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ENVIRONMENTAL ASSESSMENT

Proposed Rule to Authorize the Incidental Take of Small Numbers of Pacific Walruses (Odobenus rosmarus divergens) and Polar bears (Ursus maritimus) During Oil and Gas Industry Exploration Activities in the Chukchi Sea

DEPARTMENT OF INTERIOR

U.S. FISH AND WILDLIFE SERVICE

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Chapter 1 - Purpose and Need

1.1. Introduction

This environmental assessment (EA) is prepared to implement provisions of the National Environmental Policy Act of 1969 [(NEPA) 42 U.S.C. § 4321 et cetera]. The action being considered under NEPA is whether issuance of regulations authorizing the incidental taking of small numbers of Pacific walruses (Odobenus rosmarus divergens) and polar bears (Ursus maritimus) during oil and gas exploration activities in the Chukchi Sea is, or is not, a major Federal action. A positive finding would require the development of an Environmental Impact Statement.

It is important to note that the issuance of incidental take regulations does not authorize the actual activities associated with exploration. In Alaska, oil and gas industry activities occurring in Federal waters and on Federal lands are permitted by the Department of Interior's Mineral Management Service (MMS) and the Bureau of Land Management (BLM), respectively, while oil and gas industry activities on State lands are permitted by the State of Alaska. Therefore, oil and gas exploration activities may continue to occur in polar bear and walrus habitat regardless of a positive or negative determination being made under this EA. It is also important to note that the U. S. Fish and Wildlife Service (Service) is not evaluating the potential impacts of oil and gas exploration activities on walruses and polar bears in this document. Rather, this EA will examine the potential impacts of implementing regulations for the incidental take of walruses and polar bears in the Chukchi Sea Region on walruses, polar bears and the subsistence use of these resources. This EA will then determine if the action (implementation of regulations) will have significant impacts, address any unresolved environmental issues, and provide a basis on

whether or not to issue regulations authorizing the incidental take of Pacific walruses and polar bears.

If the implementation of regulations is selected as the appropriate action, the Service will then evaluate the total amount of take expected from the specified activity in the geographic area. The estimate of total taking involves the accumulation of impacts from all anticipated activities to be covered by the specific regulations. The applicant's anticipated taking from its own activities is only one factor to consider; the total takings expected from all persons conducting the activities to be covered by the regulations must be determined.

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1.2. By what authority can we issue Incidental Take Regulations?

Section 101(a)(5)(A) of the Marine Mammal Protection Act of 1972 (Act), As Amended (16 U.S.C. § 1371), directs the Service to allow the incidental, but not intentional, take of small numbers of marine mammals in a specified activity (other than commercial fishing) within a specified geographical area for a specified time, upon the request of U.S. citizens. The incidental taking of marine mammals may be allowed if the Service finds, based on the best scientific evidence available, that the total of such taking associated with the specified activity will have a negligible impact on the species or stock and will not have an unmitigable adverse impact on the availability of the species or stock for subsistence uses. If these findings are made, the Service must issue regulations that include monitoring and reporting requirements and permissible methods of taking and other means to ensure the least practicable adverse impact on the species and its habitat and on the availability of the species for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance. The scope of such

regulations includes descriptions of the species, habitat, and the availability of the species for subsistence uses. The regulations may also stipulate monitoring activities and reporting requirements to mitigate potential impacts to these species and subsistence hunting. Service regulations [50 CFR 18.27(f)] provide for the issuance of Letters of Authorization (LOA) once specific regulations are in place to authorize activities under the provisions of these regulations. LOA's may only be issued to citizens of the United States. Definitions of key terms used in the proposed regulation are listed below. Additional definitions can be found in 50 CFR Part 18.

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

Negligible impact. Negligible impact is an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

Small numbers. Small numbers means a portion of a marine mammal species or stock whose taking would have a negligible impact on that species or stock. We decline to quantify small numbers explicitly. Such numerical limits would ignore the significant differences in the status and population dynamics among the various marine mammal stocks and the type of taking (i.e., harassment versus mortality) or other impacts. Furthermore, Congress recognized the imprecision of "small numbers" but offered no additional guidance.

Take. The term "take" as defined by the Act means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. The term "harass" as defined by the Act, for non military readiness activities, means any act of pursuit, torment, or annoyance that a) has the potential to injure a marine mammal or marine mammal stock in the wild; or b) 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.

1.3. Why do we need incidental take regulations?

In Alaska, the Service is responsible for the management of Pacific walruses and polar bears. These species are protected under the Marine Mammals Protection Act. Neither the Pacific walrus population nor polar bears are currently listed as threatened or endangered and, therefore, are not provided protection by the Endangered Species Act.

On December 27, 2006, the Service proposed to list the polar bear as a threatened species under the Endangered Species Act and initiated a comprehensive scientific review to assess the current status and future of the species. The Service will use the next 12 months to gather more information, undertake additional analyses, and assess the reliability of relevant scientific models before making a final decision whether to list the species. More information can be found at: "http://www.fws.gov/"and "http://www.fws.gov/home/feature/2006/010907FRproposedrule.pdf."

Section 101 of the Act placed a moratorium on the taking of marine mammals in US waters. The oil and gas industry (Industry) has expressed interest in exploring for oil and gas in the Chukchi Sea; an area which includes important habitat areas for Pacific walruses and polar bears. Thus, it is possible that while conducting legal activities in pursuit of oil and gas resources, Industry actions may result in the incidental take of walruses and polar bears.

Section 101(a)(5)(A) of the Act, as described in Section 1.2 of this document, allows the incidental, but not intentional, taking of marine mammals upon request of a U.S. Citizen provided that certain findings are made. The Service must find, in regulation, based on the best scientific evidence available, that the total taking associated with specified activities will have a negligible impact on the species or stock, and, will not have an unmitigable adverse impact on the availability of the species or stock for subsistence uses. Service regulations [50 CFR 18.27(f)] provide for the issuance of Letters of Authorization (LOA) once specific regulations are in place to authorize specific activities under the provisions of these regulations. Provisions outlined in incidental take regulations typically include mitigation, monitoring and reporting requirements. In addition, LOAs may be conditioned on a case-by-case basis to afford additional protection to sensitive areas, such as areas being used by feeding or resting walruses or maternal den sites for polar bears. These regulations would not allow the intentional taking of walruses or polar bears. Without incidental take regulations, industrial activities could still continue; however, the Service would have no formal means of communicating with Industry or have the ability to require monitoring and mitigation of specific activities and any form of "take" would be a violation of the Act.

1.4. What information was considered in our findings?

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1.4.1. Description of Petitions

On August 05, 2005, the Alaska Oil and Gas Association (AOGA), on behalf of its members, (Agrium Kenai Nitrogen Operations, Alyeska Pipeline Service Company, Anadarko Petroleum Corporation, BP Exploration (Alaska) Inc., Chevron, Eni Petroleum, ExxonMobil Production

Company, Flint Hills Resources, Alaska, Forest Oil Corporation, Marathon Oil Company, Petro-Canada (Alaska) Inc., Petro Star Inc., Pioneer Natural Resources Alaska, Inc., Shell Exploration & Production Company, Tesoro Alaska Company, and XTO Energy, Inc.) requested that the Service promulgate regulations for non-lethal incidental take of small numbers of walruses and polar bears in the Chukchi Sea for a period of 5 years. The Service requested additional information from AOGA regarding the nature, scope and location of proposed activities for its analysis of potential impacts on walruses, polar bears and subsistence harvests of these resources. On November 22, 2006, Shell Offshore Inc. (SOI) provided an addendum to the AOGA petition describing SOI's projected activities for 2007–2012. On January 2, 2007, ConocoPhillips Alaska, Inc. (CPAI), also provided an addendum to the original AOGA petition describing CPAI's projected activities from 2007-2012. In addition, on January 2, 2007, AOGA, on behalf of its members, also provided an addendum to its original petition referencing the Draft Environmental Impact Statement prepared by the Mineral Management Service (MMS) for the Chukchi Sea Planning Area: Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea (Chukchi Sea EIS). The Chukchi Sea EIS includes estimates of all reasonably foreseeable oil and gas activities associated with proposed Outer Continental Shelf (OCS) lease sales in the Chukchi Sea Planning Area. The AOGA petition requested that the Service consider activities described in the Chukchi Sea EIS for the period 2007–2012. The petition and addendums are available at: (**need web site**). The Chukchi Sea EIS, referenced in the AOGA petition, is available at: http://www.mms.gov/alaska (OCS EIS/EA MMS 2006-060).

The combined requests are for regulations to allow the incidental non-lethal take of a small number of polar bears and walruses in association with oil and gas activities in the Chukchi Sea

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and adjacent coastline projected out to 2012. The information provided by the petitioners indicates that projected oil and gas activities over this time frame will be limited to offshore and onshore Exploration activities. Development and Production activities were not considered in the requests. The petitioners have also specifically requested that these regulations be issued for non-lethal take. Industry has indicated that, through implementation of the mitigation measures, it is confident a lethal take will not occur. All projected exploration activities described by SOI, CPAI and AOGA (on behalf of its members) in their petitions, as well as projections of reasonably foreseeable exploratory activities for the period 2007–2012 described in the Chukchi Sea EIS were considered in our analysis. These activities are described in Section 1.3.4. of this document.

1.4.2. Specified geographical region

Specific locations where oil and gas activity may occur over the proposed regulatory period are largely speculative, and will be determined in part on the outcome of future Federal and State oil and gas lease sales. The geographic area covered by the requested incidental take regulations (hereafter referred to as the Chukchi Sea Region; Figure 1) encompasses all Chukchi Sea waters north and west of Point Hope (68°20'20" N, -166°50'40 W, BGN 1947) to the U.S– Russia Convention Line of 1867, and west of a north-south line through Point Barrow (71°23'29" N, -156°28'30 W, BGN 1944), and up to 200 miles north of Point Barrow. The north-south line at Point Barrow is the western border of the geographic region in the Beaufort Sea incidental take regulations (FR 71 43926).

