Alaska LNG project pipeline is from Prudhoe Bay, generally paralleling the Dalton Highway corridor from the North Slope to Fairbanks. An approximately 56.3-km (35-mi) spur will take off from the main pipeline and end at Fairbanks. The main pipeline would continue south, terminating at a natural gas liquefaction plant near Nikiski. There the remaining hydrocarbons will be condensed for export to international markets. The second partnership, the Alaska Stand Alone Gas Pipeline project, was originally planned as a 24-in (0.6-m) diameter natural gas pipeline with a natural gas flow rate of 500 million ft^3 per day at peak capacity, and may be advanced in the event the larger Alaska LNG project does not proceed.

Either project would include an underground pipeline with elevated bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and off-take valve locations. Both pipelines would be designed to transport a highly conditioned natural gas product, and would follow the same general route. As currently proposed, approximately 40 km (25 mi) of pipeline would occur within the Southern Beaufort ITR region. A gas conditioning facility would need to be constructed near Prudhoe Bay and will likely require one or more large equipment modules to be off-loaded at the West Dock loading facility. The West Dock facility is a gravel causeway stretching 4 km (21.5 mi) into Prudhoe Bay. Shipments to West Dock will likely require improvements to the dock facilities including installing breasting dolphins and raising the

height of the existing dock head to accept the large shipments. Dredging will be needed to deepen the navigational channel to the dock head. Continued pre-construction project engineering and design work involving site evaluations and environmental surveys on the North Slope is likely to occur in the 2016-2021 period. Additional early-phase construction work could occur during this time but would likely be limited to expansion of West Dock beginning in 2020, gravel extraction and placement for pads and roads near Prudhoe Bay beginning in 2019, and ice-road construction in 2018-2021.

Production Activities

North Slope production facilities occur from the Barrow gas fields in the west to Badami and Point Thomson in the east. Production activities include building operations, oil and gas production, oil and gas transport, facilities maintenance and upgrades, restoration, and remediation. Production activities are permanent, year-round activities, whereas exploration and development activities are usually temporary and seasonal. Alpine and Badami are not connected to the road system and must be accessed by airstrips, barges, and seasonal ice roads. Transportation on the North Slope is by automobile, airplanes, helicopters, boats, rolligons, tracked vehicles, and snowmobiles. Aircraft, both fixed wing and helicopters, are used for movement of personnel, mail, rush cargo, and perishable items. Most equipment and materials are transported to the North Slope by truck or barge. Much of the barge traffic during the open water season unloads from West Dock. Maintenance dredging of up to 660,000 ft^3 per year of material is performed at West Dock to ensure continued operation.

Oil pipelines extend from each developed oil field to the Trans-Alaska Pipeline System (TAPS). The 122-cm (48-in) diameter TAPS pipeline extends 1,287 km (800 mi) from the Prudhoe Bay oil field to the Valdez Marine Terminal. Alyeska Pipeline Service Company conducts pipeline operations and maintenance. Access to the pipeline is primarily from established roads, such as the Spine Road and the Dalton Highway, or along the pipeline right-of-way.

Barrow Gas Fields

The North Slope Borough (NSB) operates the Barrow Gas Fields located south and east of the city of Barrow. The Barrow Gas Fields include the Walakpa, South, and East Gas Fields. The East Field and part of the South Field are included in the Beaufort Sea ITR region. Drilling and testing of the East Barrow Field began in 1974, and regular gas production from the pool began in December 1981. Production peaked at about 2.75 million ft^3 of gas per day in 1983, and then began to decline. In 2011 and 2012, NSB increased production by drilling five new wells, upgrading pipelines, and installing modern wellhead housings. In the winter of 2013, production was about 350 million ft^3 per day. Cumulatively, the field produced more than 8.8 billion ft^3 through July 2013, surpassing the original estimate of 6.2 billion ft^3.

Although activities within the Barrow Gas Fields were not specifically identified by the Applicants, the petition did include this area as part of the request for ITRs. Additionally, a portion of the Barrow Gas Fields are similarly described in ITRs for the Chukchi Sea (78 FR 35364**,** June 12, 2013), while the remainder is located in the Beaufort Sea geographic region. Therefore, as part of this analysis, we have included the Barrow Gas Fields in the event that LOAs for activities on the Beaufort Sea side of the field are requested. Gas production is expected to continue at its current rate during the next five years, and will be accompanied by

maintenance and support activities, including possible access by air or over land, ice road construction, survey work, or on-pad construction.

Alpine Oil Field

The Alpine oil field within the Colville River Unit began production in 2000. The majority interest holder and primary operator is CPAI. Alpine is currently the westernmost production oilfield on the North Slope, located 31 mi (50 km) west of the Kuparuk oilfield and 9 mi (14 km) northeast of the village of Nuiqsut. Facilities include a combined production pad/drill site, three additional drill sites, and 180 wells. Pads, gravel roads, an airstrip, and processing facilities cover a total surface area of 165 acres (67 ha). Crude oil from Alpine is transported 55 km (34 mi) through a 14-inch (0.35-m) pipeline to the Trans-Alaska Pipeline System. An ice road is constructed annually between Alpine and the Kuparuk oilfield to support major resupply activities. Small aircraft are used year-round to provide supplies and crew changeovers; camp facilities can support up to approximately 630 personnel.

Oooguruk Unit

The Oooguruk Unit, operated by Caelus, is located at the north end of the Colville-Kuparuk fairway, adjacent to the Kuparuk Unit in shallow waters of Harrison Bay. The Oooguruk drillsite is located on a 6 acre artificial island in the shallow waters of Harrison Bay. A 9.2-km (5.7-mi) system of subsea flowlines, power cables, and communications cables connects the island to onshore support facilities. Production began in 2008, and future expansion of the drill site would increase the working surface area from 2.4 hectare (6 acres) to 3.8 hectare (9.5 acres). Drilling additional production wells is planned and new injection well technology would be employed. Cumulative production was estimated to be 9.8 million bbl as of 2011 (AOGCC 2013).

Kuparuk River Unit

The Kuparuk oilfield, operated by CPAI, is Alaska's second-largest producing oilfield behind Prudhoe Bay. The gross volume of the oilfield has been estimated to be 6 billion bbl; more than 2.5 billion bbl have been produced as of 2014 (CPAI 2014). Nearly 900 wells have been drilled in the Greater Kuparuk Area, which includes the satellite oilfields of Tarn, Palm, Tabasco, West Sak, and Meltwater. The total development area in the Greater Kuparuk Area is approximately 1,508 acres (603 ha), including 104 mi (167 km) of gravel roads, 144 mi (231 km) of pipelines, six gravel mine sites, and over 50 gravel pads. The Kuparuk operations center and construction camp can accommodate up to 1,200 personnel.

Nikaitchuq / Milne Point

The Nikaitchuq Unit is located at Spy Island, north of the Kuparuk River Unit. In 2007, Eni became the operator in the area and subsequently constructed an offshore gravel pad and onshore production facilities at Spy Island and Oliktok Point. A subsea flowline was constructed to transfer produced fluids from shore. Production began in 2011 at Oliktok Point and in 2012 at Spy Island. Cumulative production at the end of 2011 was approximately 2 million bbl. As of 2016, a program to expand production is underway, including drilling of 20 or more new wells to recover oil from the nearby Schrader Bluff reservoirs.

The Milne Point Unit, operated by Hilcorp, is located approximately 56 km (35 mi) northwest of Prudhoe Bay and immediately east of the Nikaitchuq Unit. This field consists of more than 220 wells drilled from 12 gravel pads. Milne Point produces oil from three main fields: Kuparuk, Schrader Bluff, and Sag River. Cumulative oil production as of the end of 2012 was 308 barrels of oil equivalent per day (BOE; the amount of hydrocarbon product containing energy equivalent to that of a barrel of oil). The total gravel footprint of Milne Point and its satellites is 450 acres (182 ha). The Milne Point Operations Center has accommodations for up to 180 people. An expansion program is underway for the Milne Point Unit. It is likely to improve technology of existing wells and may include building a new drill pad, roads, and associated wells.

Prudhoe Bay Unit

The Prudhoe Bay Unit, operated by BPXA, is one of the largest oilfields by production in North America and ranks among the 20 largest oilfields worldwide. Over 12 billion bbl have been produced from a field originally estimated to have 25 billion bbl of oil in place. The Prudhoe Bay oilfield also contains an estimated 26 trillion ft^3 of recoverable natural gas. More than 1,100 wells are currently in operation in the Prudhoe Bay oilfields, approximately 830 of which are producing oil (others are for gas or water injection). Average daily production in 2012 was around 255,500 bbl of oil equivalent (BOE).

The Prudhoe Bay Unit encompasses several oil fields, including the Point McIntyre, Lisburne, Niakuk, Western Niakuk, West Beach, North Prudhoe Bay, Borealis, Midnight Sun, Polaris, Aurora, and Orion reservoirs. Of these, the largest field by production is the Point McIntyre oil field, which lies about 11 km (7 mi) north of Prudhoe Bay. Cumulative oil production between 1993 and 2011 was 436 million bbl (AOGCC 2013). In 2014, production at Point McIntyre averaged about 18,700 bbl of oil per day. The Lisburne field is largest by area. It covers about 80,000 acres (32,375 ha) just northwest of the main Prudhoe Bay field. Production was reported as 7,070 bbl per day in 2011, and cumulative production was approximately 182 million BOE as of 2014. The Niakuk fields have also reached high cumulative yields among the Greater Prudhoe Bay area oil fields. Between 1994 and 2011, these fields produced about 157 million bbl. In 2014, the combined Niakuk fields yielded about 1,200 bbl per day. Orion, Aurora, Polaris, Borealis and Midnight Sun are considered satellite fields and were producing more than 22,500 bbl per day combined in 2014 (BPXA 2015). In total, Prudhoe Bay satellite fields have produced more than 184 million BOE.

The total development area in the Prudhoe Bay Unit is approximately 6,883 acres (2,785 ha) within an area of about 213,543 acres (86,418 ha). On the east side of the field the main construction camp can accommodate up to 625 people, the Prudhoe Bay operations center houses up to 449 people, and the Tarmac Camp houses 244 people. The base operations center on the western side of the Prudhoe Bay oilfield can accommodate 474 people. Additional personnel are housed at facilities in Deadhorse or in temporary camps placed on existing gravel pads. Activities in this unit are likely to emphasize greater production of natural gas if construction of a gas pipeline begins during the 2016-2021 Beaufort Sea ITR period.

Northstar and Endicott

The Northstar oilfield is located 6 km (4 mi) northwest of the Point McIntyre and 10 km (6 mi) north of the Prudhoe Bay Unit. It is operated by Hilcorp. The 38,400-acre (15,360-hectare)

reservoir lies offshore in waters up to 40 feet (12 m) deep. A 5-acre (2-ha) artificial island supports 24 operating wells and all support facilities for this field. A subsea pipeline connects facilities to the Prudhoe Bay oilfield. Production began in 2001 and as of 2013 had surpassed 158.3 million bbl. The on-site base operations center houses 50 people.

The Endicott oilfield, operated by Hilcorp, is located approximately 16 km (10 mi) northeast of Prudhoe Bay. The Endicott oilfield was developed from two artificial islands connected to the mainland by a gravel causeway. The operations center and processing facilities are located on the 58-acre (24-hectare) main production island. As of August 2013, 501 million BOE have been produced from Endicott. Production is from the Endicott reservoir in the Kekiktuk formation and two satellite fields (Eider and Sag Delta North) in the Ivishak formation. All wells were drilled from Endicott's main production island. The total area of development is 522 acres (210 ha) of land (including the Liberty satellite drilling island) with 24 km (15 mi) of roads, 43 km (24 mi) of pipelines, and one gravel mine site. Approximately 85 people can be housed at Endicott's Liberty camp.

East-End Production

The Badami and Point Thompson Units are located in the eastern portion of the North Slope and Beaufort Sea planning areas. Production from the Badami oilfield began in 1998 and from Point Thompson in 1983, but has not been continuous from either unit. The Badami field is located approximately 56 km (35 mi) east of Prudhoe Bay and is the most easterly oilfield currently in production on the North Slope. Point Thompson, located 4 km (2.5 mi) east of Badami, is expected to restart production in 2016. The Badami development area is approximately 85 acres (34 ha) of tundra including 7 km (4.5 mi) of gravel roads, 56 km (35 mi) of pipeline, one gravel mine site, and two gravel pads with a total of eight wells. As of 2011, cumulative production had reached 5.7 million bbl. There is no permanent road connection from Badami to Prudhoe Bay. A pipeline connecting the Badami oilfield to the common carrier pipeline system at Endicott was built from an ice road.

3. ACTION AREA

The Action Area covered by the proposed Beaufort Sea ITRs (Beaufort Sea ITR region; Figure 3.1) encompasses all Beaufort Sea waters east of a north-south line through Point Barrow, Alaska (71° 23'29" N, -156° 28'30" W, BGN 1944), and extending approximately 322 km (200 mi) north, including all Alaska State waters and Outer Continental Shelf (OCS) waters, and east of that line to the Canadian border. The offshore boundary of the Beaufort Sea ITR region matches the boundary of the BOEM Beaufort Sea Planning area, approximately 322 km (200 mi) offshore. The onshore region is the same north/south line through Point Barrow, extending 40.2 km (25 mi) inland and east to the Canning River. The ANWR is not included in the Beaufort ITR region (approximately 29.8 million ha or 73.6 million acres) is similar to the region covered in previous regulations (approximately 29.9 million ha or 68.9 million ac; 76 FR 47011, August 3, 2011). An increase in the geographic area of the proposed Beaufort Sea ITR region versus the region set forth in previous ITRs (approximately 1.9 million ha or 4.7 million ac) is the result of matching the offshore boundary with that of the BOEM Beaufort Sea Planning area boundary.