The region also includes coastal areas up to 25 miles inland from the coast between the western boundary of the south National Petroleum Reserve-Alaska (NPR-A) near Icy Cape (70°20'00", -148°12'00) and a north-south line through Point Barrow (71°23'29" N, -156°28'30 W, BGN 1944). This terrestrial region encompasses a portion of the Northwest and South Planning Areas of the NPR-A.

1.4.3. Duration

The proposed regulations would be effective for a period of up to five years from the date of issuance. The regulations would expire at the end of 2012.

1..4.4. Specified activity

This section reviews the types and scale of oil and gas activities projected to occur in the Chukchi Sea Region over the specified time period (2007–2012). This information is based upon information provided by the petitioners and referenced in the Chukchi Sea EIS. Oil and gas activities anticipated and considered in our analysis of proposed incidental take regulations include: marine streamer 3D and 2D seismic surveys and high-resolution site-clearance surveys; offshore exploration drilling; and, onshore seismic exploration and drilling.

Marine Streamer 3D and 2D Seismic Surveys. The oil and gas industry conducts marine seismic surveys to locate geological structures potentially capable of containing petroleum accumulations. Air guns are the typical acoustic (sound) source for 2-dimensional and 3-dimensional (2D and 3D) seismic surveys. An outgoing sound signal is created by the venting of

high-pressure air from the air guns into the water to produce an air-filled cavity (a bubble) that expands and contracts. The size of individual air guns can range from tens to several hundred cubic inches (in^3). A group of air guns is usually deployed in an array to produce a more downward-focused sound signal. Air gun array volumes for both 2D and 3D seismic surveys are expected to range from 1,800-4,000 in^3, but may range up to 6,000 in^3. The air guns are fired at short, regular intervals, so the arrays emit pulsed rather than continuous sound. While most of the energy is focused downward and the short duration of each pulse limits the total energy into the water column, the sound can propagate horizontally for several kilometers. Marine-streamer 3D seismic surveys vary markedly from typical 2D seismic surveys, because the survey lines are closer spaced and are more concentrated in a particular area. The specifications of a 3D survey depend on client needs, the subsurface geology, water depth, and geological target. A 3D source array typically consists of two to three sub-arrays of six to nine air guns each, and is about 12.5-18 meters (m) long and 16-36 m wide. The size of the source-array size can vary during the seismic survey to optimize the resolution of the geophysical data collected at any particular site. Vessels usually tow up to three source arrays, depending on the survey-design specifications. Most operations use a single source vessel; however, in a few instances, more than one source vessel is used.

The vessels conducting these surveys generally are 70-90 m long. The sound-source level (zero-to peak) associated with typical 3D seismic surveys ranges between 233 and 240 decibels at 1 meter (re 1 μPa at 1 m). Marine 3D surveys are acquired at typical vessel speeds of 4.5 knots (k) (8.3 km/hour). A source array is activated approximately every 10-15 seconds, depending on vessel speed. The timing between outgoing sound signals can vary for different surveys to

achieve the desired "shot point" spacing to meet the geological objectives of the survey; typical spacing is either 25 or 37.5 m. The receiving arrays could include multiple (4-16) streamer-receiver cables towed behind the source array. Streamer cables contain numerous hydrophone elements at fixed distances within each cable. Each streamer can be 3-8 km long with an overall array width of up to 1,500 m between outermost streamer cables. Biodegradable liquid paraffin is used to fill the streamer and provide buoyancy. Solid/gel streamer cables also are used.

The wide extent of this towed equipment limits both the turning speed and the area a vessel covers with a single pass over a geologic target. It is, therefore, common practice to acquire data using an offset racetrack pattern, whereby each acquisition line is several kilometers away from and traversed in the opposite direction of the track line just completed. Adjacent transit lines for a survey generally are spaced several hundred meters apart and are parallel to each other across the survey area. Seismic surveys are conducted day and night when ocean conditions are favorable, and one survey effort may continue for weeks or months, depending on the size of the survey. Data-acquisition is affected by the arrays towed by the survey vessel and weather conditions. Typically, data are only collected between 25% and 30% of the time (or 6-8 hours a day) because of equipment or weather problems. In addition to downtime due to weather, sea conditions, turning between lines, and equipment maintenance, surveys could be suspended to avoid interactions with biological resources. The MMS estimates that individual surveys could last between 20-30 days (with downtime) to cover a 200 square mile (mi^2) area.

Marine-streamer 2D surveys use similar geophysical-survey techniques as 3D surveys, but both the mode of operation and general vessel type used are different. The 2D surveys provide a less-

detailed subsurface image because the survey lines are spaced farther apart, but they cover wider areas to image geologic structure on a more regional basis. Large prospects are easily identified on 2D seismic data, but detailed images of the prospective areas within a large prospect can only be seen using 3D data. The 2D seismic-survey vessels generally are smaller than modern 3D-survey vessels, although larger 3D-survey vessels are able to conduct 2D surveys. The 2D source array typically consists of three or more sub-arrays of six to eight air gun sources each. The sound-source level (zero-to-peak) associated with 2D marine seismic surveys are the same as 3D marine seismic surveys (233-240 dB re 1 μPa at 1 m). Typically, a single hydrophone streamer cable approximately 8-12 km long is towed behind the survey vessel. The 2D surveys acquire data along single track lines that are spread more widely apart (usually several miles) than are track lines for 3D surveys (usually several hundred meters). Marine seismic vessels are designed to operate for several months without refueling or re-supply. A guard or chase boat probably would be used for safety considerations, general support, maintenance, and re-supply of the main vessel, but it would not be directly involved with the collection of seismic data. Helicopters also may be used, when available, for vessel support and crew changes.

Marine-streamer surveys require a largely ice-free environment to allow effective operation and maneuvering of the air gun arrays and long streamers. In the Chukchi Sea Region, the timing and areas of the surveys will be dictated by ice conditions. The data-acquisition season in the Chukchi Sea could start sometime in July and end sometime in early November. Even during the short summer season, there are periodic incursions of sea ice, so there is no guarantee that any given location will be ice free throughout the survey. Marine seismic-exploration work is expected to occur in the Chukchi Sea Region in the summer of 2007 in anticipation of OCS lease

sale 193. This work is likely to include 3D seismic surveys but will not include exploration drilling. Approximately 100,000 line-miles of 2D seismic surveys already have been collected in the Chukchi Sea program area, so the MMS assumes that additional geophysical surveys will be primarily 3D surveys focusing on specific leasing targets. The 3D surveys are likely to continue during the early phase of exploration when wells are drilled; however, the number of surveys should decrease over time as data is collected over the prime prospects and these prospects are tested by drilling.

Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, the Service estimates that, in any given year during the specified time frame (2007–2012), up to four seismic survey vessels could be operating simultaneously in the Chukchi Sea Region during the open water season. Each seismic vessel is expected to collect between 3,200–14,500 linear kilometers of seismic survey data. Seismic surveys are expected to occur in open water conditions between July 1 and November 30 each year. We estimate that each seismic survey vessel will be accompanied or serviced by 1-3 support vessels.

High-Resolution Site-Clearance Surveys. Based on mapping of the subsurface structures using 2D and 3D seismic data, several well locations may be proposed. Prior to drilling deep test wells, high-resolution site clearance seismic surveys and geotechnical studies will be necessary to examine the proposed exploration drilling locations for geologic hazards, archeological features, and biological populations. Site clearance and studies required for exploration will be conducted during the open water season before a drill rig is mobilized to the site. A typical operation consists of a vessel towing an acoustic source (air gun) about 25 m behind the ship and

a 600-m streamer cable with a tail buoy. The source array usually is a single array composed of one or more air guns. A 2D high-resolution site-clearance survey usually has a single air gun, while a 3D high-resolution site survey usually tows an array of air guns. The ships travel at 3-3.5 knots (5.6-6.5 km/hour), and the source is activated every 7–8 seconds (or about every 12.5 m). All vessel operations are designed to be ultra-quiet, as the higher frequencies used in high-resolution work are easily masked by the vessel noise. Typical surveys cover one OCS block at a time. MMS regulations require information be gathered on a 300 by 900 m grid, which amounts to about 129 line kilometers of data per lease block. If there is a high probability of archeological resources, the north-south lines are 50 m apart and the 900 m remains the same. Including line turns, the time to survey a lease block is approximately 36 hours. Air gun volumes for high-resolution surveys typically are 90-150 in^3, and the output of a 90- in^3 air gun ranges from 229-233 dB high-resolution re 1μPa at 1m. Air gun pressures typically are 2,000 psi (pounds per square inch), although they can be used at 3,000 psi for higher signal strength to collect data from deep in the subsurface.

Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, the Service estimates that, during the specified time frame (2007–2012), as many as six high resolution site surveys may be carried out in any given year.

Offshore Drilling Operations. Considering water depth and the remoteness of this area, drilling operations are most likely to employ drill-ships with ice-breaker support vessels. Water depths greater than 100 feet and possible pack-ice incursions during the open water season will preclude the use of bottom-founded platforms as exploration drilling rigs. Using drill-ships allows the

operator to temporarily move off the drill site, if sea or ice conditions require it, and the suspended well is controlled by blowout-prevention equipment installed on wellheads on the seabed. Drilling operations are expected to range between 30 and 90 days at different well sites, depending on the depth to the target formation, difficulties during drilling, and logging/testing operations. Drillships operate only during the open-water season, and drifting ice can prevent their operation.

Upon reaching a drill site, the drillship is secured over the location by deploying anchors on as many as ten to twelve mooring lines. The drill pipe is encased in a riser that compensates for the vertical wave motion. The blowout preventer (BOP) is typically located at the seabed in a hole dug below the ice-scour depth. BOP placement is an important safety feature enabling the drillship to shut down operations and get underway rapidly without exposing the well. One or more ice management vessels (icebreakers) generally support drillships to ensure ice does not encroach on operations. A barge and tug typically accompany the vessels to provide a standby safety vessel, oil spill response capabilities, and refueling support. Most supplies (including fuel) necessary to complete drilling activities are stored on the drillship and support vessels. Helicopter servicing of drillships can occur as frequently as 1-2 times/day. The abandonment phase is initiated if exploratory wells are not successful. In a typical situation, wells are permanently plugged (with cement) and wellhead equipment removed. The seafloor site is restored to some practicable, pre-exploration condition. Post abandonment surveys are conducted to confirm that no debris remains following abandonment or those materials remain at the lease tract. The casings for delineation wells are either cut mechanically or with explosives during the process of well abandonment.