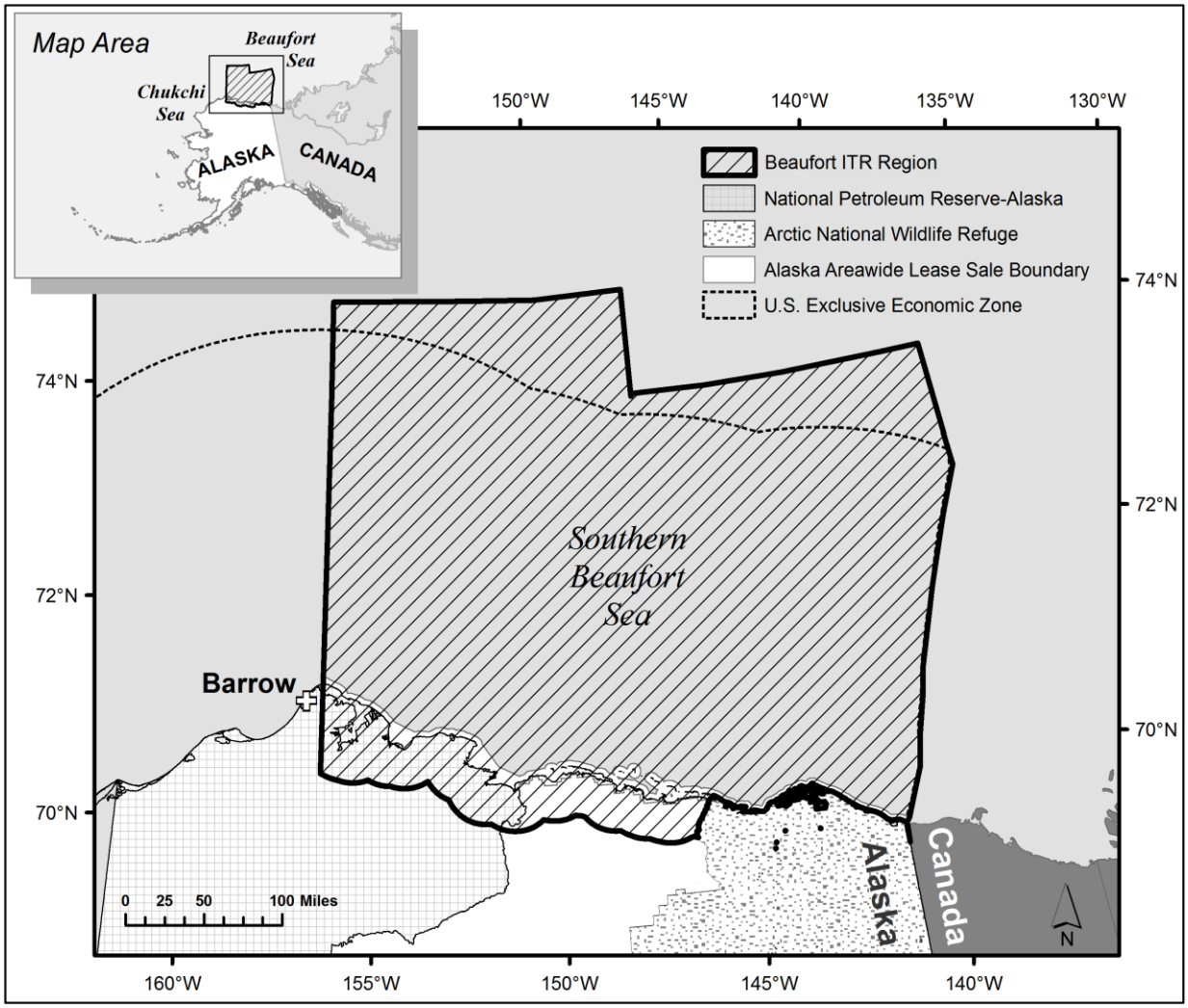

Figure 3.1. The geographic region covered by the proposed Beaufort Sea Incidental Take Regulations.

4. STATUS OF LISTED AND CANDIDATE SPECIES

Status of the Polar Bear

Status and Distribution

Due to threats to its sea ice habitat, on May 15, 2008 the Service listed the polar bear (*Ursus maritimus*) as threatened (73 FR 28212) throughout its range under the ESA. In the U.S., the polar bear is also protected under the MMPA and the Convention on International Trade in Endangered Species of Wildlife Fauna and Flora (CITES) of 1973.

Polar bears are widely distributed throughout the Arctic where the sea is ice-covered for large portions of the year. The most current population estimate for polar bears is approximately 26,000 individuals (95 % CI = 22,000-31,000; Wiig et al. 2015). Polar bears throughout their range are subdivided into 19 recognized populations or stocks (Figure 4.11). The International Union for Conservation of Nature and Natural Resources, Species Survival Commission

(IUCN/SSC) Polar Bear Specialist Group ranked nine, three, and six of these stocks as "data deficient," "declining," and "stable," respectively (Norwegian Polar Institute 2015).

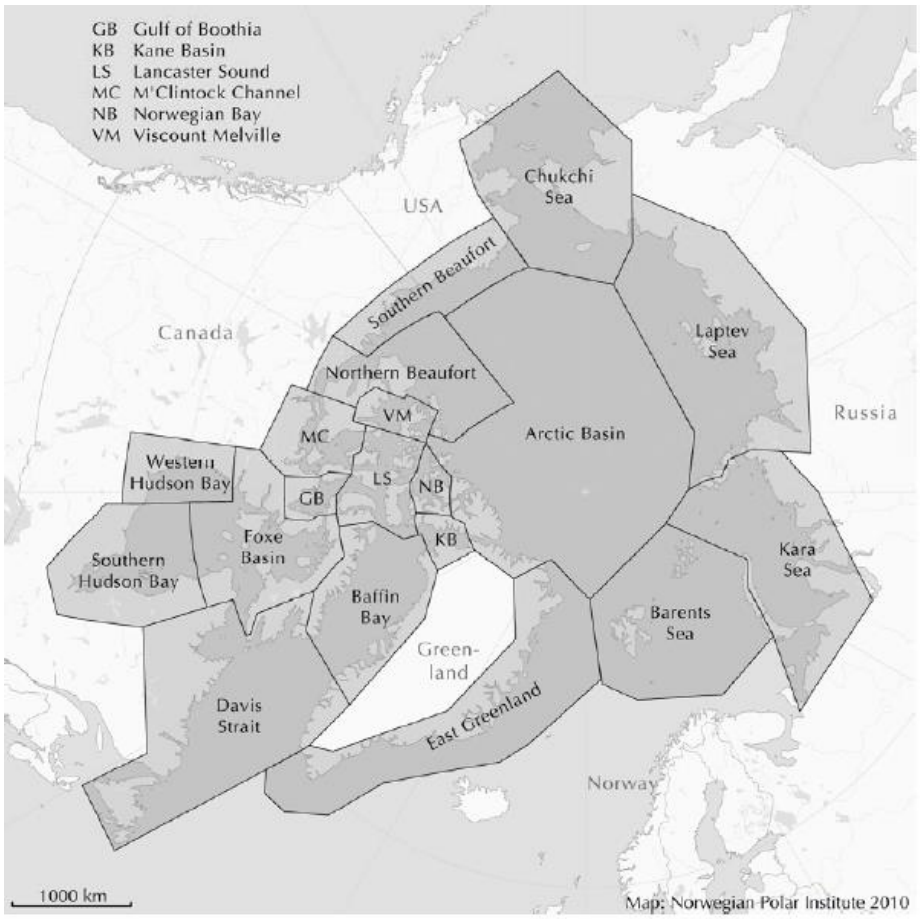

Figure 4.1. Distribution of polar bear stocks throughout the circumpolar basin (from Obbard et al. 2010).

Life History

We briefly describe aspects of the polar bear's food habits below, for a complete life history of the polar bear, please see 73 FR 28212.

Sea ice provides a platform for hunting and feeding, for seeking mates and breeding, for denning, for resting, and for long-distance movement. Ringed seals are the polar bear's primary food source, and areas near ice edges, leads, or polynyas where ocean depth is minimal are the most productive hunting grounds (Durner et al. 2004). While polar bears primarily hunt seals for food, they may occasionally consume other marine mammals (73 FR 28212). While the main food source of polar bears is ice seals, bowhead whale carcasses have been available to polar bears as a food source on the North Slope since the early 1970s (Koski et al. 2005) and therefore may affect their distribution locally. Barter Island (near Kaktovik) has had the highest recorded concentration of polar bears on shore (17.0 ± 6.0 polar bears/100 km) followed by Barrow (2.2 ± 1.8) and Cross Island (2.0 ± 1.8; Schliebe et al. 2008). Unusual numbers of polar bears were observed in 2012 in the vicinity of the bowhead whale carcass "bonepile" on Barter Island; the USFWS observed a minimum, maximum, and average of 24, 80, and 52 bears respectively

(USFWS 2012). The high number of bears on/near Barter Island compared to other areas is thought to be due in part to the proximity to the ice edge and high ringed seal densities (Schliebe et al. 2008), as the number of whales harvested at Kaktovik is lower than that at Barrow or Cross Island.

The use of whale carcasses as a food source likely varies among individuals and years. Stable isotope analysis of polar bears in 2003 and 2004 suggested that bowhead whale carcasses comprised 11%-26% (95% CI) of the diets of sampled polar bears in 2003, and 0%-14% (95% CI) in 2004 (Bentzen et al. 2007). Polar bears depend on sea ice to hunt seals, and temporal and spatial availability of sea ice is predicted to decline. Thus, polar bear use of whale carcasses may increase in the future.

Threats to the Polar Bear

The arctic is losing sea ice, which is predicted to negatively affect polar bear populations. The loss rate of ice thickness is increasing (Haas et al. 2010), and trends in arctic sea ice extent and area (see http://nsidc.org/arcticseaicenews/faq/#area_extent for explanation of these terms) are negative (-12.2% and -13.5 %/decade, respectively; Comiso 2012). Declines in sea ice are more pronounced in summer than winter (NSIDC, 2011a, b). Positive feedback systems (i.e., sea-ice albedo) and naturally occurring events, such as warm water intrusion into the Arctic and changing atmospheric wind patterns, can cause fragmentation of sea ice, reduction in the extent and area of sea ice in all seasons, retraction of sea ice away from productive continental shelf areas throughout the polar basin, reduction of the amount of heavier and more stable multi-year ice, and declining thickness and quality of shore-fast ice (Parkinson et al. 1999, Rothrock et al. 1999, Comiso 2003, Fowler et al. 2004, Lindsay and Zhang 2005, Holland et al. 2006, Comiso 2006, Serreze et al. 2007, Stroeve et al. 2008). These climatic phenomena may also reduce ice seal abundance, thereby impacting the polar bear's ability to forage (Kingsley 1979, DeMaster et al. 1980, Amstrup et al. 1986, Stirling 2002).

Climate-induced habitat degradation and loss are negatively affecting some polar bear stocks, and unabated global warming is expected to reduce the worldwide polar bear population (Obbard et al. 2010). Loss of sea ice habitat due to climate change is identified as the primary threat to polar bears (Schliebe et al. 2006, 73 FR 28212, Obbard et al. 2010). Patterns of increased temperatures, earlier spring thaw, later fall freeze-up, increased rain-on-snow events (which may cause dens to collapse), and potential reductions in snowfall are also occurring. However, threats to polar bears will likely occur at different rates and times across their range (Obbard et al. 2010).

Because the polar bear depends on sea ice for its survival, loss of sea ice due to climate change is its largest threat worldwide, although polar bear subpopulations face different combinations of human-induced threats (Obbard et al. 2010). Arctic summer sea ice reached its lowest average extent in 2012 and has declined 13% since 1979 (NSIDC). The largest human-caused loss of polar bears is from subsistence hunting of the species, but for most subpopulations where subsistence hunting of polar bears occurs, it is a regulated and/or monitored activity (Obbard et al. 2010). Other threats include accumulation of persistent organic pollutants in polar bear tissue, tourism, human-bear conflict, and increased development in the Arctic (Obbard et al. 2010). Because uncertainty exists regarding the numbers of bears in some stocks and how

human activities interact to ultimately affect the worldwide polar bear population, conservation and management of polar bears at the worldwide population level is challenging.

Summary

Polar bears are found throughout the ice-covered seas and adjacent coasts of the Arctic. The most recent population estimate for polar bears is approximately 26,000 individuals (Wiig et al. 2015), and due to climate-driven sea ice loss, the world-wide polar bear population is likely to face future declines. The *Environmental Baseline* includes a more detailed description of polar bears in the Beaufort Sea ITR region.

Status of the Pacific walrus

Abundance and Distribution

Pacific walrus constitute a single panmictic population inhabiting the shallow continental shelf waters of the Bering and Chukchi seas (Lindqvist et al. 2009, Berta and Churchill 2012). The distribution of walrus is largely influenced by the extent of the seasonal pack ice and prey densities. From April to June, most of the walrus population migrates from the Bering Sea through the Bering Strait and into the Chukchi Sea. Walruses tend to migrate into the Chukchi Sea along lead systems that develop in the sea-ice. Walruses are closely associated with the edge of the seasonal pack ice during the open-water season. By July, thousands of animals can be found along the edge of the pack ice from Russian waters to areas west of Point Barrow, Alaska. The pack-ice usually advances rapidly southward in late fall, and most walruses return to the Bering Sea by mid- to late-November. During the winter breeding season walruses are found in three concentration areas of the Bering Sea where open leads, polynyas, or thin ice occur (Fay et al. 1984, Garlich-Miller et al. 2011). While the specific location of these groups varies annually and seasonally depending upon the extent of the sea-ice, generally one group occurs near the Gulf of Anadyr, another south of St. Lawrence Island, and a third in the southeastern Bering Sea south of Nunivak Island into northwestern Bristol Bay.

Walrus are generally found in waters of 100 m (328 ft) or less although they are capable of diving to greater depths. They use sea-ice as a resting platform over feeding areas, as well as for giving birth, nursing, passive transportation and avoiding predators (Fay 1982, Ray et al. 2006). They feed almost exclusively on benthic invertebrates. Native hunters have also reported incidences of walruses preying on seals, and other items such as fish and birds are occasionally taken (Sheffield and Grebmeier 2009, Seymour et al. 2014). Foraging trips may last for several days with walruses diving to the bottom nearly continuously. Most foraging dives last between 5 and 10 minutes, with a 1-2-minute surface interval. Disturbance of the sea floor by foraging walrus releases nutrients into the water column, provides food for scavenger organisms, contributes to the diversity of the benthic community, and is thought to have a significant influence on the ecology of the Bering and Chukchi seas (Ray et al. 2006).