Geologic studies indicate that exploration usually will test prospects from 3,000-15,000 ft in the subsurface. Based on the characteristics of the geologic plays, it is assumed that exploration wells will average 8,000 ft. For the assumed drilling depths, a typical exploration well will use 475 tons (ton = 2000 pounds) of dry mud and produce 600 tons of dry rock cuttings. Considering the cost of synthetic drilling fluids now commonly used, the MMS assumes that most of the drilling mud will be reconditioned and reused. All of the rock cuttings will be discharged at the exploration site.

Considering the relatively short open water season in the Chukchi (July-November), the MMS estimates that up to four wells could be started by one rig each drilling season. However, it is more likely that only one to two wells could be drilled, tested, and abandoned by one drill ship in any given season, leaving work on the other wells to the next summer season. A total of 5 exploration wells have been drilled on the Chukchi shelf, and the MMS estimates that 7–14 additional wells will be needed to discover and delineate a commercial field.

Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, the Service estimates that as many as five drill ships could be operating in the Chukchi Sea Region in any given year during the specified time frame (2007–2012). Each drill ship is expected to drill up to four exploratory or delineation wells per season. Each drill ship is likely to be supported by 1–2 ice breakers, a barge and tug, 1–2 helicopter flights per day and 1–2 supply ships per week. The operating season is expected to be limited to the open water season July 1–November 30.

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Onshore seismic exploration and drilling. The CPAI petition also describes conducting onshore seismic exploration and drilling over the next five years, including geotechnical site investigations, vibroseis, construction of ice pads, roads, and islands, and exploratory drilling.

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

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

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

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

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

CPAI proposes to drill up to three onshore exploration wells on private lands south of Barrow near the North Slope Borough's Walakpa gas field in the winter of 2007. It is estimated that another 3 to 5 wells could be drilled in this area within the next 5 years. In support of these activities, CPAI estimates that the following associated infrastructure would be required: 20-100 miles of ice roads, 20-300 miles of rolligon trails, 1 to 2 airfields, of approximately 5000 feet in

size, storage of rigs and/or support equipment in Barrow, and barging of equipment to and from Barrow from existing facilities.

On federal lands, CPAI estimates drilling 3 to 6 onshore wells within the next 5 years. Drilling will likely include both well testing and VSPs. Three onshore wells are proposed for 2007. Drilling operations will require an estimated 20 to 100 miles of ice roads, 20 to 300 miles of rolligon trails, 1 to 4 airfields approximately 5000 ft in length on lakes or tundra, rig storage on gravel, possibly at new sites in NW-NPR-A., 1 to 5 camps, and 1 to 3 rigs operating in a given year.

1.4.5. Existing Measures to Mitigate Potential Effects of Oil and Gas Activities on Walruses and Polar Bears

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The Chukchi Sea EIS (http://www.mms.gov/alaska (OCS EIS/EA MMS 2006-060)), identifies several existing measures designed to mitigate potential effects of oil and gas exploration activities on marine mammal and subsistence use of marine mammal resources (II.B.3.; II-B.5-24). All plans for OCS exploration activities will go through a MMS review and approval to ensure compliance with established laws and regulations. Operational compliance is enforced through the MMS on-site inspection program. The following lease sale stipulations and mitigation measures are expected to apply to all exploration activities in the Chukchi Lease Sale Planning Area:

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Orientation Program. The program shall be designed in sufficient detail to inform individuals working on the project of specific types of environmental, social, and cultural concerns that relate to the sale and adjacent areas.

This stipulation provides positive mitigating effects by requiring that all personnel involved in petroleum activities on the North Slope resulting from any leases issued from Sale 193 be aware of the unique environmental, social, and cultural values of the local Inupiat residents and their environment. This stipulation should help avoid damage or destruction of environmental, cultural, and archaeological resources through awareness and understanding of historical and cultural values. It also would help minimize potential conflicts between subsistence hunting and gathering activities and oil and gas activities that may occur.

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Pre-Booming Requirements for Fuel Transfers. Fuel transfers (excluding gasoline transfers) of 100 barrels or more will require pre-booming of the fuel barge(s). The fuel barge must be surrounded by an oil-spill-containment boom during the entire transfer operation to help reduce any adverse effects from a fuel spill. The lessee's oil-spill-response plans must include procedures for the pre-transfer booming of the fuel barge(s).

Pre-Booming requirements are intended to lower the potential effects to water quality, lower trophic-level organisms, marine mammals, subsistence resources and hunting, and sociocultural systems by providing additional protection from potential fuel spills. By containing any spill within the boom area, this stipulation would reduce the chance of any fuel spill contacting

walruses and polar bears, the risk of harm to a walruses and polar bears, and the risk that a harvested animal may be tainted from a potential spill.

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

Site-specific monitoring programs would provide information about the seasonal distributions of walruses and polar bears. This information can be used to evaluate the threat of harm to the species and provides immediate information about their activities, and their response to specific events. This stipulation should help reduce potential effects of exploration activities, contribute incremental and important information to ongoing walrus and polar bear research and monitoring efforts, and help reduce effects to subsistence-harvest patterns and potential effects of oil and gas activities to the local hunters and subsistence users.

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Conflict Avoidance Mechanisms to Protect Subsistence-Harvesting Activities. Through consultation with potentially effected communities, the lessee shall make every reasonable effort to assure that their proposed activities are compatible with marine mammal subsistence hunting activities and will not result in unreasonable interference with subsistence harvests. In the event no agreement is reached between the parties, the lessee, the appropriate management agencies

and co-management organizations, and any communities that could be directly affected by the proposed activity may request that the MMS assemble a group consisting of representatives from the parties to specifically address the conflict and attempt to resolve the issues before the MMS makes a final determination on the adequacy of the measures taken to prevent unreasonable conflicts with subsistence harvests.

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

Measures to Mitigate Seismic-Surveying Effects. The measures summarized below are based on the protective measures in MMS' most recent marine seismic survey exploration permits and the recently completed *Programmatic Environmental Assessment of Arctic Ocean Outer Continental Shelf Seismic Surveys – 2006* (USDOI, MMS, 2006).

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

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

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

Monitoring of the Seismic-Survey Area - Aerial-monitoring surveys or an equivalent monitoring program designed to investigate animal distributions and abundance in the Seismic Survey may be required.

Reporting Requirements - Reporting requirements, (such as the monitoring plans required by the Service for polar bears and walruses) provide regulatory agencies with specific information on the monitoring techniques to be implemented and how any observed impacts to marine mammals will be recorded. In addition, operators must report immediately any shut downs due to a marine

mammal entering the exclusion zones and provide the regulating agencies with information on the frequency of occurrence and the types and behaviors of marine mammals (if possible to ascertain) entering the exclusion zones.

Temporal/Spatial/Operational Restrictions - Seismic-survey and associated support vessels shall observe a 0.5-mile (~800-meter) safety radius around Pacific walrus groups hauled out onto land or ice. Aircraft shall be required to maintain a 1,000-foot minimum altitude within 0.5 miles of hauled out Pacific walruses. Seismic-survey operators shall notify MMS and the Service in the event of any loss of cable, streamer, or other equipment that could pose a danger to marine mammals.

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

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1.4.6. Permissible methods of taking

The following are types of take that are deemed permissible for the incidental taking of small numbers of walruses and polar bears.

1.4.6.1. Harassment

The specified oil and gas activities have the potential to disturb walruses and polar bears in their natural environment and disrupt normal behavioral patterns.

1.4.6. 2. Human encounters with polar bears or walrus

Encounters between people and polar bears or Pacific walrus may also occur incidental to exploration activities. In the Beaufort Sea area, where the oil and gas industry operates in both terrestrial and marine environments, each operator mitigates potential encounters with training and having a pre-approved polar bear/walrus interaction plan on site. Such plans outline the steps the applicant will take to minimize impacts on animals, such as garbage disposal procedures to reduce the attraction of polar bears. Interaction plans must also outline the chain of command for responding to an animal sighting or stranding (for walrus). In addition to interaction plans, Industry personnel participate in polar bear awareness training. The intent of interaction plans and training activities is to allow for the early detection and appropriate response to polar bears and walrus which may be encountered during Industry activities. Most often, the appropriate response involves monitoring the animal's activities.

Chapter 2 - Alternatives Including the Proposed Action

2.1. Alternative 1: No Action

The no action alternative for this EA would result in no incidental take regulations being issued. The moratorium and prohibitions on the taking of marine mammals imposed by the Act prohibits Industry from "taking" marine mammals, including incidental taking. Therefore, no further

mitigation to minimize the effects of Industry activities on walruses and polar bears, monitoring, or reporting would be required. Under this alternative, takings that could occur incidental to oil and gas activities would be subject to prohibitions found in the Act, and Industry would be liable for penalties should a take occur.

2.2. Alternative 2: The Proposed Action (Incidental Take Regulations)

The proposed alternative is to promulgate incidental take regulations, which will authorize incidental take of small numbers of walruses and polar bears associated with oil and gas activities in the Chukchi Sea and adjacent Alaska coast. These activities must be conducted according to existing State and Federal law.

The proposed action would allow the Service to issue Letters of Authorizations (LOAs) for incidental take, which include further mitigation, monitoring and reporting requirements. The Service would review each request for a LOA and make a determination on the adequacy of mitigation, monitoring and reporting requirements to protect walruses and polar bears. LOAs may be conditioned on a case-by-case basis to afford additional protection to sensitive areas, such as areas being used by feeding walruses. These regulations would not allow the intentional taking of polar bears or Pacific walruses.