Walrus are social animals. They travel and haul-out onto ice or land in groups. Walruses spend approximately 20−30 percent of their time out of the water, and hauled-out walruses tend to be in close physical contact. Young animals often lie on top of adults. The size of hauled-out groups can range from a few animals to several thousand individuals. The largest aggregations

occur at terrestrial haulouts. In recent years, the barrier islands north of Point Lay, Alaska, have held large aggregations of walruses (20,000−40,000) in late summer and fall (Monson et al. 2013).

The size of the walrus population has never been known with certainty. Based on large sustained harvests in the 18th and 19th centuries, Fay (1957) speculated the pre-exploitation population was represented by a minimum of 200,000 animals. Since that time, population size following European contact is believed to have fluctuated markedly in response to varying levels of human exploitation. Large-scale commercial harvests are believed to have reduced the population to 50,000-100,000 animals in the mid-1950s (Fay et al. 1989). The population increased rapidly in size during the 1960s and 1970s in response to harvest regulations that limited take of females. The population likely reached or exceeded the food-based carrying capacity (K) of the region by 1980 (Fay et al. 1989, Fay et al. 1997, Garlich-Miller et al. 2006, MacCracken et al. 2014).

Between 1975 and 1990, aerial surveys conducted jointly by the United States and Russia at 5-year intervals produced population estimates ranging from about 200,000 to 255,000 individuals, with large confidence intervals. Efforts to survey the walrus population were suspended by both countries after 1990 because problems with survey methods produced population estimates with unknown bias and unknown variances that severely limited their utility. In 2006, the United States and Russia conducted another joint aerial survey in the pack ice of the Bering Sea using thermal imaging systems to more accurately count walrus hauled out on sea-ice, and satellite transmitters to account for walrus in the water. The number of walrus within the surveyed area was estimated at 129,000 with 95 percent confidence limits of 55,000 to 507,000 individuals. This estimate should be considered a minimum, as weather conditions forced termination of the survey before large areas of the Bering Sea were surveyed (Speckman et al. 2011).

Taylor and Udevitz (2015) used both the aerial survey population estimates described above and ship-based age and sex composition counts that occurred in 1981-1984, 1998, and 1999 (Citta et al. 2014) in a Bayesian integrated population model to estimate population trend and vital rates from 1975-2006. They recalculated the 1975-1990 aerial survey estimates based on a lognormal distribution for inclusion in their model. Their results generally agreed with the large-scale population trends identified by the previous efforts, but with slightly different population estimates in some years along with more precise confidence intervals. They were careful to note that all demographic rates in their model were estimated based on age structure data from 1981 to 1999, when the population was in decline, and that projections outside those years are extrapolations of demographic functions that may not accurately reflect dynamics for different population trends. Ultimately, they concluded 1) that though their model provides improved clarity on past walrus population trends and vital rates, it cannot overcome the large uncertainties in the available population size data, and 2) that the absolute size of the Pacific walrus population will continue to be speculative until accurate empirical estimation of the population becomes feasible. A detailed description of the Pacific walrus stock can be found in the Pacific Walrus Stock Assessment Report (announced at 79 FR 22154, April 21, 2014).

Range-wide Threats and Uncertainties

On February 10, 2011, the Service issued a *12-month Finding on a Petition to List the Pacific Walrus as Endangered or Threatened* (76 FR 7634). The listing of walruses was found to be warranted, but precluded due to higher priority listing actions and, the Pacific walrus was added to the list of candidate species under the ESA. In the Finding, the Service evaluated and considered five factors: (A) the present or threatened destruction, modification, or curtailment of its habitat or range, (B) overutilization for commercial, recreational, scientific, or educational purposes, (C) disease or predation, (D) the inadequacy of existing regulatory mechanisms, and (E) other natural or manmade factors affecting its continued existence); we discuss these factors below.

Factor A -- Walrus may become increasingly dependent on terrestrial haulouts due to loss of sea ice. High walrus concentrations at coastal haulouts could deplete local prey and cause walrus to expend more energy as they travel further from shore to forage (76 FR 7634:7646). Intra-specific trauma at terrestrial haulouts is also a known source of injury and mortality (USFWS 2014). Disturbance events can cause walrus to stampede into the water and have been known to result in injuries and mortalities. The risk of stampede-related injuries increases with the number of animals hauled out. Calves and young animals are particularly vulnerable to trampling injuries and mortality. Management and protection programs in both the United States and Russian Federation have been successful in reducing disturbances and large mortality events at coastal haulouts (USFWS 2014).

Factor B – Walruses have been hunted by coastal Natives in Alaska and Chukotka for thousands of years (Ray 1975). Exploitation of the walrus population by Europeans has also occurred in varying degrees since beginning with the arrival of exploratory expeditions, but ceased in 1972 in the United States with the passage of the MMPA and in 1990 in Russia. Presently, walrus hunting in Alaska and Chukotka is restricted to subsistence use by native peoples. Harvest mortality from 2000−2014 for both the United States and Russian Federation averaged 3,207 (SE = 194) walrus per year. This mortality estimate includes corrections for under-reported harvest (U.S. only) and struck and lost animals. Resource managers in Russia have concluded the population has declined and reduced harvest quotas in recent years accordingly (Kochnev 2004; Kochnev 2005; Kochnev 2010; pers. comm.; Litovka 2015, pers. comm.), based in part on the lower abundance estimate generated from the 2006 survey. However, Russian hunters have never reached the quota (Litovka 2015, pers. comm.). Subsistence harvest reporting in the U.S. is required under section 109(i) of the MMPA and is administered through a Marking, Tagging, and Reporting Program (MTRP; 50 CFR 18.23(f)). Compliance rates vary annually with estimates from 60 to 100 percent. Harvests rates in Russia and the United States have declined by about 3 percent per year since 2000 and were exceptionally low in the United States in 2012−2014.

Factor C. The occurrence and effects of diseases and parasites on walrus appear to be minor. Polar bears are known to prey on walruses, particularly calves, and killer whales *(Orcinus orca)* have been known to take all age classes of walruses (Frost et al. 1992, Melnikov and Zagrebin 2005). Predation rates are unknown but are thought to be highest near terrestrial haulout sites where large aggregations of walruses can be found. However, few observations exist of predation upon walruses farther offshore. The Service could not conclude with sufficient

reliability that disease, or predation will rise to the level of a threat (i.e., a stressor contributing to the risk of extinction) for the Pacific walrus population in the foreseeable future (76 FR 7634: 7659-7660).

Factor D. Analysis of the adequacy of laws and regulations regarding Pacific walrus focused on two primary threats: loss of sea-ice habitat and subsistence harvest. The Service concluded there are no known regulatory mechanisms in place at the national or international level that are likely to effectively reduce or limit greenhouse gas emissions, and thus regulatory mechanisms do not currently exist to effectively address the loss of sea-ice habitat. Likewise, this analysis concluded that subsistence harvest is expected to continue at current levels, while the walrus population is projected to decline with continued loss of sea ice and associated impacts. Therefore, barring additional Tribal or Federal regulations, we anticipate the proportion of animals harvested will increase relative to the overall population. As a result, the current level of subsistence harvest will likely become unsustainable in the foreseeable future. To address this threat, regulatory mechanisms will need to be developed and implemented to ensure that future harvest levels are reduced in proportion to the declining walrus population such that subsistence harvest levels are sustainable.

Factor E. Other natural or manmade stressors analyzed in the 12-month Finding included pollution and contaminants, oil and gas exploration, development, production, commercial fisheries interactions, shipping, oil spills, and icebreaking activities. The Service concluded none of these stressors are a threat that contributes to the risk of extinction of the Pacific walrus, and they are not likely to become a threat that contributes to the risk of extinction in the foreseeable future (76 FR 7634:7671).

Summary

The Pacific walrus ranges across the shallow continental shelf of the northern Bering and Chukchi seas, occasionally ranging into the East Siberian and Beaufort seas. The most recent estimate of population size for Pacific walrus was 129,000 (95% CI, 55,000 to 507,000) although this estimate should be considered a minimum (Speckman et al. 2011). Factors associated with climate change (e.g., loss of sea ice) and subsistence hunting, are likely to continue into the foreseeable future.

5. ENVIRONMENTAL BASELINE

The environmental baseline includes the current status of listed and candidate species, their habitats, and any designated critical habitat resulting from past and ongoing human and natural factors in the Action Area. Also included are the anticipated impacts of other proposed and ongoing Federal projects in the Action Area. Thus, we considered the following activities/factors to be relevant in the environmental baseline:

- Polar bear and Pacific walrus abundance, distribution, and trends (when known) and factors affecting these population indices in the Action Area, including loss of sea ice resulting from climate change and subsistence harvest;

- Proposed planning area documents and permits issued by BOEM, BLM, USACE, and the EPA for Industry-related development, some of which are described in the *Project Description*;
- Lease sales by BOEM and BLM;
- Annual summer programmatic for activities in the NPR-A (e.g., the 2016 summer programmatic BO) for the next five years;
- NPR-A permits for winter travel on- and offshore for non-oil and gas activities for the next five years;
- Research in the NPR-A and OCS;
- U.S. Coast Guard operations;
- Polar bear research by the U.S. Geological Survey (USGS), the Service's MMM, and the North Slope Borough;
- Passive and preventative deterrence measures; and
- Non-Federal activities such as snow machine or other recreation in the Action Area.

Baseline of the Polar Bear

Two stocks of polar bears occur within the Beaufort Sea ITR region: the Chukchi/Bering seas stock (CS) and Southern Beaufort Sea (SBS) stock (Figure 5.1). The stocks overlap in the eastern Chukchi Sea/western Beaufort region, but have been distinguished by animal movement data and tissue contaminants (Amstrup et al. 2004, Amstrup et al. 2005). Most denning in Alaska occurs by the SBS population, due to the relative proximity of the Beaufort Sea's ice edge to terrestrial habitat during fall when some pregnant females come ashore. Both stocks range beyond the U.S.; the CS population ranges into Russia, and the SBS population ranges into Canada.

The highest number of polar bears in the Beaufort Sea ITR region occur on land during fall and winter when some polar bears enter the coastal environment as they abandon melting sea ice, forage for terrestrial food (e.g., whale carcasses), or search for suitable den sites (pregnant females). Bears may also spend some time on land while transiting to other areas. If bears come ashore due to fall storms, melting sea ice, and/or ocean currents, they may remain along the coast or on barrier islands for several weeks until sea ice returns. Polar bears do not use the Chukchi Sea and adjacent Alaska coastline in the same manner they use the Beaufort Sea and the adjacent North Slope (Craig Perham, MMM-FWS, pers. com.). The number of bears using the coastline of the Beaufort Sea during the open-water season would likely be higher than the number of bears using the Chukchi Sea coastline. Interactions with polar bears in the SBS could occur at both onshore and offshore facilities and would likely be related to seasonal variation in sea ice cover and extent.

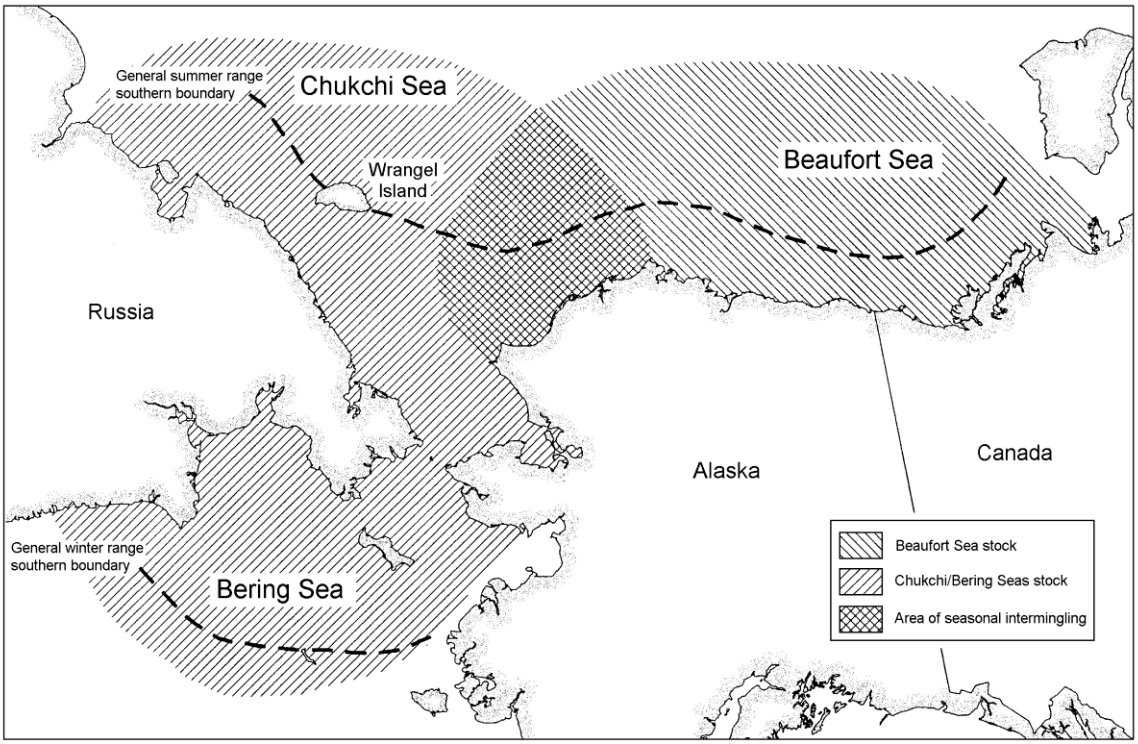

Figure 5.1. Polar bear distribution/range in Alaska.

Chukchi/Bering seas Stock

The CS polar bear population is shared between the Russian Federation and Alaska. The CS stock is widely distributed on the pack ice in the Chukchi Sea and northern Bering Sea and adjacent coastal areas in Alaska and Chukotka, Russia. Radio-telemetry data indicate that the north-eastern boundary of the CS population is near the Colville Delta in the central Beaufort Sea and the western boundary is near the Kolyma River in north-eastern Siberia (Garner et al.1990; Amstrup 1995; Amstrup et al. 2005). The population's southern boundary is determined by the extent of annual sea ice in the Bering Sea. An extensive area of overlap between the Southern Beaufort Sea stock and the Chukchi/Bering seas stock occurs between Point Barrow and Point Hope (Figure 4.7; Garner et al. 1990; Garner et al. 1994; Amstrup et al. 2000; Amstrup et al. 2004; Obbard et al. 2010; Wiig et al. 2015). Polar bears in this overlap area have an equal probability of being from the CS population or from the SBS population (Amstrup et al. 2004).