2.3. Alternatives Considered but Not Feasible

Alternatives that the Service considered, but determined were not feasible, included separating Industry operations by the type of activity, as well as the location or timing of the activity,

promulgating separate rules for each type of activity, and initiating a incidental Harassment Authorization (IHA) program similar to the program the National Marine Fisheries Service (NMFS) program.

In determining the impact of incidental taking, the Service must evaluate the "total taking" expected from the specified activity in a specific geographic area. The estimate of total taking involves the accumulation of impacts from all anticipated activities to be covered by the specific regulations. The applicant's anticipated taking from its own activities is only one factor to consider; the total takings expected from all persons conducting the activities to be covered by the regulations must be determined. Our analysis indicate that separating Industry operations is not a viable alternative, as we cannot separate, exclude, or exempt specific activities in making a negligible finding.

Section 101(a)(5)(A) states that upon request from a citizen of the United States, the Secretary of the Interior shall allow the incidental, but not intentional, taking of small numbers of marine mammals if certain findings are made. This section also states that the Secretary, subsequent to making such findings, will prescribe "regulations setting forth permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse to [the] species [of marine mammal(s) involved]...." Thus, since regulations are required by the Act, no alternatives were addressed.

Beaufort Sea incidental take regulations have been in place since 1993 and are an established process within the Service. In addition, during the 2006 open-water season the Service

authorized IHAs for oil and gas development activities in the Chukchi Sea as a means to establish temporary incidental take authorization for a limited number of projects occurring in the area. This was a new process for the Service and subsequently the Service concluded that the IHA process did not provide the comprehensive coverage necessary due to the types and numbers of onshore and offshore oil and gas activities that may encounter walrus and polar bears during the next 5 years.

Chapter 3 - Affected Environment

3.1. Physical Environment

Refer to the MMS PEA III.A. pp 15-18.

3.2. Biological Environment

The biological environment associated with this environmental assessment in the Chukchi Sea includes the Pacific walrus population and polar bears from the Chukchi and Bering seas stock.

3.2.1. Pacific walruses

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3.2.1.1. Stock Definition and Range

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Pacific walrus (Odobenus rosmarus divergens) are represented by a single stock of animals that inhabit the shallow continental shelf waters of the Bering and Chukchi seas (Sease and Chapman 1988). The population ranges across the international boundaries of the United States and

Russia, and both nations share common interests with respect to the conservation and management of this species (Figure 2).

The distribution of Pacific walruses varies markedly with seasons. During the late winter breeding season, walruses are found in areas of the Bering Sea where open leads, polynas, or areas of broken pack-ice occur. Significant winter concentrations are normally found in the Gulf of Anadyr, the St. Lawrence Island Polyna, and in an area south of Nunivak Island. In the spring and early summer, most of the population follows the retreating pack-ice northward into the Chukchi Sea; however, several thousand animals, primarily adult males, remain in the Bering Sea, utilizing coastal haulouts during the ice-free season. During the summer months, walruses are widely distributed across the shallow continental shelf waters of the Chukchi Sea. Significant summer concentrations are normally found in the unconsolidated pack-ice west of Point Barrow, and along the northern coastline of Chukotka in the vicinity of Wrangel Island. As the ice edge advances southward in the fall, walruses reverse their migration and re-group on the Bering Sea pack-ice (USFWS 2002a).

3.2.1.2. Population Status

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Several decades of intense commercial exploitation in the late 1800s and early 1900s left the population severely depleted. Fay et al. (1986) reviewed the results of aerial surveys conducted between 1960 and 1985 and concluded that the population had increased from 50,000–100,000 animals in the late 1950s to more than 250,000 animals by 1985. They attributed this rapid population growth to hunting restrictions enacted in the United States and Russia that reduced the size of the commercial harvest and provided protection to female walruses and calves.

Information concerning population size and trend after 1985 is less certain. An aerial survey flown in 1990 produced a population estimate of 201,039 animals; however, large confidence intervals associated with that estimate precluded any conclusions concerning population trend (Gilbert et al. 1992). The current size and trend of the Pacific walrus population are unknown (USFWS 2002a).

3.2.1.3. Habitat

Walruses rely on floating pack-ice as a substrate for resting and giving birth. Walruses generally require ice thicknesses of 50 centimeters (cm) or more to support their weight. Although walruses can break through ice up to 20 cm thick, they usually occupy areas with natural openings and are not found in areas of extensive, unbroken ice (Fay 1982). Thus, their concentrations in winter tend to be in areas of divergent ice flow or along the margins of persistent polynas. Concentrations in summer tend to be in areas of unconsolidated pack-ice, usually within 100 km of the leading edge of the ice pack (Gilbert 1999). When suitable pack-ice is not available, walruses haul out to rest on land. Isolated sites, such as barrier islands, points, and headlands, are most frequently occupied. Social factors, learned behavior, and proximity to their prey base are also thought to influence the location of haulout sites. Traditional walrus haulout sites in the eastern Chukchi Sea include Cape Thompson, Cape Lisburne and Icy Cape. In recent years, the Cape Lisburne haulout site has seen regular use in late summer. Numerous haulouts also exist along the northern coastline of Chukotka, and on Wrangel and Herald islands, which are considered important hauling grounds in September, especially in years when the pack-ice retreats far to the north.

Although capable of diving to deeper depths, walruses are for the most part found in shallow waters of 100 m or less, possibly because of higher productivity of their benthic foods in shallower water. They feed almost exclusively on benthic invertebrates although Native hunters have also reported incidences of walruses preying on seals. Prey densities are thought to vary across the continental shelf according to sediment type and structure. Preferred feeding areas are typically composed of sediments of soft, fine sands. The juxtaposition of ice over appropriate depths for feeding is especially important for females and young walruses that may not be capable of deep diving or long exposure in the water. The mobility of the pack ice is thought to help prevent walruses from overexploiting its prey resource (Ray et al. 2006). Foraging trips may last for several days, during which time they dive to the bottom nearly continuously. Most foraging dives to the bottom last between 5 and 10 minutes, with a relatively short (1–2 minute) surface interval. The intensive tilling of the sea floor by foraging walruses is thought to have significant influence on the ecology of the Bering and Chukchi Seas. Foraging activity recycles large quantities of nutrients from the sea floor back into the water column, provides food for scavenger organisms, and contributes greatly to the diversity of the benthic community.

3.2.1.4. Life History

Walruses are long-lived animals with low rates of reproduction. Females reach sexual maturity at 4–9 years of age. Males become fertile at 5–7 years of age; however, they are usually unable to compete for mates until they reach full physical maturity at 15–16 years of age. Breeding occurs between January and March in the pack-ice of the Bering Sea. Calves are usually born in late April or May the following year during the northward migration from the Bering Sea to the Chukchi Sea. Calving areas in the Chukchi Sea extend from the Bering Strait to latitude 70°N.

(Fay et al. 1984). Calves are capable of entering the water shortly after birth, but tend to haulout frequently, until their swimming ability and blubber layer are well developed. Newborn calves are tended closely. They accompany their mother from birth and are usually not weaned for 2 years or more. Cows brood neonates to aid in their thermoregulation (Fay and Ray 1968), and carry them on their back or under their flipper while in the water (Gehnrich 1984). Females with newborns often join together to form large "nursery herds" (Burns 1970). Summer distribution of females and young walruses is closely tied to the movements of the pack-ice relative to feeding areas. Females give birth to one calf every two or more years. This reproductive rate is much lower than other pinniped species; however, some walruses may live to age 35–40 and remain reproductively active until relatively late in life.

Walruses are extremely social and gregarious animals. They tend to travel in groups and haulout onto ice or land in groups. Walruses spend approximately one-third of their time hauled out onto land or ice. Hauled-out walruses tend to lie in close physical contact with each other. Youngsters often lie on top of the adults. The size of the hauled out groups can range from a few animals up to several thousand individuals.

3.2.1.5. Mortality

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Polar bears (Ursus maritimus) are known to prey on walrus calves, and killer whales (Orcinus orca) have been known to take all age classes of animals. Predation levels are thought to be highest near terrestrial haulout sites where large aggregations of walruses can be found; however, few observations exist for off-shore environs.

Pacific walruses have been hunted by coastal Natives in Alaska and Chukotka for thousands of years. Exploitation of the Pacific walrus population by Europeans has also occurred in varying degrees since first contact. Presently, walrus hunting in Alaska and Chukotka is restricted to meet the subsistence needs of aboriginal peoples. The Service, in partnership with the Eskimo Walrus Commission (EWC) and the Association of Traditional Marine Mammal Hunters of Chukotka, administered subsistence harvest monitoring programs in Alaska and Chukotka in 2000–2005. Harvest mortality over this time frame averaged 5,458 walruses per year. This mortality estimate includes corrections for under-reported harvest and struck and lost animals.

Intra-specific trauma is also a known source of injury and mortality. Disturbance events can cause walruses 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 at the perimeter of these herds are particularly vulnerable to trampling injuries.

3.2.1.6. Distributions and Abundance in the Chukchi Sea

Walruses are seasonably abundant in the Chukchi Sea and Lease Sale 193 Area. Their distribution is thought to be influenced primarily by the extent of the seasonal pack-ice (Fay 1982), although habitat use patterns are poorly known. In May and June, most of the Pacific walrus population migrates through the Bering Strait into the Chukchi Sea. Walruses tend to migrate into the Chukchi Sea along lead systems that develop along the northwest coast of Alaska. Walruses are expected to be closely associated with the southern edge of the seasonal pack-ice during the open water season. By July, large groups of walruses, up to several thousand

animals, can be found along the edge of the pack ice between Icy Cape and Point Barrow. During August, the edge of the pack-ice generally retreats northward to about 71°N, but in light ice years, the ice edge may retreat beyond 76°N. The sea ice normally reaches its minimum (northern) extent in September. It is unclear how walruses respond in years when the sea ice retreats beyond the relatively shallow continental shelf waters. At least some animals are thought to migrate west towards Chukotka, while others have been observed hauling out along the shoreline between Point Barrow and Cape Lisburne. The pack-ice rapidly advances southward in October, and most animals are thought to have returned to the Bering Sea by early November (Fay 1982).