It has been difficult to obtain a reliable population estimate for this stock due to the vast and inaccessible nature of the habitat, movement of bears across international boundaries, logistical constraints, and budget limitations (Amstrup and DeMaster 1988; Garner et al. 1992; Garner et al. 1998; Evans et al. 2003). Estimates of the stock have been derived from observations of dens and aerial surveys (Chelintsev 1977; Stishov 1991a; Stishov 1991b; Stishov et al. 1991c); however, those estimates have wide confidence intervals and are out of date. The most recent estimate of the CS stock was approximately 2,000 animals, based on extrapolation of aerial den surveys (Lunn et al. 2002; USFWS 2010a; Wiig et al. 2015). However, the current status and trend of the CS stock are considered unknown due to a lack of data.

Southern Beaufort Sea Stock

The SBS polar bear population is shared between Canada and Alaska. Radio-telemetry data, combined with ear tag returns from harvested bears, suggest that the SBS population occupies a region with a western boundary near Icy Cape, Alaska, and an eastern boundary near Pearce Point, Northwest Territories, Canada (USFWS 2010b).

Early estimates from the mid-1980s suggested the size of the SBS population was approximately 1,800 polar bears. A population analysis of the SBS stock was completed in June 2006 through joint research coordinated between the United States and Canada. That analysis indicated the population of the region between Icy Cape and Pearce Point was approximately 1,500 polar bears (95 percent CI = 1,000–2,000). Although the CI of the 2006 population estimate overlapped the previous population estimate of 1,800, other statistical and ecological evidence (e.g., high recapture rates encountered in the field) suggest that the current population is actually smaller than has been estimated for this area in the past.

The most recent estimate of the SBS stock, which used an open population mark/recapture analysis, estimated a population size of approximately 900 bears in 2010 (90% C.I. 606-1,212; Bromaghin et al. 2015), down from a previous estimate of 1,526 bears (95% CI = 1,211; 1,841) in 2006 (Regehr et al. 2006). Available trend data suggests this stock has experienced varying periods of stability and decline over the past few decades. Little or no growth was observed during the 1990s (Amstrup et al. 2001). An overall population decline rate of 3% per year was reported from 2001-2005 (Hunter et al. 2007). Regehr et al. (2006, 2009) reported declining survival and recruitment from 2004 through 2006, which were years when summer and fall sea ice were reduced (NSIDC 2014). This led to a 25-50% decline in abundance, which was hypothesized to result from unfavorable ice conditions that limited access to prey, and possibly, low prey abundance (Bromaghin et al. 2015). For reasons not understood, survival of adults and cubs began to improve in 2007 (Bromaghin et al. 2015), which was a record low year for September sea ice (NSIDC 2007). Abundance was comparatively stable between 2008 and 2010.

Threats in the Action Area

In the Action Area, the greatest threat to polar bears is loss of sea ice resulting from climate change. Other factors such as subsistence hunting, oil and gas development, research, and contaminants are also discussed in this section.

Climate Change and Loss of Sea Ice

Global climate change and its effects in the Arctic are likely to have serious consequences for the worldwide population of polar bears and their prey (Amstrup et al. 2007, Amstrup et al. 2008, Hunter et al. 2010, Atwood et al. 2015). The associated reduction of summer Arctic sea ice is expected to be a primary threat to polar bear populations (Stirling and Derocher 2012), and projections indicate continued climate warming at least through the end of this century (IPCC 2013). The Service recently issued a draft Polar Bear Conservation Management Plan (USFWS 2015). In it, the Service reaffirms its finding from the ESA listing decision in 2008 that the decline of sea ice habitat due to changing climate, driven primarily by increasing atmospheric concentrations of greenhouse gases, is the primary threat to polar bears.

Climate change is expected to impact polar bears in a variety of ways. The timing of ice formation and breakup will impact seal distributions and abundance, and, consequently, how efficiently polar bears can hunt seals. Reductions in sea ice are expected to increase the polar bears' energetic costs of traveling, as moving through fragmented sea ice and swimming in open water requires more energy than walking across consolidated sea ice (Cherry et al. 2009, Pagano et al. 2012, Rode et al. 2014). Research has linked declines in summer sea ice to reduced physical condition, growth, and survival of polar bears (Bromaghin et al. 2015).

Decreased sea ice extent may impact the reproductive success of denning polar bears. Polar bears require a stable substrate for denning, and as ice conditions moderate, ice platforms become less stable, and coastal dens become vulnerable to erosion from storm surges. In the 1990s, around 50 percent of the maternal dens of the SBS polar bear population occurred on the pack ice in (Amstrup and Gardner 1994). Recently, the proportion of dens on pack ice declined from 62 percent in 1985–1994 to 37 percent in 1998–2004 (Fischbach et al. 2007). This trend in terrestrial denning appears to have continued. Polar bear dens on land, especially on the North Slope of Alaska, are at greater risk of conflict with human activities.

Habitat loss due to declining Arctic sea ice throughout the polar bear's range has been identified as the primary cause of population decline and is expected to continue for the foreseeable future (73 FR 28212). Amstrup et al. (2007) projected a 42 percent loss of optimal summer polar bear habitat by 2050. They concluded that if current Arctic sea-ice declines continue, polar bears may eventually be excluded from onshore denning habitat in the Polar Basin Divergent Region. Amstrup et al. (2007) projected the SBS and CS polar bear populations may be extirpated within the next 45–75 years, if sea-ice declines continue at current rates.

Due to the changing ice conditions, the Service anticipates polar bear use of the Beaufort Sea coast will increase during the open-water season (June through October). Indeed, polar bear use of coastal areas during the fall open-water period has increased in recent years in the Beaufort Sea (Schliebe et al. 2008). This change in distribution has been correlated with the distance of the pack ice from the coast at that time of year (i.e., the farther from shore the leading edge of the pack ice is, the more bears are observed onshore; Schliebe et al. 2006). Reductions in sea ice will result in increased distances between the ice edge and land, which may lead to increasing numbers of bears coming ashore during the open-water period, or possibly drowning in an attempt to reach land. In some cases, researchers have observed bears swim long distances during the open water period seeking either ice or land, and these bears may become vulnerable to exhaustion (Durner et al. 2011; Pagano et al. 2012). In the fall of 2004, four drowned polar bears were observed in the Beaufort Sea during a BOEM coastal aerial survey program (Monnett and Gleason 2006). An increased number of bears on land may increase human–bear interactions or conflicts during this time.

Participants in an Inuvialuit Traditional Knowledge survey and associated workshop indicated changing ice conditions and a warming Arctic are of great concern (Joint Secretariat 2015). Participants concluded there have been visible changes and considerable annual variation in the Beaufort Sea environment, including areas where until recently, many landscape features used for bear hunting were found with some certainty year after year. Participants indicated physical condition and the number of polar bears in traditional hunting areas appear to have remained

relatively stable within living memory, although bears are not as fat as they were prior to the mid-1980s and there are fewer large bears. Workshop participants also agreed that over the last several years, bears in certain areas appear to be visiting land more frequently and waiting on land for ice to form in the fall (Joint Secretariat 2015).

Subsistence Harvest

SBS population – The Inuvialuit-Inupiat Polar Bear Management Agreement, a Native-to-Native agreement, between the Inupiat from Alaska and the Inuvialuit in Canada was created for the SBS stock of polar bears in 1988. Polar bears harvested from the communities of Barrow, Nuiqsut, Kaktovik, Wainwright, and Atqasuk are currently considered part of the SBS stock and thus are subject to the terms of the Inuvialuit-Inupiat Polar Bear Management Agreement. The agreement establishes quotas and recommendations concerning protection of denning females, family groups, and methods of harvest.

In 1988, the Inuvialuit-Inupiat Council (Council) established a sustainable harvest quota of 80 bears for the SBS population. In 2010, the Council reduced the quota to 70 polar bears (email T. DeBruyn, August 13, 2010) based on a reduced population estimate (email T. DeBruyn, August 13, 2010). Since 1980, native subsistence harvest of polar bears from the SBS has remained relatively consistent and averages 36 bears per year.

CS population – In 2007, the U.S. ratified the *Agreement between the Government of the United States of America and the Government of the Russian Federation on the Conservation and Management of the Alaska–Chukotka Polar Bear Population* which established long-term, science-based conservation of the shared CS polar bear population and allowed for unifying management. In June 2010, the U.S./Russia Commission adopted an annual harvest limit for polar bears from the CS population. An annual limit of 19 females and 39 males is to be split evenly between Native peoples of Alaska and Chukotka (DeBruyn et al. 2010). The quota will be adopted in phases over the next several years. The Alaskan share of the harvest is 29 total polar bears per year, which is below the average of 37 polar bears harvested each year between 2004 and 2008 (USFWS, unpublished data). The Agreement applies to all Alaskan coastal villages south of, and including Barrow, but does not directly affect the geographic region of the Beaufort Sea ITRs.

Oil and Gas Activities

Most impacts of oil and gas activities are presented in the *Effects* section of this document. However, anthropogenic activities (e.g., industrial activities and associated polar bear ITRs) are expected to exert a considerably smaller influence on polar bear populations than the effects of global climate change (Atwood et al. 2015; Regehr et al. 2015).

Previous Incidental Take Regulations – Incidental Take Regulations have been issued under the MMPA for oil and gas activities in the Beaufort Sea area since 1993. As part of LOAs issued pursuant to these Regulations, the oil and gas industry is required to report the number of polar bears observed, their response, and if deterrence activities were required (see below).

Deterrence Activities and Intentional Take Authorizations – Polar bear deterrence activities associated with non-Industry and Industry activities take place in the Action Area. The Service previously consulted on a Final Rule regarding passive and preventative deterrence measures any person can use when working in polar bear habitat (75 FR 61631). These passive deterrence measures are expected to cause only short-term changes in behavior, such as bears departing the area. However, intentional take LOAs also allow trained individuals to use other mechanisms (e.g., non-lethal projectiles) to deter polar bears from human structures and activities. Industry-related intentional take authorizations are described further in Section 6 (*Effects of the Action*) of this document.

Scientific Research

Polar bear research takes place throughout the Action Area. In general, the long-term goal of research programs is to gain information on the ecology and population dynamics of polar bears to help inform management decisions, especially in light of climate change. These activities may cause short-term disturbance and/or minor injuries (e.g., sedation, tissue sampling, marking, etc.) to individual polar bears targeted in survey and capture efforts and may incidentally disturb other individuals. In rare cases, research efforts may lead to serious injury or death of polar bears. Polar bear research is authorized through Division or Management Authority (DMA) permits issued under the MMPA. These permits include estimates of the maximum number of bears likely to be impacted by disturbance or minor capture-related injuries, and include a condition to halt research if a specified number of deaths, usually four to five, occur during the life of the permit. Research DMA permits are typically issued for a five-year period.

Environmental Contaminants

Exposure to environmental contaminants may affect polar bear survival or reproduction. Three main types of contaminants in the Arctic are thought to pose the greatest potential threat to polar bears: petroleum hydrocarbons, persistent organic pollutants (POPs), and heavy metals. To date, no large oil spills from oil and gas activities have occurred in marine waters of arctic Alaska. However, 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, Proshutinsky and Johnson 2001, Lie et al. 2003). Arctic ecosystems are particularly sensitive to environmental contamination due to 1) the slower rate of breakdown of POPs including organochlorine compounds (OCs), 2) relatively simple food chains, 3) and the presence of long-lived organisms with low rates of reproduction and high lipid levels that favor bioaccumulation and biomagnification. Consistent patterns between OC and mercury contamination and trophic status have been documented in Arctic marine food webs (Braune et al. 2005), and the highest concentrations of persistent organic pollutants in Arctic marine mammals have been found in seal-eating walruses and polar bears near Svalbard (Norstrom et al. 1988, Andersen et al. 2001, Muir et al. 1999). While polar bears may come into contact with contaminants in the Action Area if they are not properly disposed of or secured, this has occurred very rarely. Furthermore, contaminant concentrations are not presently thought to have population-level effects on most polar bear populations. However, increased exposure to contaminants has the potential to operate in concert with other factors, such as nutritional stress from loss or degradation of sea ice habitat, decreased prey availability and accessibility, or lower

recruitment and survival rates. These combined stressors could ultimately have negative population level effects on polar bears.

Other Activities

Polar bear viewing at sites such as subsistence whale bone piles may result in increased anthropogenic disturbance of polar bears (e.g., humans on foot, ATVs, snow machines, vessels, or other vehicles. Although difficult to quantify, these disturbances are usually temporary, confined to small areas, and limited in number, which likely limits the extent and severity of their impact.

Baseline of the Pacific Walrus

Although most walrus remain in the Chukchi Sea throughout the summer months, a few occasionally range into the Beaufort Sea in late summer. Industry monitoring reports have observed no more than 35 walruses in Beaufort Sea ITR region between 1995 and 2012, with only a few instances of disturbance to those walrus (AES Alaska 2015, Kalxdorff and Bridges 2003, USFWS unpubl. data). Beginning in 2008, the USGS, and since 2013 the Alaska Department of Fish and Game (ADF&G), have fitted about 30−60 walruses with satellite transmitters each year during spring and summer. In 2014, a female tagged by ADF&G spent about 3 weeks in Harrison Bay (ADF&G 2014). The USGS tracking data indicates that at least one instrumented walrus ventured into the Beaufort Sea for brief periods in all years except 2011. Most of these movements extended northeast of Barrow to the continental shelf edge north of Smith Bay (USGS 2015). All available information indicates that few walruses enter the Beaufort Sea and those that do spend little time there. The Service and USGS are conducting multiyear studies on the walrus population to investigate movements and habitat use patterns. It is possible that as sea-ice diminishes in the Chukchi Sea beyond the 5-year period of this proposed rule, walrus distribution and habitat use may change.