A recent abundance estimate for the number of walruses present in the Chukchi Sea, including the Lease Sale 193 Area during the proposed operating season is lacking. Johnson et al. (1982) estimated 101,213 walruses hauled-out onto Chukchi Sea pack-ice, east of 172°30' W, in September 1980. Gilbert (1989) estimated 62,177 walruses were distributed in the Chukchi Sea pack-ice in the eastern Chukchi Sea in September 1985. Gilbert et al. (1992) estimated 16,489 walruses were distributed in the Chukchi sea pack-ice between Wrangel Island and Point Barrow in September 1990, but the authors also noted that the pack-ice was distributed well beyond the continental shelf at the time of the survey. These abundance estimates are all considered conservative because no corrections were made for walruses in water (not visible) at the time of the surveys.

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3.2.2 Polar bears

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3.2.2.1. Stock Definition and Range

Polar bears occur throughout the Arctic. The world population estimate of polar bears ranges from 20,000–25,000 individuals. In Alaska, they have been observed as far south in the eastern Bering Sea as St. Matthew Island and the Pribilof Islands (Ray 1971). However, they are most commonly found within 180 miles of the Alaskan coast of the Chukchi and Beaufort Seas, from the Bering Strait to the Canadian border. Two stocks occur in Alaska: (1) the Chukchi-Bering seas stock (CS); and (2) the Southern Beaufort Sea stock (SBS) (Figure 3). A summary of the Chukchi and Southern Beaufort Sea polar bear stocks are described below. A detailed description of the Chukchi Sea and Southern Beaufort Sea polar bear stocks can be found in the, "Range-Wide Status Review of the Polar Bear (*Ursus Maritimus*)" (http://alaska.fws.gov/fisheries/mmm/polarbear/issues.htm).

Chukchi/Bering Sea stock (CS)

The Chukchi/Bering seas stock is defined as polar bears inhabiting the area as far west as the eastern portion of the Eastern Siberian Sea, as far east as Point Barrow, and extending into the Bering Sea, with its southern boundary determined by the extent of annual ice. Based upon these telemetry studies, the western boundary of the population was set near Chaunskaya Bay in northeastern Russia. The eastern boundary was set at Icy Cape, Alaska, which also is the previous western boundary of the SBS. This eastern boundary constitutes a large overlap zone with bears in the SBS population.

Estimates of the size of the population have been derived from observations of dens, and aerial surveys. However, these estimates have wide ranges (*ca.* 200-500) and are considered to be of little value for management. Reliable estimates of population size based upon mark and

recapture are not available for this region (Evans et al. 2003). The status of the CS population, which was believed to have increased after the level of harvest was reduced in 1972, is now thought to be uncertain or declining. Measuring the population size remains a research challenge and recent reports of substantial levels of illegal harvest in Russia are cause for concern. Legal harvesting activities are currently restricted to Inuit in western Alaska. In Alaska, average annual harvest levels declined by approximately 50% between the 1980s and the 1990s and have remained at low levels in recent years. There are several factors potentially affecting the harvest level in western Alaska. The factor of greatest direct relevance is the substantial illegal harvest in Chukotka. In addition, other factors such as climatic change and its effects on pack ice distribution, as well as changing demographics and hunting effort in native communities could influence the declining take. Recent measures undertaken by regional authorities in Chukotka may have reduced the illegal hunt. The unknown rate of illegal take makes the stable designation uncertain and tentative and as a precaution the Chukchi population is designated as declining.

B. Southern Beaufort Sea (SBS)

The SBS polar bear population is shared between Canada and Alaska. Radio-telemetry data, combined with earlier tag returns from harvested bears, suggested that the SB region comprised a single population with a western boundary near Icy Cape, Alaska, and an eastern boundary near Pearce Point, NWT, Canada. The Southern Beaufort Sea population (from Point Hope, Alaska, to Banks Island, Northwest Territories) was estimated at 2,200 bears in 2000 (USFWS 2002b; 2002c). Later estimates suggested the size of the SBS population was approximately 1800 polar bears, although uneven sampling was known to compromise the accuracy of that estimate. A preliminary population analysis of the SBS stock was completed in June 2006 through joint

research coordinated between the U.S. and Canada. That analysis indicated the population of the region between Icy Cape and Pearce Point is now approximately 1500 polar bears (95% confidence intervals approximately 1000 - 2000). Further analyses are likely to tighten the confidence intervals, but not likely to change the point estimate appreciably. Although the confidence intervals of the current population estimate overlap 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. Although the new SBS population estimate is preliminary, we believe it should be used for current status assessments.

Recent analyses of radio-telemetry data of spatio-temporal use patterns of bears of the SBS stock using new spatial modelling techniques suggest realignment of the boundaries of the Southern Beaufort Sea area. We now know that nearly all bears in the central coastal region of the Beaufort Sea are from the SBS population, and that proportional representation of SBS bears decreases to both the west and east. For example, only 50% of the bears occurring in Barrow, Alaska and Tuktoyaktuk, NWT are SBS bears, with the remainder being from the CS and northern Beaufort Sea populations, respectively. The recent radio-telemetry data indicate that bears from the SBS population seldom reach Pearce Point, which is currently on the eastern management boundary for the SBS population. Conversely, SBS bears can also be found in the eastern regions of their range (i.e., Wainwright and Point Lay) in lower proportions than the central portion of their range.

The primary management and conservation concerns for the CS and SBS populations are: Climate warming, which continues to increase both the expanse and duration of open water in summer and fall; Human activities, including hydrocarbon exploration and development

occurring within the near-shore environment; Changing atmospheric and oceanic transport of contaminants into the region; and Possible inadvertent over-harvest, if the stocks become increasingly nutritionally-stressed or decline due to some combination of the afore-mentioned threats.

On December 27, 2006, the Service proposed to list the polar bear as a threatened species under the Endangered Species Act and initiated a comprehensive scientific review to assess the current status and future of the species. The Service will use the next 12 months to gather more information, undertake additional analyses, and assess the reliability of relevant scientific models before making a final decision whether to list the species. More information can be found at: "http://www.fws.gov/"and http://www.fws.gov/home/feature/2006/010907FRproposedrule.pdf.

3.2.2.2. Habitat

Polar bears of the Chukchi Sea are subject to the movements and coverage of the pack-ice. The most extensive north-south movements of polar bears are associated with the spring and fall ice movement. For example, during the 2006 ice-covered season, six bears radio-collared in the Beaufort Sea were located in the Chukchi and Bering Seas as far south as 59° latitude. Summer movements tend to be less dramatic due to the reduction of ice habitat. Summer distribution is somewhat dependent upon the location of the ice front; however, polar bears are accomplished swimmers and are often seen on floes separated from the main pack-ice. Therefore, bears can appear at any time in what can be called "open water." The summer ice pack can be quite disjunct and segments can be driven by wind great distances carrying polar bears with them.

Bears from both stocks overlap in their distribution around Point Barrow and can move into surrounding areas depending on ice conditions.

Polar bears spend most of their time in near-shore, shallow waters over the productive continental shelf associated with the shear zone and the active ice adjacent to the shear zone. Sea ice and food availability are two important factors affecting the distribution of polar bears. In the near-shore environment, Beaufort Sea polar bears are generally widely distributed in low numbers across the Beaufort Sea area; however, polar bears have been observed congregating on the barrier islands in the fall and winter resting, moving, and feeding on available food. Polar bears will occasionally feed on bowhead whale (Balaena mysticetus) carcasses at Point Barrow, Cross and Barter islands, areas where bowhead whales are harvested for subsistence purposes. An increase trend by polar bears to use coastal habitats in the fall during open-water and freeze-up conditions has been noted since 1992.

3.2.2.3. Denning and Reproduction

Although insufficient data exist to accurately quantify polar bear denning along the Alaskan Chukchi Sea coast, dens in the area are less concentrated than for other areas in the Arctic. The majority of denning of Chukchi Sea polar bears occurs on Wrangel Island, Herald Island, and certain locations on the northern Chukotka coast. Females without dependent cubs breed in the spring. Females can initiate breeding at 5 to 6 years of age. Females with cubs do not mate. Pregnant females enter maternity dens by late November, and the young are usually born in late December or early January. Only pregnant females den for an extended period during the winter; other polar bears may excavate temporary dens to escape harsh winter winds. An

average of two cubs are usually born, and after giving birth, the female and her cubs remain in the den where the cubs are nurtured until they can walk. Reproductive potential (intrinsic rate of increase) is low. The average reproductive interval for a polar bear is 3 to 4 years, and a female polar bear may produce about 8 to 10 cubs in her lifetime; in healthy populations, 50 to 60 percent of the cubs will survive. Female bears can be quite sensitive to disturbances during this denning period.

In late March or early April, the female and cubs emerge from the den. If the mother moves young cubs from the den before they can walk or withstand the cold, mortality to the cubs may increase. Therefore, it is thought that successful denning, birthing, and rearing activities require a relatively undisturbed environment. Radio and satellite telemetry studies elsewhere indicate that denning can occur in multi-year pack-ice and on land.

Both fur and fat are important to polar bears for insulation in air and water. Cubs-of-the-year must accumulate a sufficient layer of fat in order to maintain their body temperature when immersed in water. It is unknown to what extent young cubs can withstand exposure in water before they are threatened by hypothermia. Polar bears groom their fur to maintain its insulative value.

3.2.2.4. Prey

Ringed seals (Phoca hispida) are the primary prey of polar bears in most areas. Bearded seals (Erignathus barbatus) and walrus calves are hunted occasionally. Polar bears opportunistically

scavenge marine mammal carcasses, and there are reports of polar bears killing beluga whales (Delphinapterus leucas) trapped in the ice. Polar bears are also known to eat nonfood items including styrofoam, plastic, antifreeze, and hydraulic and lubricating fluids.

Polar bears hunt seals along leads and other areas of open water or by waiting at a breathing hole, or by breaking through the roof of a seal's lair. Lairs are excavated in snow drifts on top of the ice. Bears also stalk seals in the spring when they haul out on the ice in warm weather. The relationship between ice type and bear distribution is as yet unknown, but it is suspected to be related to seal availability.

3.2.2.5. Mortality

Polar bears are long-lived (up to 30 years) and have no natural predators, and they do not appear to be prone to death by diseases or parasites. Cannibalism by adult males on cubs and occasionally on other bears is known to occur. The most significant source of mortality is man. Before the MMPA was passed in 1972, polar bears were taken by sport hunters and residents. Between 1925 and 1972, the mean reported kill was 186 bears per year. Seventy-five percent of these were males, as cubs and females with cubs were protected. Since 1972, only Alaska Natives from coastal Alaskan villages have been allowed to hunt polar bears for their subsistence uses or for handicraft and clothing items for sale. The Native hunt occurs without restrictions on sex, age, or number provided that the population is not determined to be depleted. From 1980 to 2005, the total annual harvest for Alaska averaged 101 bears: 64 percent from the Chukchi Sea and 36 percent from the Beaufort Sea. Other sources of mortality related to human activities

include bears killed during research activities, euthanasia of sick and or injured bears, and defense of life kills by non-Natives (Brower et al. 2002).

3.2.2.6. Distributions and Abundance in the Chukchi Sea

Polar Bears are seasonably abundant in the Chukchi Sea and Lease Sale 193 Area and their distribution is influenced by the movement of the seasonal pack ice. Polar bears in the Chukchi and Bering Seas move south with the advancing ice during fall and winter and move north in advance of the receding ice in late spring and early summer (Garner et al. 1990). The distance between the northern and southern extremes of the seasonal pack ice is approximately 800 miles. In May, and June polar bears are likely to be encountered in the Lease Sale Area as they move northward from the northern Bering Sea, through the Bering Strait into the southern Chukchi Sea Bering Strait. During fall/early winter period polar bears are likely to be encountered in the Lease Sale Area during their southward migration in late October and November. Polar bears are dependent upon the sea ice for foraging and the most productive areas seem to be near the ice edge, leads, or polynas where the ocean depth is minimal (Durner et al. 2004). In addition polar bears could be present along the shoreline in this area as they will opportunistically scavenge on marine mammal carcasses washed up along the shoreline (Kalxdorff and Fischbach 1998).

3.3. Socio-Economic Environment

The communities most likely to be impacted by the proposed activities are Point Hope, Point Lay, Wainwright, and Barrow. Walruses and polar bears have been traditionally harvested from these communities for subsistence purposes. The harvest of these species plays an important role in the culture and economy of these coastal communities. Walrus meat is consumed by humans

and dogs, and the ivory is used to manufacture traditional arts and crafts. Polar bears are primarily hunted for their fur, which is used to manufacture cold weather gear; however, their meat is also occasionally consumed.

An exemption under section 101(b) of the MMPA allows Alaska Natives who reside in Alaska and dwell on the coast of the North Pacific Ocean or the Arctic Ocean to take polar bears and walrus if such taking is for subsistence purposes or occurs for purposes of creating and selling authentic native articles of handicrafts and clothing, as long as the take is not done in a wasteful manner. Sport hunting of both species has been prohibited in the United States since enactment of the MMPA in 1972. Under the terms of the MMPA, there are no restrictions on the number, season, or ages of polar bears or walruses that can be harvested in Alaska. A more restrictive Native to Native agreement between the Inupiat from Alaska and the Inuvialuit in Canada was created for the Southern Beaufort Sea stock of Polar bears in 1988 (Brower et al. 2002). Polar bears harvested from the villages of Barrow and Wainwright are currently considered part of the Southern Beaufort Sea stock and thus are subject to the terms of the Inuvialuit-Inupiat Polar Bear Management Agreement (Agreement). The Agreement establishes quotas and recommendations concerning protection of denning females, family groups, and methods of take. Quotas are based on estimates of population size and age specific estimates of survival and recruitment. The polar bears harvested by the communities of Point Hope and Point Lay are thought to come primarily from the Chukchi/Bering sea stock. Neither Point Hope nor Point Lay hunters are parties to the Agreement.

The US Fish and Wildlife Service collects information on the subsistence harvest of walruses and polar bears in Alaska through the Marking, Tagging and Reporting Program (MTRP). The program is administered through a network of MTRP "taggers" employed in subsistence hunting communities. The marking and tagging rule requires that hunters report harvested walruses and polar bears to MTRP taggers within 30 days of kill. Taggers also certify (tag) specified parts (ivory tusks for walruses, hide and skull for polar bears) to help control illegal take and trade. Table 1 presents the mean number of walruses and polar bears recorded through the MTRP program in Wainwright, Barrow, Point Hope, and Point Lay from 1990-2005. Harvest data for 2006 were incomplete at the time of this analysis. It is unknown what proportion of the total walrus harvest is reported through the MTRP, though some estimates are as low as 30% (T. Evans, pers. comm.). Polar bear harvests reported by the MTRP are believed to be as high as 80% (Tom Evans, pers. com.).

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Table 1. Mean (± SD) number of polar bears and walruses harvested per year in 4 communities on the Chukchi Sea, 1990-2005, as recorded through the USFWS MTRP.

	Barrow	*Wainwright*	*Point Hope*	*Point Lay*
Polar bears	20.9 ± 8.0	6.8 ± 4.0	12.1 ± 4.1	2.2 ± 1.8
Walrus[1]	26.0 ± 15.2	50.8 ± 30.0	5.6 ± 5.8	4.4 ± 3.4

[1] Reported harvests are thought to be approximately 30% of the actual animals harvested.

Harvest levels of polar bears and walruses in these communities vary considerably between years, presumably in response to differences in ice conditions (Braund 1993 a, b). Sections 3.3.1.–3.3.4. provide more specific descriptive information on subsistence harvests of walruses and polar bears in each community based on available literature.

3.3.1. Point Hope

Between 1990 and 2005, the average annual walrus harvest recorded through the MTRP at Point Hope was 5.6 (± 5.8) animals per year (Table 1). Walruses are thought to represent approximately 16% (by weight) of the community's annual marine mammal harvest (Braund 1993a). Point Hope hunters typically begin their walrus hunt in late May and June as walruses migrate into the Chukchi Sea. The sea ice is usually well off shore of Point Hope by July and does not bring animals back into the range of hunters until late August and September. Most (70.8%) of the reported walrus harvest at Point Hope occurred in June and September. It should be noted that other sources report higher harvest levels. A study by Fuller and George (1997) in 1992 reported 72 walruses being harvested, compared with five reported through the MTRP, and Courtnage and Braund (1984) estimated 10-30 are harvested per year in June alone. Most of the walruses recorded through the MTRP at Point Hope were taken within five miles of the coast, or near coastal haulout sites at Cape Lisburne and Cape Thompson. Braund and Burnham (1984) mapped intensive walrus subsistence use areas within 5 miles of the coast from Cape Thompson to five miles north of Point Hope, within several miles of Kilkralkik Point, along a five mile stretch near Cape Dyer, and within a several mile radius of Cape Lisburne.

Between 1990 and 2005, the average reported polar bear harvest at Point Hope was 12.1 ± 4.1 animals per year (Table 1). Polar bear harvests typically occur from January to April coincidental to the winter seal hunting season (Courtnage and Braund 1984). Most of the polar bears reported through the MTRP program were harvested within 10 miles of the community; however, residents also reported taking polar bears as far away as Cape Thompson and Cape Lisburne.

3.3.2. Point Lay

Point Lay hunters reported an average of 4.4 ± 3.4 walruses per year between 1990 and 2005 (Table 1). Walruses are thought to represent a relatively small fraction (4%) of the community's annual consumption of marine mammals (Braund 1993b). Based on MTRP data, walrus hunting in Point Lay peaks in June-July with 84.4% of all walruses being harvested during these months. Historically, harvests have occurred primarily within 40 miles north and south along the coast from Point Lay and approximately 30 miles offshore (see Fig. III-C-9; MMS 1990). MTRP data suggests that most walrus harvests occur within 30 miles of the community.

Between 1990 and 2005, the average reported polar bear harvest at Point Lay was 2.2 ± 1.8 animals per year (Table 1). The only information on harvest locations comes from the MTRP database; all reported harvest occurred within 25 miles of the village.

3.3.3. Wainwright

Wainwright hunters have consistently harvested more walruses than any other subsistence community on the North Slope. Between 1990 and 2005, the average reported walrus harvest in Wainwright was 50.8 ± 30.0 animals per year (Table 1). A discrepancy between MTRP data and other sources of harvest information is noted. For example, Braund (1993b) notes that Wainwright hunters harvested 106 walruses per year in 1989, whereas the MTRP program only recorded 59. According to Braund (1993b) walruses represent approximately 40% of the communities' annual subsistence diet of marine mammals. Wainwright residents hunt walruses from June through August as the ice retreats northward. Walruses are plentiful in the pack-ice near the village this time of year. Most (85.2%) of the harvest occurs in June and July (data from

1988-1989; Braund 1993b). Most walrus hunting is thought to occur within 20 miles of the village, in all directions (MTRP). Locations of walrus harvests in 1988 and 1989 overlapped strongly with locations of ringed seal and bearded seal harvests (Braund 1993b).

Between 1990 and 2005, the average reported polar bear harvest at Wainwright was 6.8 ± 4.0 animals per year (Table 1). Polar bears are harvested throughout much of the year, with peaks in May and December (MTRP database). Braund (1993a) reported that locations of polar bear harvests in 1988 and 1989 closely coincided with locations of beluga and bowhead whale harvests. MTRP data indicates that most hunting occurs within 10 miles of the community.

3.3.4. Barrow

Barrow is the northernmost community within the geographical region being considered. Most (88.6%) walrus hunting occurs in June and July when the land-fast ice breaks up and hunters can access the walruses by boat as they migrate north on the retreating pack-ice (Pedersen and North Slope Borough 1979, Braund 1993a). Braund (1993a) reported that walrus hunters from Barrow range up to 60 miles from shore. MTRP data indicate that most harvests occur within 30 miles of the community. Between 1990 and 2005, the average reported walrus harvest in Barrow was 26.0 ± 15.2 animals per year (Table 1). Braund (1993a) reported that in 1987-1989, 29% of the Barrow community participated in walrus hunting activities and walruses accounted for 16% of the total marine mammals harvest (by volume). In 1992, walruses accounted for approximately 12% of the marine mammal harvest (Fuller and George 1999).