Climate change and loss of sea ice

As previously discussed, loss of sea ice during summer has caused walrus to become increasingly dependent on terrestrial haulouts, which increases the risk of injury or mortality due to trampling. However, establishment of new terrestrial haulouts has been limited to the Chukchi coastline (Thomas et al. 2009, Clarke et al. 2011), and there are currently no known terrestrial haulouts from Point Barrow to Demarcation Point on the Beaufort Sea coast (Figure 5.1). Nonetheless, if terrestrial haulouts were to form on the Beaufort Sea coast within the 5-year period of the Beaufort Sea ITRs, mitigation measures designed to protect walrus and reduce impacts are set forth within the proposed ITRs.

Subsistence harvest

On the North Slope of Alaska, subsistence harvest of Pacific walrus varies among villages and years. In the Beaufort Sea where walrus are extralimital, this species is rarely harvested, although 24 walrus were harvested at Barrow between 2007 and 2011 (78 FR 1942:1956). Harvest of Pacific walrus will likely continue, however due to their extremely low density in the Beaufort Sea, subsistence use of this species in the Beaufort Sea ITR region will likely be uncommon.

Oil and Gas Activities
Most impacts of oil and gas activities to Pacific walrus are presented in the *Effects* section of this document. However, anthropogenic activities (e.g., industrial activities and associated LOAs) are expected to exert a considerably smaller influence on Pacific walrus than the effects of global climate change.

Previous Incidental Take Regulations – Incidental Take Regulations have been issued under the MMPA for oil and gas activities in the Beaufort Sea area since 1993. As part of LOAs issued pursuant to the Beaufort Sea ITRs, the oil and gas industry is required to report the number of walrus observed and their response to industry activities.

6. EFFECTS OF THE ACTION ON LISTED SPECIES

This section includes an analysis of the direct, indirect, interdependent, and interrelated effects of the proposed Action on polar bears and Pacific walrus. The Service's MMM made a "negligible impact" determination under the MMPA based on the best scientific information available regarding the species status, the results of Industry monitoring data from previous ITRs, the review of information generated by the listing the polar bear as a threatened species, ongoing analysis of the petition to list the Pacific walrus as a threatened species under the ESA, and the results of MMM's and BOEM's oil spill risk analyses (81 FR 36663: 36701). The proposed Action would allow nonlethal incidental take of small numbers of polar bears and Pacific walruses, require mitigation measures to avoid or minimize potential adverse effects from Industry activity, require monitoring of the effectiveness of such measures, and documentation of incidental take of these marine mammals.

Issuance of the proposed 2016-2021 Beaufort ITRs and associated LOAs would not permit or authorize oil and gas activities. Rather, oil and gas activities would be authorized by other federal agencies as part of separate, though related actions. Because the proposed Beaufort ITRs would be unnecessary if not for otherwise permitted oil and gas activities, the effects of industry actions operating under authority of the Beaufort ITRs and issued LOAs are considered interdependent and interrelated actions. Interdependent actions are defined as actions having no independent utility apart from the proposed Action. 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). Therefore, we discuss effects of oil and gas activities for which LOAs may be issued as interdependent and interrelated effects in the sections below.

Interdependent and interrelated effects on polar bears

Most polar bears occur in the active ice zone, far offshore, hunting throughout the year. Polar bears also spend limited time on land to feed or move to other areas, although melting sea ice may result in increased numbers of polar bears in the terrestrial environment. Therefore, although they occur at low densities, polar bears may occur year-round throughout the action area in marine or terrestrial environments. Impacts to polar bears could result from the proposed action primarily through disturbance, physical obstruction, increased polar bear-human interactions, oil spills, and effects on prey species.

Disturbance

Disturbance produced by Industry activities during the open-water or ice-covered seasons could affect polar bears. The impact of disturbance may affect bears differently depending on their reproductive status (e.g., denning versus non-denning bears), although the best available scientific information indicates female polar bears entering dens, or females in dens with cubs, are more sensitive than males and non-denning females, which can more readily avoid or move away from disturbance.

Disturbance may originate from either stationary or mobile sources. Stationary sources include construction, maintenance, repair and/or remediation activities, operations at production facilities, gas flaring, and drilling operations from either onshore or offshore facilities. Mobile sources include vessel and aircraft traffic, open-water seismic exploration, winter vibroseis programs, geotechnical surveys, ice road construction, vehicle traffic, snow-tracked vehicles and snowmobiles, drilling, dredging, and ice-breaking vessels.

Disturbance caused by stationary activities may elicit variable responses from polar bears. The disturbance may act as a deterrent to bears entering the area, although in some cases it could attract bears. Attracting bears to Industry facilities, especially exploration facilities in the coastal or nearshore environment, could result in increased human-bear encounters, unintentional harassment, intentional hazing, or lethal take of bears.

Effects of disturbance on denning polar bears

Polar bears will den on land or sea ice. Because potential impacts to polar bears from industry activities in these two environments are similar, the effects described in this section are relevant to bears denning in either environment. Denning polar bears are more sensitive to disturbance from noise than are non-denning bears (USFWS 2011). If disturbed during fall before cubs are born, females appear more likely to abandon dens and relocate (Lentfer and Hensel 1980, Amstrup 1993) than after cubs are born, when relocating or leaving the maternal den early can affect cub survival (Amstrup and Gardner 1994). In addition, females and cubs continue to rely on the den site after cubs first emerge and they have been observed to spend an average of 8 days in the area before a den site is abandoned (USGS data cited by USFWS 2006). Therefore, denning polar bears and females with young cubs may be particularly susceptible to disturbance.

Behavioral response of individual denning females and family groups to disturbance is variable, and some studies have reported individual denning polar bears to be tolerant of human disturbance (Amstrup 1993, Smith et al. 2007). For example, USFWS (2011) reported three instances (2006, 2009, and 2010) of pregnant females establishing dens within 400 m (1,312 ft) of industry activities prior to the onset of operations and remaining in the den through the normal denning cycle. Conversely, an example of early den abandonment occurred in January 1985, where a female polar bear appeared to have abandoned her den in response to Rolligon traffic within 500 m (1,640 ft) of the den site. In spring 2002, noise associated with a polar bear research camp near a bear den is thought to have caused a female bear and her cub(s) to abandon their den and move to the ice prematurely. In spring 2006, a female with two cubs emerged from a den 400 m (1,312 ft) from an active construction site. The den site was abandoned within hours of cub emergence, and 3 days after the female had emerged. In spring 2009, a female with two cubs emerged from a den within 100 m (328 ft) of an ice road with

heavy traffic and quickly abandoned the site. In January 2015 a freshly dug polar den was discovered in an active gravel pit adjacent to an active landfill and busy road. The bear occupied the den for 56 days and then abandoned it. During the time the bear occupied the den, Industry activity in the area was restricted, and the den was constantly monitored. A subsequent investigation of the den found no evidence that the bear gave birth. It is unknown if or to what extent Industry activity contributed to the bear leaving the den. While observations of den abandonment associated with industry activities in northern Alaska have been reported, available data indicates such events have been infrequent and isolated (USFWS 2011). It is important to note that the knowledge of these recent examples occurred because of the monitoring and reporting program established by existing ITRs. Industry observation data suggests that, with proper mitigation measures in place, activities can continue in the vicinity of dens until the emergence by the female bear. Mitigation measures such as activity shutdowns near the den and 24-hour monitoring of the den site can minimize impacts to the animals and allow the female bear to naturally abandon the den when she chooses.

Effects of disturbance on transient polar bears

Onshore disturbance – Transient (non-denning) polar bears onshore could be disturbed by the presence of humans or equipment noise. However, we expect disturbances would be minor and temporary because most transient bears would respond to human presence or disturbance by departing the area. However, polar bears may also need to be hazed if they approach Industry activities. Many passive deterrence methods (e.g., airhorns or revving an engine) are not likely to adversely affect polar bears (75 FR 61631). However, as described in LOAs issued to oil and gas agencies, trained individuals may also use mechanisms (e.g., chemical repellants, electric fences, or non-lethal firearm projectiles) to deter polar bears away from personnel and equipment. Polar bears could experience temporary disturbance due to deterrence activities and would likely depart the area. Bears deterred with more aggressive methods (e.g., non-lethal firearm projectiles), may experience minor stress or short-term pain. In extremely rare cases, if performed incorrectly, non-lethal projectiles could result in injury or death of a polar bear.

Although LOAs may authorize trained Industry personnel to use non-lethal projectiles for polar bear deterrence, we expect most deterrence events would not involve contact with the bear (e.g., deterrence would be limited to MMPA[1] Level B Harassment), resulting in only minor, temporary, behavioral changes (e.g., the bear departs the area). For example, from 2006 through 2010, the oil and gas industry on the North Slope reported sightings of 1,414 polar bears, of which 209 (15%) were intentionally deterred (USFWS 2013), with only 0-5 polar bears deterred using bean bags and 0-1 with rubber bullets, annually. Given that: 1) most (85%) polar bear-industry interactions do not require deterrence (USFWS 2013); 2) most deterrence events are expected to result in only minor, temporary behavioral changes; and 344) it is extremely rare that deterrence actions result in injury or death of polar bears, we expect the proposed action would have a minimal impact on polar bears.

[1] Level B Harassment - 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 but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

Offshore activities – Offshore sources of Industry disturbance, (e.g., vessel-based exploration, seismic or geophysical surveys), may affect polar bears. During the open-water season, Industry activities would generally be limited to ice-free areas of open water. During these periods in the Beaufort Sea, polar bears are typically found either on land or on pack ice, which limits the probability of polar bear encounters. Although polar bears have been observed in open water, miles from the ice edge or ice floes, these encounters are relatively rare. For example in 2012, Shell vessels encountered very few polar bears swimming in ice-free water more than 70 mi (112.6 km) offshore in the Chukchi Sea. In those instances bears either swam away or briefly approached the vessels before departing the area. Therefore, if bears encounter Industry operations in open water, we expect such encounters would result in only minor short-term changes in behavior.

Bears in water could also be affected by acoustic propagation of underwater sounds (e.g., seismic airguns), although sound received in water would likely be attenuated due to the pressure release effect of sounds near the water's surface (Greene and Richardson 1988, Richardson et al. 1995). Furthermore, because polar bears do not generally dive or spend prolonged periods with their heads submerged, it is likely polar bears in the water would experience very little acoustic disturbance.

Ice-based Industry activities (e.g., ice roads or ice-based seismic exploration) may also disturb polar bears, although similar to open-water disturbance, we would expect impacts from ice-based activities to result in only minor and short-term behavioral effects to polar bears. Given the size of the Action Area, the low density of polar bears in offshore areas, and mitigation measures included in the proposed Beaufort ITRs, the potential for disturbance of polar bears from offshore activities is low. Therefore, we expect offshore Industry disturbance (i.e., open-water or ice-based) would likely result in no more than short-term behavioral disturbance, and is not expected to result in injury or death to polar bears.

Aircraft – Extensive or repeated overflights of aircraft could disturb polar bears. For example, observations of polar bears during fall coastal surveys conducted at an altitude of approximately 300 ft (91 m; a much lower altitude than is required of Industry aircraft) indicate 14.2% to 28.9% of polar bears exhibited short-term changes their behavior (Rode 2008, 2009, 2010). As with other sources of disturbance, transient polar bears are expected to respond to aircraft by moving away from the disturbance, and no more than short-term minor impacts are expected to affect bears. Furthermore, mitigation measures such as minimum flight altitudes and flight restrictions around habitat of concern (e.g., dens), would be required, as appropriate, to reduce the likelihood of polar bears disturbance by aircraft. Therefore, given the size of the Action Area, the low density of polar bears, and mitigation measures included in the proposed Beaufort ITRs, we conclude the potential for disturbance of polar bears from aircraft is extremely low. In addition, if polar bears are disturbed by aircraft, we expect only minor, short-term behavioral changes that would not result in injury or death to polar bears.

Physical Obstruction

Industry facilities could conceivably pose physical barriers to polar bear movements. Offshore or coastal facilities are more likely to be approached by polar bears and the majority of Industry bear observations occur within 1.6 km (1 mi) of the coast as bears use this area as a travel

corridor. Although most facilities are located inland where polar bears occur less frequently, a subset of Industry infrastructure is currently located, or may be proposed, in offshore or coastal locations. For example, because the Endicott and West Dock causeways extend continuously from the coastline to their respective offshore facilities, this infrastructure could potentially obstruct polar bear movement. Nonetheless, polar bears have frequently been observed crossing existing roads and causeways, and appear to traverse developed areas relatively easily. Furthermore, offshore production facilities, such as Northstar, Spy Island, and Oooguruk, have been frequently approached by polar bears, and appear to present only a small-scale, local obstruction to polar bear movement. Of greater concern is the increased potential for polar bear-human interaction at these facilities (see below).

Increased human-polar bear interactions

Although uncommon, close encounters between Industry personnel and polar bears can be dangerous for bears and humans. Polar bear interaction plans, training, and monitoring required by existing ITRs have proven effective at reducing 1) encounters between polar bears and humans, and 2) risks to bear and human safety when encounters do occur. As required by LOAs, site-specific polar bear interaction plans detail appropriate policies and procedures to avoid attracting polar bears, avoid encounters with polar bears, and minimize impacts to bears and humans in the event an encounter does occur. Interaction plans also identify appropriate chains of command and communication in the event of an encounter.

Industry has developed and employs methods to help detect polar bears, including: bear monitors, closed-circuit televisions, video cameras, thermal cameras, radar devices, and motion-detection systems. In addition, some facilities use measures to prevent bears from accessing facilities (e.g., safety gates and fences).

Industry observations from 2010-2014 indicate an average of 383 polar bears were observed annually during Industry activities, possibly including multiple sightings of some bears on different occasions. Although most Industry observations involved no interaction between polar bears and humans (~81 percent of observations), some interruption of normal behavior is expected and a number of interactions that meet the definition of Level B harassment under the MMPA are expected. According to Industry monitoring data, interactions affecting behavior and thought to cause Level B harassment averaged 68 per year from 2010 through 2014, and based on this information, MMM estimates there will be no more than 340 Level B harassment takes (MMPA take) of polar bears during the 5-year period of the 2016-2021 Beaufort ITRs. All incidental take authorized under the MMPA is anticipated to be nonlethal and is expected to involve only minor temporary changes in bear behavior. Because avoidance, mitigation, monitoring measures included in the Beaufort ITRs are expected to prevent injury or death of polar bears (i.e., Level A harassment), MMM anticipates that no lethal impacts will occur. By extension, adverse effects to polar bears (i.e., changes in behavior or other impacts expected to cause injury or death, and thereby meeting the definition of incidental take under the ESA) due to increased human-polar bear interactions are not anticipated.