Between 1990 and 2005, the average reported polar bear harvest at Barrow was 20.9 ± 8.0 animals per year (Table 1). According to Braund (1993a) the number of polar bears harvested in Barrow is influenced primarily by ice conditions and the number of people out on the ice. Most (74%) of all polar bear harvests reported by Barrow residents occurred in February and March (MTRP Database). Although relatively few people are thought to hunt specifically for polar bears, those that do hunt primarily between October and March (Braund 1993a). Hunting areas for polar bears overlap strongly with areas of bowhead subsistence hunting; particularly the area from Point Barrow to Walakpa where walrus and whale carcasses are known to concentrate polar bears.

3.4. Nature of Effects between Industry and the Biological Resources: Potential Impacts of Proposed Exploration Activities on Pacific Walruses, Polar Bears and Subsistence Users

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3.4.1. Potential Impacts of Proposed Exploration Activities on Pacific Walruses

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Proposed oil and gas exploration activities for the Chukchi Sea Region involve the operation of seismic survey vessels, drill ships, icebreakers, supply boats, fixed-winged aircrafts and helicopters. These activities may result in disturbances to walruses. Potential impacts of disturbances on walruses include: insufficient rest, increased stress and energy expenditure, interference with feeding, masked communication, and impaired thermoregulation of calves that leave haulouts and spend too much time in the water. Prolonged or repeated disturbances may displace individuals or herds from preferred feeding or resting areas. Disturbance events may cause walrus groups to abandon land or ice haulouts. Severe disturbance events could result in trampling injuries or cow-calf separations, both of which are potentially fatal. Calves and young

animals at the perimeter of the herds are particularly vulnerable to trampling injuries. Under certain ice conditions, noise generated from exploration activities may obstruct migratory pathways and interfere with the free movements of animals.

The response of walruses to disturbance stimuli is highly variable. Anecdotal observations by walrus hunters and researchers suggest that males tend to be more tolerant of disturbances than females and individuals tend to be more tolerant than groups. Females with dependent calves are considered least tolerant of disturbances.

Hearing sensitivity is assumed to be within the 13 Hz and 1200 Hz range of their own vocalizations (Kastelein et al. 2002). Walrus hunters and researchers have noted that walruses tend to react to the presence of humans and machines at greater distances from upwind approaches than from downwind approaches, suggesting that odor may be a stimulus for a flight response. The visual acuity of walruses is thought to be less than for other species of pinnipeds.

Seismic operations are expected to introduce significant levels of noise into the marine environment. There are relatively few data available to evaluate the potential response of walruses to seismic operations. Airgun volumes for high-resolution surveys are typically 90-150 in^3, and the output of a 90-in^3 airgun ranges from 229-233 dB re 1μPa at 1 m. Airgun pressures typically are 2,000 psi (pounds per square inch), although they can be used at 3,000 psi for more output. Although the hearing sensitivity of walruses is poorly known, source levels associated with Marine 3D and 2D seismic surveys are thought to be high enough to cause temporary hearing loss in other pinniped species. Therefore, it is possible that walruses within the 180-

decibel (dB re 1 μPa) safety radius for seismic activities could suffer shifts in hearing thresholds and temporary hearing loss (Kastak et. al. 2005).

The reaction of walruses to vessel traffic appears to be dependent upon vessel type, distance, speed, and previous exposure to disturbances. Underwater noise from vessel traffic in the Chukchi Sea may "mask" ordinary communication between individuals. Other factors, such as weather and length of time hauled out, may also determine whether an animal responds. Ice management operations are expected to have the greatest potential for disturbances since these operations typically require the vessel to accelerate, reverse direction, and turn rapidly thereby maximizing propeller cavitations and resulting noise levels. Previous monitoring efforts suggest that icebreaking activities can displace some walrus groups up to several kilometers away; however most groups of hauled out walruses showed little reaction beyond ½ mile (Brueggeman et al. 1990). Environmental variables such as wind speed and direction may contribute to variability in detection and response.

Reactions of walruses to aircraft are thought to vary with aircraft type, range, and flight pattern, as well as the age, sex, and group size of exposed individuals. Fixed-winged aircraft are less likely to elicit a response than helicopter overflights. Walruses are particularly sensitive to changes in engine noise and are more likely to stampede when planes turn or fly low overhead. Researchers conducting aerial surveys for walruses in sea ice habitats have observed little reaction to aircrafts above 1,000 ft (305 m).

A lack of information concerning the distribution and abundance of walruses in the Chukchi Sea Lease Sale Area precludes a meaningful assessment of the numbers of animals likely to be impacted by the proposed exploration activities. Based upon previous aerial survey efforts (Johnson et al. 1982; Gilbert 1989; Gilbert et al. 1992), and exploration monitoring programs (Brueggeman et. al. 1991), walruses are expected to be closely associated with seasonal pack ice during the proposed operating season. Therefore, in evaluating potential impacts of exploration activities, broken pack ice may serve as a reasonable predictor of walrus abundance. Activities occurring in or near sea ice habitats are presumed to have the greatest potential for impacting walruses.

Geotechnical seismic surveys and high-resolution site clearance seismic surveys are expected to occur primarily in open water conditions, some distance from the pack ice, which will presumably limit their interactions with large concentrations of walruses. Based upon previous seismic monitoring programs, it is reasonable to assume that seismic surveys will interact with small numbers of walruses swimming in open water. Industry is expected to adopt standard seismic mitigation measures including the monitoring of a 180 db ensonification exclusion zone, which is expected to minimize the potential for air-gun pulses to injure walruses during seismic operations. Although the hearing sensitivity of walruses is poorly known, it is reasonable to assume that walruses swimming in open water will be able to detect air-gun pulses well beyond the 180db safety radius. Marine mammal monitoring programs are expected to provide some insight into the response of walruses to various seismic operations from which future mitigative measures can be developed.

The physical presence of vessels and aircrafts engaged in seismic surveys and support activities may also result in the disturbance of animals via visual or other cues. The most likely response of walruses in open water to acoustic and visual cues will be for animals to move away from the source of the disturbance. Because of the transitory nature of the proposed seismic surveys, impacts to walruses exposed to seismic operations are expected to be temporary in nature. It is noted that prolonged or repeated exposures in open water have the potential to displace animals from preferred foraging areas.

Although seismic surveys are expected to occur in areas of open water some distance from the pack ice, support vessels and/or aircraft servicing seismic operations (1 every 2 weeks) may encounter large aggregations of walruses hauled out onto sea ice. The sight, sound or smell of humans and machines may displace these animals from ice haulouts. Because seismic operations are expected to move throughout the Chukchi Sea, impacts associated with support vessels and aircrafts are likely to be distributed in time and space. The potential for disturbance events to result in animal injuries, mortalities or mother-calf separations is also of concern. The potential for injuries is expected to increase with the size of effected walrus aggregations. MMS permit stipulations are expected to include a 0.5-mile (800-m) exclusion zones for marine vessels and aircraft around walrus groups observed on ice. This stipulation should serve to reduce the intensity of disturbance events and minimize the potential for injuries to animals.

Drilling operations are expected to occur at several offshore locations. Drilling operations are expected to range between 30 and 90 days per well site. Although drilling activities are expected to occur primarily during open water conditions, the dynamic movements of sea ice may

transport walruses within range of drilling operations. Drilling operations are expected to involve drill ships attended by icebreaking vessels to manage incursions of sea ice. Monitoring programs associated with exploratory drilling operations in the Chukchi Sea in 1990 noted that 25% of walrus groups encountered in the pack ice during icebreaking responded by diving into the water, with most reactions occurring within 1 km of the ship. The monitoring report, noting that: 1) walrus and polar bear distributions were closely linked with pack ice; 2) pack ice was near active prospects for relatively short time periods; and 3) ice passing near active prospects contained relatively few animals concluded that effects of the drilling operations on walruses and polar bears were limited in time, geographical scale, and the proportion of population affected (Brueggeman et. al. 1991). It should be noted that the distribution and abundance of walruses in the Chukchi Sea is poorly understood. Without knowledge of the relative importance of various habitat areas, or the likely locations of drilling operations, it is impossible to make precise predictions about the number of animals likely to be impacted by drilling operations.

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Drilling operations will be supported by supply vessels (1-3 trips per week) and/or helicopters (1-3 trips day) depending upon the distance from shore. Support missions may encounter aggregations of walruses on sea ice along their transportation route. Because drilling operations are expected to last from 30-90 days at a single location, walruses in the vicinity of drilling operations may be subjected to prolonged or repeated disturbances. The most likely response of walruses subjected to prolonged or repeated disturbances will be for them to abandon the area. The MMS permit stipulation identifying a 0.5 mile operational exclusion zone around groups of hauled out walruses may help mitigate disturbances to walruses near prospective drill sites.

MMS may also require additional monitoring and mitigation measures should a prospective drill site occur in an area frequented by walruses.

The potential also exists for oil/fuel spills to occur from seismic and support vessels, fuel barges, and drilling operations. Little is known about the effects of oil on walruses; however, walruses may react to oil much like other pinniped species. Damage to the skin of pinnipeds can occur from contact with oil because some of the oil penetrates into the skin, causing inflammation and ulcers. Exposure to oil can quickly cause permanent eye damage. Inhalation of hydrocarbon fumes presents another threat to marine mammals. In studies conducted on other species of pinnipeds, pulmonary hemorrhage, inflammation, congestion, and nerve damage resulted after exposure to concentrated hydrocarbon fumes for a period of 24 hours. Walruses are extremely gregarious animals and normally associate in large groups; therefore any contact with spilled oil or fuel may impact several individuals.