Oil spills

To date, large oil spills from Industry activities in the Beaufort Sea coastal region have not occurred, although Industry interest in future development of hydrocarbon reservoirs in the

Beaufort Sea region may increase the potential for oil spills. Oil is highly toxic to polar bears (St. Aubin 1990), and oil and toxic substance spills could conceivably result as interrelated effects of the proposed action. The volume, location, and timing of a spill would influence the number of polar bears affected, and exposure to oil can affect polar bears in several ways. For example, polar bears in the marine or terrestrial environment that contact spilled oil, or inhale volatile compounds (e.g., aromatic hydrocarbons), could suffer damage to their digestive, respiratory, and central nervous systems. Effects of oil-contaminated fur, or ingestion of oil or other chemicals, range from short-term impacts to death (Øritsland et al. 1981). When contacted by oil, fur loses its insulative properties, and irritation or damage to the skin from oil contamination may further contribute to impaired thermoregulation. Bears may also ingest oil through grooming, nursing, or consumption of contaminated prey (Stirling 1990), and polar bears may not avoid feeding or scavenging on prey already contaminated by oil (St. Aubin, 1990; Neff, 1990; Derocher and Stirling, 1991). Oil ingestion may produce pathological effects, depending on the amount of oil ingested and the physiological state of the bear. These effects could be fatal if a large amount of oil is ingested or if volatile compounds are drawn into the lungs (76 FR 47010: 47029-47030). Oil also remains highly toxic to polar bears, even after aromatic hydrocarbons have dissipated (St. Aubin 1990). Ingestion of smaller amounts of oil can have a variety of sub-lethal physiological effects on a polar bear. For example, ingested hydrocarbons can irritate or destroy epithelial cells lining the digestive tract, thereby affecting nutrient absorption. Therefore, polar bears could suffer a range of harmful effects from encounters with oil spills.

Only pregnant female polar bears den, and due to low densities of denning polar bears in the Beaufort Sea, we would not anticipate appreciable impacts from oil spills on denning bears. However, the majority of the population is transient year-round, and potential effects of a spill to transient bears would likely vary with timing and location (Schliebe et al. 2006). For example, polar bears may occupy the margin of advancing or retreating sea ice in fall or spring to access important feeding areas. Polar bears occupying this transitional ice would be at risk from oil spills during these time periods (Schliebe et al. 2006). Furthermore, if spills were to occur in the fall or spring, sea ice conditions would likely hinder response and cleanup activities. Similarly, spill response and cleanup during winter may be delayed or complicated if spills were to occur either above or below solid ice.

Transient polar bears are more likely to occupy sea ice than to be found in open water or on land, however they may swim considerable distances from ice to land, and vice versa (Schliebe et al. 2006). Swimming polar bears would conceivably be at risk of encountering oil spilled in the marine environment, although the likelihood would be remote due to the extremely low density of polar bears during open-water periods. Furthermore, individual bears or small groups in the terrestrial environment may be vulnerable if spilled oil were to contact the Beaufort Sea coastline, where bears sometimes congregate to feed on whale carcasses (Schliebe et al. 2006). In summary, despite their low density and transient nature, non-denning polar bears in the marine or terrestrial environment could conceivably be at risk from oil spills.

Small spills – Small spills of oil or other chemicals would likely occur. A small spill in the terrestrial environment will be unlikely to affect polar bears as these spills can be easily contained and polar bears deterred from the affected area. However, a spill occurring in the

marine environment poses more of risk to polar bears in part because oil would be more difficult to clean up in the marine environment than on land.

Current management practices employed by Industry, such as proper use, storage, and disposal of hazardous materials, would likely minimize the potential occurrence of small spills. In the event of a small spill, it is also likely polar bears would be deterred from the spill area, further reducing the likelihood of impacts to individual bears. Because of spill containment and/or weathering, and because the likelihood of a polar bear coming into contact with a small spill at any given time is low, the effects of a small spill would be short-term, localized, and at most affect very low numbers of individuals.

Large spills – Although documented oil spill-related impacts on polar bears in the Beaufort Sea are minimal to date, the possibility of large oil spills from Industry activities and subsequent impacts on polar bears remains. There have been efforts to improve techniques for containing, recovering, and cleaning up oil spills in Arctic marine environments, but effectiveness of oil spill cleanup during poor weather or variable ice-coverage has not been proven. Therefore, Industry oil spill prevention and response plans focus on methods to prevent spills from occurring. For example, all current offshore production facilities have spill containment systems at the well heads. In the event of an oil discharge, containment systems are designed to collect the oil before it contacts the environment.

With limited data regarding large oil spills in the Arctic, the environmental consequences of such a spill are unknown. In the event of a large spill, polar bears could encounter oil during the open-water and ice-covered seasons in offshore or onshore habitat. Although most polar bears in the SBS population spend time offshore on the pack-ice, it is likely some bears would encounter oil from a large spill that persisted for 30 days or more.

Although the extent of impacts from a large oil spill would depend on the size, location, and timing of the spill, as well as effectiveness of spill response efforts, under some scenarios, population-level impacts could occur. For example, a large spill originating from an offshore oil platform could have significant impacts on polar bears if it contacted an area of higher polar bear density (e.g., a whale carcass). However, during the 5-year period of the proposed Beaufort ITRs, the probability of a large spill would likely be low.

While there is uncertainty in oil spill risk analyses (OSRA), certain factors must align for polar bears to be impacted by a large oil spill occurring in the marine environment. First, a large spill must occur. Second, the large spill must contaminate areas where bears may be located. Third, polar bears must be present within the affected region when the oil is present. For example, assuming a large spill occurs, BOEM's OSRA estimated up to a 13 percent chance of oil contacting Cross Island within 60 days, as much as an 11 percent chance that it would contact Barter Island and/or the coast of the Arctic National Wildlife Refuge, and up to a 5 percent chance of a large spill contacting the coast near Barrow during the summer (81 FR 36686:36692). Data from polar bear coastal surveys indicate polar bears are unevenly and seasonally distributed along the Beaufort Sea coast. Seasonally, only a portion of the SBS population utilizes the coastline between Barrow and the Alaska/Canada border, and only a subset of those bears would likely be in oil-spill-affected areas.

Based on recent and earlier risk assessments (81 FR 36686:36692, Amstrup et al. 2006), the Service concludes the likelihood of a large offshore oil spill in the next 5 years would be low. Moreover, in the unlikely event of a large spill, the likelihood that oil would contaminate areas occupied by large numbers of bears would be low. While individual bears could be adversely affected by a spill, the potential for population-level effects is low unless the spill contacted an area of higher polar bear density. Areas of higher polar bear density tend to occur seasonally (e.g., in fall prior to ice formation), be small in size, and few in number (e.g., bone piles from subsistence harvest of marine mammals); conditions which further minimize the likelihood of a spill impacting a significant proportion of the population. Therefore, we conclude 1) the likelihood of a large spill occurring during the 5-year period of the Beaufort ITRs is low, 2) if a large spill did occur, the likelihood that it would contaminate areas occupied by large numbers of polar bears is also low, and therefore 3) only small numbers of polar bears would be adversely affected. This level of impact to individual bears would represent only a negligible impact to the SBS population and would not be expected to jeopardize the continued existence of polar bears by appreciably reducing their survival and recovery.

Impacts on prey species

The greatest impacts from Industry activity on polar bear prey, primarily ringed (*Phoca hispida*) and bearded seals (*Erignathus barbatus*), would likely be through disturbance or exposure to an oil spill. Seals may be displaced by disturbance from pupping habitat or haulouts, and/or abandon breathing holes near Industry activity. However, we expect these disturbances would have minor, temporary effects on prey behavior (NMFS 2013), and would not significantly impact the availability of prey species to polar bears. Effects of oil spills on seals are expected to be similar to those described above for polar bears. Given 1) the low density of seals in the action area, 2) the low likelihood of a large spill during the 5-year period of the ITRs, and 3) the low likelihood that an oil spill would contaminate areas occupied by large numbers of seals; we would expect only small numbers of individual seals to be impacted. Overall, we would not anticipate appreciable impacts from oil spills to seal populations in the Beaufort Sea such that their availability to polar bears would be significantly reduced.

Summary

The proposed issuance of the 2016-2021 Beaufort ITRs could affect polar bears through disturbance, physical obstruction, increased polar bear-human interactions, oil spills, and effects on prey species. Due to the low density of polar bears and the expansive size of the action area, encounters with polar bears are expected to be infrequent. However, the Service's MMM anticipates up to 340 polar bears (68 annually) would be subject to non-lethal incidental take (as defined by the MMPA) during the 5-year period of the 2016-2021 Beaufort ITRs. Due to mitigation measures included in the Beaufort ITRs, associated LOAs, and Industry polar bear interaction plans, these encounters are expected to cause only minor temporary changes in bear behavior, and no adverse effects to polar bears (i.e., no injuries or deaths of polar bears, meeting the definition of incidental take under the ESA) are anticipated. Finally, we would not expect significant impacts to the SBS population of polar bears from large oil spills, which are considered to be unlikely to occur.

Interdependent and interrelated effects on Pacific walrus

Pacific walruses are uncommon in the Beaufort Sea and the likelihood of Industry encountering walruses during their activities in the 5-year period of the 2016-2020 Beaufort Sea ITRs is low. For example, during Industry monitoring between 1995 and 2012 only 35 Pacific walruses were reported in the Beaufort Sea region, and no encounters with walrus were reported from 2009 through 2014 (AES Alaska 2015, USFWS unpublished data). Nonetheless, during the 5-year period of these regulations, Industry operations may occasionally encounter small numbers of walruses in open water or in ice-based or terrestrial haulouts along the coast, and the Service's MMM estimates no more than 50 Level B incidental takes (as defined under the MMPA) of Pacific walrus during the 5-year period of the ITRs. To date, we have no evidence of appreciable impacts to individual walruses resulting from Industry activities in the Beaufort Sea although walrus could be subject to disturbance, human-walrus interactions, physical obstruction, oil spills, and impacts to prey as interdependent and interrelated effects of the proposed Beaufort Sea ITRs.

Disturbance

Disturbance produced by Industry activities during the open-water season could affect Pacific walrus. The impact of disturbance may affect walrus differently depending on their age, sex, or reproductive status. For example, observations by walrus hunters and researchers suggest males are more tolerant of disturbance than females, and individuals are more tolerant than groups. Females with dependent calves are considered least tolerant of disturbance. Although there are currently no known terrestrial haulouts along the Beaufort Sea coast, disturbance events at haulouts in the Chukchi Sea have caused large groups of walrus to stampede. Occasionally, these stampede abandonments of terrestrial haulouts result in trampling injuries or cow-calf separations, both of which are potentially fatal. Calves and young animals at terrestrial haulouts are particularly vulnerable to trampling injuries.

Disturbance may originate from either stationary or mobile sources. Stationary sources include construction, maintenance, repair and/or remediation activities, operations at production facilities, gas flaring, and drilling operations from either onshore or offshore facilities. Mobile sources include vessel and aircraft traffic, open-water seismic exploration, winter vibroseis programs, geotechnical surveys, ice road construction, vehicle traffic, snow-tracked vehicles and snowmobiles, drilling, dredging, and ice-breaking vessels.

Vessel traffic – Although seismic surveys and offshore drilling operations would be concentrated in areas of open water away from pack ice, Industry vessels may still encounter groups of walruses hauled out on sea-ice. Disturbance from these vessels could potentially displace walrus from ice haulouts. Walruses react variably to disturbance from vessel traffic and the reaction of individuals would be influenced in part by vessel type, distance, speed, and previous exposure to disturbances. For example, it appears low-frequency diesel engines cause less disturbance than high-frequency outboard engines. Additionally, walruses in the water appear to be less disturbed by vessels than walruses hauled out on land or ice. It is also likely barges and other Industry vessels would travel in open water, avoiding large ice floes or land where walruses are likely to be found, and thereby reducing the likelihood of disturbance.

Drilling operations may involve drill ships attended by icebreaking vessels to manage incursions of sea-ice. Ice management operations are expected to have the greatest potential for causing disturbance because walruses are more likely to be encountered in sea-ice. Previous monitoring efforts in the Chukchi Sea suggest icebreaking activities can displace some walrus up to several kilometers away; however, most groups of hauled-out walruses showed little reaction when activities occurred beyond 805 m (0.5 mi) from them.

Monitoring programs associated with exploratory drilling operations in the Chukchi Sea since 1990 noted that approximately 25 percent of walrus groups encountered in the pack-ice during icebreaking responded by diving into the water, with most reactions occurring within 1 km (0.6 mi) of the ship. The monitoring report also noted 1) walrus distribution was closely linked with pack-ice, 2) pack-ice was near active prospects for relatively short time periods, and 3) ice adjacent to active prospects contained relatively few animals. The report concluded effects of the drilling operations on walruses were limited in duration, geographical scale, and the proportion of the population affected. We would expect offshore Industry activities, including vessel traffic, to have similar effects on any walrus present in the Beaufort Sea proximal to these activities.

Because Industry vessels the Beaufort Sea are expected to move throughout the Beaufort Sea, impacts associated with support vessels are likely to be distributed in time and space. Therefore, the effects of disturbance from vessel traffic would likely be minor and temporary, impacting small numbers of walruses that may be present in the vicinity of active operations. Furthermore, adoption of mitigation measures, including an 805-m (0.5-mi) exclusion zone around walrus hauled out on ice, would reduce impacts of vessel disturbance and minimize the potential for injuries. Additionally, due to the very low density of walrus in the Beaufort Sea, disturbance is anticipated to be limited to a few individuals.

Underwater noise from vessel traffic in the Beaufort Sea may also impact Pacific walrus. Acoustic propagation of underwater sounds may “mask” communication, displace individuals from certain habitats, and may impede walrus movement. Over time, vessel traffic in the Beaufort Sea may increase if offshore Industry expands.

Seismic exploration – Typical source levels associated with underwater marine 3D and 2D seismic surveys are between 230 and 240 decibels (dB). Airgun arrays produce broadband frequencies from 10 Hz to 2 kHz with most of the energy concentrated below 200 Hz. Frequencies used for high-resolution oil and gas exploration surveys are typically 200 Hz-900 kHz. Commercial sonar systems may also generate lower frequencies audible to marine mammals (Deng et al 2012). Some surveys use frequencies as low as 50 Hz or as high as 2 MHz. Broadband source levels for high-resolution surveys can range from 210 to 226 dB at 1 m. Sound attenuates in air more rapidly than in water, and underwater sound levels can be loud enough to cause hearing loss in nearby animals and/or disturbance of animals at greater distances.

In the open waters of the Beaufort Sea, seismic surveys and high-resolution site-clearance surveys would likely be the primary source of high levels of underwater sound. Such surveys would typically be carried out away from the edge of seasonal pack-ice where walrus are more

likely to be found. The most likely response of walruses to acoustic disturbances in open water would be for animals to move away from the source of the disturbance. Displacement from a preferred feeding area may reduce foraging success and/or increase stress and increase energy expenditures. However, potential adverse effects of seismic disturbance on walruses would be reduced by monitoring and mitigation measures included in the Beaufort ITRs.

Potential acoustic injuries from high levels of sound such as those produced during seismic surveys may manifest in the form of temporary or permanent changes in hearing sensitivity. The underwater hearing abilities of the Pacific walrus have not been studied sufficiently to develop species-specific criteria for preventing harmful exposure. However, sound pressure level thresholds have been developed for other pinnipeds, above which exposure is likely to cause behavioral responses and injuries (Finneran et al. 2015).

Historically, the National Oceanic and Atmospheric Administration (NOAA) used 190 dB $_{rms}$ as a threshold for predicting injury to pinnipeds and 160 dB $_{rms}$ as a threshold for behavioral impacts from exposure to impulse noise (NMFS 1998, HESS 1999). The behavioral response threshold was developed based primarily on observations of marine mammal responses to airgun operations (e.g., Malme et al. 1983a, 1983b; Richardson et al., 1986, 1995). Southall et al. 2007 assessed relevant studies, found considerable variability among pinnipeds, and determined exposures between ~90 and 140 dB generally do not induce strong behavioral responses of pinnipeds in water, but an increasing probability of avoidance and other behavioral effects exists in the 120 to 160 dB range.

The NOAA 190-dB $_{rms}$ injury threshold is an estimate of the sound level likely to cause a permanent shift in hearing (permanent threshold shift or PTS). This value was modelled from temporary threshold shifts (TTS) observed in pinnipeds (NMFS 1998, HESS 1999). More recently, Kastak et al. (2005) found exposures resulting in TTS for pinniped test subjects ranging from 152 to 174 dB (183 to 206 dB SEL). Southall et al. (2007) reviewed the literature and derived behavior and injury thresholds based on peak sound pressure levels of 212 dB (peak) and 218 dB (peak) respectively. Because onset of TTS can vary in response to duration of exposure, Southall et al. (2007) also derived thresholds based on sound exposure levels (SEL). Sound exposure level can be thought of as a composite metric representing both the magnitude of a sound and its duration. The study proposed threshold SELs weighted at frequencies of greatest sensitivities for pinnipeds of 171 dB (SEL) and 186 dB (SEL) for behavioral impacts and injury respectively (Southall et al. 2007). Reichmuth (2009) demonstrated a persistent TTS, if not a PTS, after 60 seconds of 184 dB SEL. Kastelein (2012) found small but statistically significant TTSs at approximately 170 dB SEL (136 dB, 60 min) and 178 dB SEL (148 dB, 15 min).

Based on these data, and applying a precautionary approach in the absence of empirical information, we assume it would be possible for walruses exposed to 190-dB or greater sound levels from underwater activities (especially seismic surveys) could suffer injury from PTS. Walruses exposed to underwater sound pressure levels greater than 180 dB could suffer temporary shifts in hearing thresholds. Repeated or continuous exposure to sound levels between 160 and 180 dB may also result in TTS, and exposures above 160 dB are more likely to elicit behavioral responses than lower level exposures. The Service's underwater sound

mitigation measures include employing protected species observers (PSOs) to establish and monitor 160-dB, 180-dB, and 190-dB isopleth mitigation zones centered on any underwater sound source greater than 160 db. The 160-dB zone must be monitored and walruses in this zone will be assumed to experience Level B MMPA take. The 180-dB and 190-dB zones shall be free of marine mammals before the sound-producing activity can begin and must remain free of marine mammals during the activity. The proposed Beaufort Sea ITRs incorporate slight changes in the mitigation zones when compared to previous ITRs for the region. Previous ITRs required separate actions for groups of greater than 12 walruses. Industry activities are unlikely to encounter large groups of walruses in the Beaufort Sea. This stipulation was originally developed for and is more applicable to mitigation of impacts to walruses in the Chukchi Sea and is not likely to be applicable in the Beaufort Sea.

Acoustic thresholds for marine mammals under NOAA's jurisdiction are currently being revised (NOAA 2015, NOAA 2016). New thresholds will estimate PTS onset levels for impulsive (e.g., airguns, impact pile drivers) and nonimpulsive (e.g., sonar, vibratory pile drivers) sound sources. Thresholds will be specific to marine mammal functional hearing groups; separate thresholds for otariid and phocid pinnipeds will be adopted. Auditory weighting functions will be incorporated into calculation of PTS threshold levels. The updated acoustic thresholds will also account for accumulation of injury due to chronic exposure by adopting dual metrics of sound (cumulative sound exposure level and peak sound pressure level). These updated criteria will not provide specification for modeling sound exposures from various activities. They will not update thresholds for preventing behavioral responses, nor will they provide any new information regarding the Pacific walrus.

However, once NOAA's new criteria for preventing harm to marine mammals from sound exposure are finalized, the Service will evaluate new thresholds for applicability to walruses. In most cases, the Service's existing thresholds for Pacific walrus will likely result in greater separation distances or shorter periods of exposure to Industry sound sources than would NOAA's new pinniped thresholds. Assuming walrus hearing sensitivities are similar to other pinnipeds, the Service's sound exposure thresholds are, in some situations, likely to be more conservative to prevent injury from PTS and TTS. However, animals may be exposed to multiple stressors beyond acoustics during an activity, with the possibility of additive or synergistic effects (e.g., Crain et al. 2008). The Service's mitigation measures will prevent acoustic injury as well as minimize noise exposures that may cause biologically significant behavioral reactions in walruses.

Because mitigation measures stipulated in the proposed Beaufort Sea ITRs would require 1) seismic survey vessels and associated support vessels to apply acoustic mitigation zones, 2) maintain an 805-m (0.5-mile) distance from Pacific walrus groups, and 3) introduce noise gradually by implementing ramp-up procedures, and 4) maintain a 457-m (1,500-ft) minimum altitude above walruses, these measures are expected to significantly reduce the effects of seismic disturbance and minimize the potential for injuries to Pacific walrus.

Aircraft – Extensive or repeated overflights of aircraft could disturb walruses. Reactions to aircraft would likely vary with aircraft type, distance, altitude, flight pattern, and the demographics of affected walrus (e.g., age, sex, and group size). For example, adult females,

calves, and immature walruses would likely be more sensitive to aircraft disturbance. In addition, fixed-wing aircraft would be less likely to elicit a response than helicopters. Walruses seem particularly sensitive to changes in engine noise, and therefore, would be more likely to stampede when aircraft fly low or make abrupt changes in direction. It also appears walruses are more sensitive to disturbance when hauled out on land versus sea-ice. For example, aircraft conducting flights along the Chukchi Sea coast have been responsible for disturbing walrus at terrestrial haulouts, inciting stampedes, and ultimately causing numerous calf mortalities. However above 457 m (1,500 ft), researchers have observed little reaction to fixed-winged aircraft (USFWS unpubl. data). Furthermore, mitigation measures included in the Beaufort Sea ITRs (e.g., contingent on operational safety, minimum flight altitude and distance from walrus observed on ice or land) are intended to reduce impacts of aircraft disturbance to walrus. Given 1) the low density of walrus in the Beaufort Sea, 2) responses of walrus to aircraft disturbance are variable, 3) mitigation measures included in the Beaufort Sea ITRs would minimize impacts of aircraft disturbance on Pacific walrus; the effects of aircraft disturbance to Pacific walrus are expected to be limited to minor temporary changes in behavior that would not result in injury or death.

Human-walrus encounters

Although rare, human encounters with walrus during the course of Industry activities could occur. In 2004 for example, a lone walrus calf hauled-out on Northstar Island multiple times during a 48-hour period. To avoid impacts to the hauled-out walrus, Industry personnel ceased certain activities and altered work patterns. In another instance in 2009, an adult walrus in the Chukchi Sea hauled out on the stern of an Industry vessel. Therefore, encounters between walrus and humans, human infrastructure, or vessels during the period of the proposed ITRs are conceivable. However, due to the low density of Pacific walrus in the Beaufort Sea, and because Industry entities would abide by mitigation measures included in the proposed ITRs designed to reduce impacts to Pacific walrus, we would not anticipate adverse effects to Pacific walrus during the 5-year period of the Beaufort Sea ITRs from human-walrus encounters.

Physical obstructions

Because walrus occur at very low density in the Beaufort Sea it is unlikely natural movements of walrus would be displaced by offshore Industry activities (e.g., Northstar Island, the Endicott causeway complex, or vessel traffic) in such a way that the fitness of individuals would be appreciably impacted. We would expect most walrus to be capable of avoiding Industry activities by swimming around infrastructure or moving away to a safe distance. Therefore, we would expect physical obstructions associated with Industry activities to result in only minor temporary changes in behavior.

Oil spills

Because walrus are uncommon in the Beaufort Sea, the probability of walruses encountering spilled oil or other contaminants as a result of Industry activities is low. Because walrus are closely associated with the coast, we would not expect onshore oil spills to impact walruses unless spilled oil moved into the marine environment. In the event a spill occurs during the open-water season, oil on the surface or in the water column could drift offshore and possibly contact small numbers of walruses. Oil spills from offshore Industry structures could also contact walruses under certain conditions. Furthermore, if spills were to occur in the fall or

spring, sea ice conditions would likely hinder response and cleanup activities. Similarly, spill response and cleanup during winter may be delayed or complicated if spills were to occur either above or below solid ice.

Little is known about the effects of oil on walruses as no species-specific studies have been conducted. Nonetheless, we would expect oil to impact walruses much like other pinnipeds. Walruses would be unlikely to ingest oil while grooming because walruses do not exhibit grooming behavior. Because walrus are gregarious, an oil spill would most likely affect multiple individuals. Walruses may also expose themselves to oil more frequently as they repeatedly enter and exit the water from terrestrial or ice-based haulouts. Even if walruses were not affected by spilled oil through direct contact, they may be impacted by disturbance from spill response efforts.

Female walrus with calves may be more likely to suffer from oil contamination. Female walruses with calves stay in close proximity at all times, and even very young calves will join their mother in the water during foraging bouts. Therefore, and oil spill in the marine environment would be likely to contact both animals potentially impacting the fitness of both parent and offspring. In addition, if a lactating female contacted spilled oil, the calf may ingest oil while nursing, also increasing the risk of injury or mortality.

Rather than pelage, walruses have thick skin and blubber and heat loss is regulated by control of peripheral blood flow through the animal's skin and blubber. Therefore, direct contact of walruses with oil would be unlikely to decrease the insulating capacity of their skin and blubber, although it is unknown if oil could affect peripheral blood flow. For example, damage to the skin of other pinnipeds can occur from contact with oil as some oil penetrates the skin, causing inflammation and tissue necrosis. Dead tissue is often sloughed, leaving behind an ulcer. While these lesions have only rarely been found on oiled seals, the effects on walrus may be greater due to their lack of hair. Direct exposure to oil may also result in conjunctivitis. Like other pinnipeds, walruses would be susceptible to oil contamination in their eyes, and prolonged exposure to oil may cause permanent eye damage. Inhalation of volatile hydrocarbon compounds presents another threat to walrus. In studies conducted on pinnipeds, pulmonary hemorrhage, inflammation, congestion, and nerve damage resulted after exposure to concentrated hydrocarbon fumes for a period of 24 hours. These effects could also be fatal if exposure was chronic or severe.

However, due to the low density of walrus in the Beaufort Sea, and oil spill risk assessments (discussed above for polar bears; 81 FR 36686:36692 and Amstrup et al. 2006) the Service concludes the likelihood of a large marine oil spill in the next 5 years would be low. Moreover, in the unlikely event of a large spill, the likelihood that oil would contaminate areas occupied by large numbers of walrus would be low. While individual walrus could be adversely affected by a spill, the potential for population-level effects is low. Areas of higher walrus density (e.g., terrestrial haulouts) are unknown in the Beaufort Sea. This further minimizes the likelihood of a spill impacting a significant proportion of the population. Therefore, we conclude 1) the likelihood of a large spill occurring during the 5-year period of the Beaufort ITRs is low, 2) if a large spill did occur, the likelihood that it would contaminate areas occupied by large numbers of walrus is also low, and therefore at most 3) only small numbers of walrus would be impacted.

This level of impact would not be expected to jeopardize the continued existence of Pacific walrus by appreciably reducing their survival and recovery.

Impacts on prey species

Walruses feed primarily on benthic invertebrates. Industry impacts on benthic invertebrates would most likely result from oil spilled into the marine environment. Oil could impact benthic species in a variety of ways including, but not limited to, mortality, disruption of community composition, and altered metabolic or growth rates. For example, bivalve mollusks are not effective at processing hydrocarbon compounds, resulting in highly concentrated accumulations and long-term retention of contaminants within the organism. Furthermore, complete recovery of a bivalve mollusk population may take 10 years or more, which could impact the efficiency and range of foraging walrus. However, because 1) walrus occur at low density in the Beaufort Sea, 2) the Beaufort Sea does not support productive feeding grounds for walrus, and 3) the low likelihood of an oil spill during the 5-year period of the Beaufort Sea ITRs, we would not anticipate appreciable impacts from oil spills to benthic prey in the Beaufort Sea such that their availability to Pacific walrus would be significantly reduced.

Summary

The proposed issuance of the 2016-2021 Beaufort ITRs could affect Pacific walrus through disturbance, physical obstruction, human-walrus encounters, oil spills, and effects on prey species. Due to the extremely low density of Pacific walrus and the expansive size of the action area, human encounters with walrus are expected to be rare. However, the Service's MMM anticipates up to 50 walrus would be subject to Level B incidental take (as defined by the MMPA) during the 5-year period of the 2016-2021 Beaufort ITRs. Due to mitigation measures included in the Beaufort ITRs, associated LOAs, and Industry interaction plans, encounters with walrus are expected to cause only minor temporary changes in behavior, and no adverse effects to walrus are anticipated (i.e., no injuries or deaths of walrus, meeting the definition of incidental take under the ESA). Finally, we would not expect significant impacts to Pacific walrus in the Beaufort Sea from large oil spills, which are considered to be unlikely to occur.

7. CUMULATIVE EFFECTS

Cumulative effects include 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 pursuant to section 7 of the ESA.

Future Industry development

Future Industry development, whether in Federal or State land or waters would likely require Federal permits (e.g., section 404 permits under the Clean Water Act issued by USACE, or National Pollution Discharge Elimination System permits issued by the EPA) and, therefore, are not considered cumulative impacts under the ESA.

Natural gas pipelines

While much of the proposed Alaska LNG natural gas pipeline and Alaska Stand Alone Pipeline would be located on State lands, some subset of the proposed action would require Federal

permits and section 7 consultation. Therefore, development of these projects is not a cumulative effect under the ESA.

Community growth

Within the Action Area, continued community growth and infrastructure or utilities expansion will likely occur. However, these activities would require Federal permits (e.g., from the BLM and USACE) and separate consultation, and therefore are not considered cumulative effects under the ESA.

Commercial fishing

Reduction in the extent and duration of Arctic sea ice coverage may increase the potential for commercial fishing in the Beaufort Sea, but the likelihood and magnitude of these activities are unknown at this time. Under the Arctic Fisheries Management Plan, all commercial fishing in the Arctic is currently prohibited. However, if future fisheries were developed, we expect they would be adequately managed by the North Pacific Fisheries Management Council or the National Marine Fisheries Service, and the issuance of any future regulations would require section 7 consultations. Therefore, future development of commercial fisheries are not considered cumulative effects of the proposed action.

Increased vessel traffic

Reduction in the extent and duration of Arctic sea ice coverage has increased interest in shipping through Arctic waters (Brigham and Ellis 2004). Increased vessel operations could include military vessels, cruise ships, barges, research vessels, private watercraft, and Industry vessels. The potential increase in vessels operating in Arctic waters has been matched by an increase in U.S. Coast Guard activities (USCG). In recent years, the USCG has performed a number of exercises in Arctic waters and these actions required separate section 7 consultations.

Increased Arctic vessel traffic could impact listed or candidate species through disturbance or increase the risk of oil spills. However, the scale of increased vessel traffic and magnitude of potential risk are unknown. In addition, most commercial shipping in the Arctic currently utilizes the Northern Sea Route in Russian waters rather than the Northwest Passage. As more information becomes available, we will amend the environmental baseline to include these impacts in future section 7 consultations.

Increased scientific research

Scientific research across the Arctic is increasing as concern about the effects of climate change in the Arctic grows. While research is often conducted by universities or private institutions, many research projects are funded by the National Science Foundation or operate from USCG ice-breaking vessels. Therefore, these activities are evaluated in separate section 7 consultations.

Subsistence harvest

Subsistence harvest of polar bears and walrus are expected to continue in the Action Area in the future. The Service will continue to work with Native groups and others nationally and internationally using the mechanisms described in the *Environmental Baseline* to manage subsistence harvest of these species.

Conclusion
In summary, we anticipate oil and gas development, community growth, commercial fisheries, scientific research, and subsistence harvest will continue, or may increase, in the Action Area in the future. Most activities with potential impacts to listed species (e.g., oil and gas development) will require separate consultation under the ESA.

8. CONCLUSION

Regulations (51 CFR 19958) 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." In addition, it is Service policy to consider candidate and proposed species when conducting consultation on Intra-Service actions. In this case, we have evaluated issuance of the proposed Beaufort Sea ITRs on polar bears and Pacific walruses to ensure that their continued existence would not be jeopardized.

As described in *Effects of the Action*, issuance of the proposed 2016-2021 Beaufort ITRs and associated LOAs would not permit or authorize oil and gas activities. Rather, oil and gas activities would be authorized by other federal agencies as part of separate, though related actions. Because the proposed Beaufort ITRs would be unnecessary if not for otherwise permitted oil and gas activities, the effects of industry actions operating under authority of the Beaufort ITRs and issued LOAs are considered interdependent and interrelated actions. Interdependent actions are defined as actions having no independent utility apart from the proposed Action. 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). Therefore, we base our conclusion on a comprehensive analysis of the effects of oil and gas activities for which LOAs may be issued (i.e., interdependent and interrelated effects), as well as the status of the species, environmental baseline, Industry monitoring data, and cumulative effects of the proposed action.

Polar Bear
As described in the *Effects of the Action*, a number of mechanisms could potentially impact polar bears, including disturbance, human-polar bear interactions, and oil spills. While polar bears may be encountered during Industry activities during the proposed Action, we expect encounters would result in only minor, temporary changes in behavior. These changes in behavior would meet the definition of Level B harassment under the MMPA, and are estimated to number up to 68 per year (340 total over 5 years). All incidental take authorized under the MMPA is anticipated to be nonlethal and is expected to involve only minor temporary changes in bear behavior. Because avoidance, mitigation, and monitoring measures included in the Beaufort Sea ITRs are expected to prevent injury or death of polar bears (i.e., Level A harassment), we do not expect lethal impacts to polar bears. By extension, adverse effects to polar bears (i.e., incidental take under the ESA) due to disturbance or human-polar bear interactions are not anticipated.

After reviewing the current status of the polar bear, environmental baseline, effects of the action and interdependent and interrelated effects, Industry monitoring data, and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the

continued existence of the polar bear by appreciably reducing the likelihood of both survival and recovery of the species in the wild by reducing its reproduction, numbers, or distribution.

Pacific Walrus

As described in the *Effects of the Action*, Pacific walrus could be impacted by disturbance, human-walrus interactions, physical obstruction, oil spills, and impacts to prey, and the Service anticipates up to 50 walrus would be subject to Level B incidental take (as defined by the MMPA) during the 5-year period of the 2016-2021 Beaufort Sea ITRs. However, due to the extremely low density of Pacific walrus in the Beaufort Sea, and mitigation measures included in the Beaufort Sea ITRs, associated LOAs, and Industry interaction plans; these impacts are expected to cause only minor temporary changes in behavior, and no adverse effects to walrus are anticipated (i.e., incidental take under the ESA).

After reviewing the current status of the Pacific walrus, environmental baseline, effects of the action and interdependent and interrelated effects, Industry monitoring data, and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Pacific walrus by appreciably reducing the likelihood of both survival and recovery of the species in the wild by reducing their reproduction, numbers, or distribution.

9. ADMINISTRATION OF THE BIOLOGICAL OPINION

This BO considers effects of the proposed issuance of 2016-2021 Beaufort Sea ITRs on polar bears and Pacific walrus regarding Industry activities in the Beaufort Sea region of northern Alaska.

The Service has concluded that the comprehensive effects of these activities, when considered with the environmental baseline, status of the species, and cumulative effects would not jeopardize the continued existence polar bears of Pacific walrus. In part, this conclusion relies on the determination that the activities that may be authorized under the Beaufort Sea ITRs would only result in negligible impacts to small numbers of polar bears and walrus (i.e., Level B harassment of roughly 68 polar bears and 10 Pacific walrus annually). However, 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 section 101(a)(5) of the MMPA are in effect. Accordingly, the Service defers authorization of incidental take until an LOA authorizing take under the MMPA is issued.

Upon receipt of an LOA application, MMM will:

- Determine whether the request is within parameters established by the Beaufort ITRs.
  - If not, evaluation will be necessary to determine if additional LOA/ITS mitigation measures will be sufficient to bring the request within the Beaufort ITRs parameters.
    - If additional measures are insufficient and/or cannot be implemented by the applicant, a separate consultation may be required.
    - For requests that fall within the parameters of the Beaufort ITRs, MMM would issue a combined LOA/ITS that would provide incidental take coverage under

both the ESA snd MMPA. Therefore, issuance of the LOA/ITS would conclude ESA consultation for that action.

- Each LOA would require applicants to monitor and report take of polar bears and Pacific walruses to the Service.

10. INCIDENTAL TAKE STATEMENT

Polar bears

Traditional Incidental Take Statements (ITS) 1) enumerate take, 2) provide a threshold for reinitiation of consultation, and 3) authorize take while 4) providing reasonable and prudent measures with associated terms and conditions to minimize take. While we enumerate anticipated incidental take of polar bears and provide a threshold for re-initiation of this consultation, we do not authorize take for reasons described below.

1) The Service's MMM has estimated small numbers of polar bears (up to 340 instances of Level B incidental take) would be incidentally taken over the 5-year period of the Beaufort Sea ITRs. These takes are not expected to result in injury or death of polar bears, and therefore are not likely to rise to the level of ESA-take. Although a very small subset of these 340 Level B harassment incidents could conceivably result in minor injury to polar bears (and thereby also meet the definition of ESA-take), no permanent impacts to individuals (i.e., mortality) or to populations would be expected.
2) Due to the challenges associated with enumerating incidental take under two authorities with different definitions of take (MMPA and ESA), and because monitoring and reporting level B harassment (and incidental take under the MMPA) will be required in the LOA regulatory process, we will adopt MMM's estimate of 340 instances of Level B incidental take under the MMPA as our re-initiation threshold.
3) Take of marine mammals cannot be authorized under the ESA until it is authorized under the MMPA. Therefore, the Service will defer authorization of incidental take until an LOA authorizing take under the MMPA is issued.
4) Likewise, pursuant to section 101(a)(5) of the MMPA as amended, and implementing regulations at 50 CFR §18.27, and 50 CFR Sections 216 and 229, methods of incidental take are required to be consistent with the total instances of incidental take authorized, and to effect the least practical adverse impact on the species, its habitat, and on the availability of the species for subsistence uses through appropriate avoidance and mitigation measures. Therefore, we adopt the avoidance and mitigation measures included in the proposed Beaufort Sea ITRs as the reasonable and prudent measures (RPMs) and implementing terms and conditions (T&Cs) for this BO. Additionally, required monitoring and reporting will allow the Service to determine if/when the level of authorized take is exceeded, and whether subsequent reinitiation is necessary. These mitigation measures are non-discretionary, and LOAs will be conditioned with these measures in order for the exemption in section 7(o)(2) of the ESA to apply.

Take authorized for intentional harassment LOAs will be permitted as needed under separate authorities [(101(a)(4)(A), 109(h), and 112(c) of the MMPA)] and section 7 consultations.

Pacific Walrus

Because the Pacific walrus is a candidate under the ESA, effects to this species are not enumerated in terms of take under the ESA as they are for listed species. Therefore, we are not providing an incidental take authorization for Pacific walruses at this time.

11. REASONABLE AND PRUDENT MEASURES

Reasonable and prudent measures (RPMs) and their implementing terms and conditions aim to minimize incidental take anticipated from activities described in this BO. As described in the *Effects of the Action* and *Incidental Take Statement* interdependent and interrelated effects of the proposed Beaufort Sea ITRs are expected to result in incidental take of polar bears and Pacific walrus.

The Service anticipates the mitigating measures set forth in the proposed Beaufort Sea ITRs and associated LOAs will minimize potential adverse impacts of oil and gas activities on polar bears. Therefore, the Service has not identified any additional measures to reduce impacts under the ESA because all mitigation measures included in the proposed ITRs will also be required in LOAs issued to Industry applicants. Therefore, the Service's RPMs and implementing Terms and Conditions require compliance with mitigating measures provided through the Beaufort Sea ITRs and LOA regulatory process.

12. TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the ESA, MMM must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are non-discretionary.

1. MMM will require the implementation of appropriate mitigation measures by Industry applicants to minimize impacts to polar bears and Pacific walrus through the Beaufort Sea ITRs and applicant-specific LOAs.
2. Monitoring reports will be provided by holders of LOAs to MMM per stipulations in the LOA. Reports shall include, but are not limited to, 1) the amount of polar bear and/or Pacific walrus take expected in each LOA issued, and 2) the amount of actual polar bear and/or Pacific walrus take observed under the LOA.
3. MMM will conduct periodic in-year reviews of combined incidental take from Industry reports to ensure total take does not considerably exceed roughly 68 polar bears or 10 Pacific walrus annually.

13. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to use 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. Therefore, the Service recommends the following actions be implemented:

- The response of polar bears and Pacific walrus to changing environmental conditions in the Arctic is of particular interest. Therefore, the Service recommends MMM and its partners in this action (e.g., permitting agencies and Industry) support collection of baseline data to improve our understanding of how the effects of climate change will affect listed species in the action area. For example, ongoing USGS research in partnership with the Service, studying polar bear and Pacific walrus habitat use, reproduction, and survival relative to changing sea-ice conditions.

14. REPORTING REQUIREMENTS

To monitor the effects of incidental take, MMM will provide annual monitoring reports to the FFWFO as specified in the ITS [50 CFR 402.14(i)(3)]. MMM will provide the FFWFO with an annual report including:

- A summary of the total instances of incidental take for that year;
- Details of each incident, including:
    - The LOA holder;
    - Incident location (decimal coordinates);
    - The number of polar bears or Pacific walrus affected, including demographic information (e.g., sex, age, and/or reproductive status); and
    - A brief description of the Industry activity that resulted in incidental take.

The annual report is due by January 15th each year.

15. REINITIATION NOTICE

This concludes formal consultation on effects to polar bears and Pacific walrus from the proposed Beaufort Sea ITRs. 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 that may affect listed species in a manner or to an extent not considered in this opinion;
(3) The 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 biological and conference opinion. If you have any comments or require additional information, please contact Sarah Conn, Field Supervisor, Fairbanks Fish and Wildlife Field Office, 101 12th Ave., Fairbanks, AK, 99701, Telephone: 907/456-0499.

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