Exposure to oil may also impact benthic prey species. Bivalve mollusks, a favorite prey species of the walrus, are not effective at processing hydrocarbon compounds, resulting in highly concentrated accumulations and long-term retention of contamination within the organism. Exposure to oil may kill prey organisms or result in slower growth and productivity. In addition, because walrus feed primarily on mollusks, they may be more vulnerable to a loss of this prey species than other pinnipeds that feed on a larger variety of prey.

Although oil/ fuel spills has the potential to cause adverse impacts to walruses and prey species, small operational spills associated with the proposed exploration activities are not considered a major threat to walruses. Operational spills would likely be of a relatively small volume, and

occur in areas of open ocean where walrus densities are expected to be relatively low. MMS operating stipulations, including oil spill prevention and response plans, reduce both the risk and scale of potential spills. Any impacts associated with an operational spill are likely to be limited to a small numbers of animals.

3.4.1.1 Cumulative effects of proposed exploration activities on Pacific walruses

The following types of past, present, and reasonably foreseeable actions and factors have contributed to the environmental baseline conditions in the Chukchi Sea and could contribute to potential cumulative effects on the Pacific walrus population:

Commercial and Subsistence Harvest-Walruses have an intrinsically low rate of reproduction and therefore are limited in their capacity to respond to exploitation (Fay 1982). In the late 19th century, American whalers intensively harvested walruses in the northern Bering and southern Chukchi seas. Between 1869 and 1879, catches averaged more than 10,000 per year (Bockstoce and Botkin 1982), with many more animals struck and lost (Fay and Bowlby 1994). The population was substantially depleted by the end of the century (Fay et al. 1989) and the industry collapsed in the early 1900s (Bockstoce and Botkin 1982). Since 1930, the combined walrus harvests of the U.S. and Russia have ranged from 2,300–9,500 animals per year. Notable harvest peaks occurred during 1930–1960 (4,500–9,500 per year) and in the 1980's (5,000–9,000 per year). These harvest levels were thought to be of sufficient scale to result in subsequent population declines (Fay et al. 1989, Fay and Bowlby 1994, Fay et al. 1997). Commercial hunting continued in Russia until 1991 under a quota system of up to 3,000 animals per year (Garlich-Miller and Pungowiyi 1999). Since 1992, the harvest of Pacific walruses has been

limited to the subsistence catch of coastal communities in Alaska and Chukotka. Harvest levels through the 1990s ranged from approximately 2,400–4,700 animals per year. The lack of information on population size and trend preclude any assessment of sustainable harvest rates (Garlich-Miller et al. 2006).

Climate Change- Analysis of long-term environmental data sets indicate that substantial reductions in both the extent and thickness of the arctic sea-ice cover have occurred over the past 20-40 years, with record minimum extent in 2002 and again in 2005, and extreme minima in 2003 and 2004 (Stroeve et al., 2000; NASA, 2005). The Chukchi Sea EIS provides a comprehensive literature review regarding potential impacts of diminishing sea ice on Arctic marine mammals (V.C.8.b.). Walruses, which rely on suitable sea ice as a substrate for resting, pupping, and molting, may be especially vulnerable. Reasonably foreseeable impacts to walruses as a result of diminishing sea ice cover include: shifts in range and abundance (Tynan and DeMaster, 1997); population declines in prey species (Lovvorn et al., 2003); increased mortalities resulting from storm events ((USDOI, FWS, 2005); and premature separation of females and dependent calves (Cooper et al., 2006). The juxtaposition of sea ice over shallow-shelf habitat suitable for benthic feeding is critical to walruses (Ray et al. 2006). Recent trends in the Chukchi Sea have resulted in seasonal sea-ice retreating off the continental shelf and over deep Arctic Ocean waters, presenting significant adaptive challenges to walruses in the region (Derocher et al. 2004).

Commercial Fishing and Marine Vessel Traffic - Based on available data, walruses rarely interact with commercial fishing and marine vessel traffic in the Arctic (USFWS 2002a).

Walruses are normally closely associated with sea ice, which limits their interactions with fishing vessels and barge traffic. However, as noted in the section on climate change, the temporal and seasonal extent of the sea ice is projected to diminish in the future. There has been speculation recently that commercial shipping through the Northwest Passage is likely to increase in the coming decades. Commercial fishing opportunities may also expand should the sea ice continue to diminish. The result could be increased temporal and spatial overlap between fishing and shipping operations and walrus habitat use and increased interactions between walruses and marine vessels. The potential cumulative effects of increased boat traffic and commercial fishing operations is a primary concern and warrants continued close attention and effective mitigation practices.

Past Offshore Oil and Gas Related Activities- Oil and gas related activities have been conducted in the Chukchi and Beaufort seas since the late 1960's. Much more oil and gas related activity has occurred in the Beaufort Sea OCS than in the Chukchi Sea OCS.

Pacific walrus do not normally range into the Beaufort Sea (USFWS 2002a), though individuals and small groups are occasionally observed. During the history of the incidental take regulations in the Beaufort Sea interactions with walruses have been minimal. From 1994 to 2004, a total of nine sightings, involving 10 walruses were recorded by Industry during the open-water season. Three of the sightings involved potential disturbance to walruses: two sightings were of walrus hauling out on the armor of Northstar Island and one sighting occurred at the SDC on the McCovey prospect, where the walrus reacted to helicopter noise.

The Chukchi Sea OCS has previously experienced some oil and gas exploration activity but no development or production. Portions of the current Chukchi Sea planning area were offered in four previous lease sales (Sales 97 and 109 in 1988 and Sales 124 and 126 in 1991). A total of 483 tracts were leased in these four sales. Five large prospects were drilled (Burger, Klondike, Crackerjack, Popcorn, and Diamond) between 1989 and 1991. None of the Chukchi Sea drilling prospects discovered commercial quantities of oil or gas, and exploration of Chukchi shelf was discontinued. Through successive rounds of relinquishments, industry lease holdings gradually diminished and, of the 483 leases active on Chukchi shelf in 1992, none remain active today.

Unlike the Beaufort Sea, the Chukchi is considered important summer habitat for the Pacific walrus population. Although a recent abundance estimate is lacking for the region, a significant proportion of the Pacific walrus population is thought to spend the summer months in the Chukchi Sea (USFWS 2002a). Aerial surveys and vessel based observations of walruses were carried out in 1989 and 1990 to examine the responses of walruses to drilling operations at three Chukchi sea drill prospects. (Brueggeman et al. 1990, 1991) The aerial surveys documented several thousand walruses in the vicinity of the drilling prospects; most (> 90%) were closely associated with sea ice (Brueggeman et al. 1990, 1991). Vessel based observations indicated that walrus responses were greatest during ice management activities, when the icebreaker crisscrossed the prospect. Animals moved deeper into the pack ice, where the noise level from the icebreaker was an estimated 15–25 dB above ambient (97 dB) (Brueggeman et al. 1990).

During the 2006 open water season, three pre-lease seismic surveys were carried out in the Chukchi Sea OCS planning area. The results of the 2006 monitoring program were not available

at the time of this analysis. Marine mammal observers on board the seismic and support vessels reported 1,186 walrus and 4 polar bear sightings during their operations. The impact of these encounters to walruses or subsistence hunting activities is unknown.

Future (Speculative) Offshore Oil and Gas Related Activities: Development and Production

Despite a history of encouraging exploration, no actual development of offshore oil resources has occurred in the Chukchi Sea. For the purposes of this environmental analysis we assume that development and production will take place as a result of exploration activities in Lease Sale Area 193. The most potentially significant effect of development and production activities is the increased risk of a large oil spill. The MMS in its analysis of a hypothetical development and production scenario estimated the chance of a large spill greater than or equal to 1,000 bbl occurring and entering offshore waters is within a range of 33-51% (Chukchi Sea EIS). A large oil spill in the Chukchi Sea could result in potentially significant cumulative impacts to Pacific walruses, their habitat and prey resources, and their availability and quality as a subsistence resource. The realization and scale of the impacts would depend in part on the location and timing of the spill.

In addition to potential production spills from wells or pipelines, the potential also exists for oil/fuel spills to occur from associated support vessels, fuel barges, and even aircraft. However, this risk is considered slight in ice free waters, and any spills which result from the proposed action will most likely be of small volume, and are not considered a major threat to marine mammals in the action area. Impacts to them would most likely include temporary displacement until clean-up activities are completed.

While development and production activities are beyond the scope of the proposed regulations, the potential for a large oil spill to occur as a result of future development and production activities is of concern. The potential effects of large oil releases will need to be addressed in future assessments of proposed development and production activities.

Contribution of Proposed Activities to Cumulative Impacts- The proposed seismic surveys and exploratory drilling operations identified by the petitioners are likely to result in some incremental cumulative effects to walruses through the potential exclusion or avoidance of walruses from feeding or resting areas and disruption of important associated biological behaviors. However, the impact analysis of the likely range of effects and the likelihood of exposures resulting in adverse behavioral effects supports a conclusion that the proposed activities cannot be reasonably expected to, or reasonably likely to, adversely affect the Pacific walrus population through effects on annual rates of recruitment or survival. Mitigation measures imposed through MMS lease stipulations and mitigation measures are designed to avoid Level A Harassment (injury), reduce the potential for significant adverse effects on walruses, and avoid an unmitigable adverse impact on their availability for subsistence purposes. The Service proposes to develop additional measures to help reduce the level of uncertainty during the conduct of exploration activities through the promulgation of incidental take regulations and the issuance of LOAs with site specific operating restrictions and monitoring requirements, which should provide yet another level of mitigation and protection. Therefore, we conclude that the proposed exploration activities, especially as mitigated through the regulatory

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process, are not expected to add significantly to the cumulative impacts on walruses from past, present, and future activities.

3.4.2. Potential impacts of offshore and onshore exploration activities on Polar bears

In the Chukchi Sea, polar bears will have a limited presence during the open-water season during Industry operations as they generally move to the northwestern portion of the Chukchi Sea during this time. This limits the chances of impacts on polar bears from Industry activities. Although polar bears have been documented in open-water, miles from the ice edge or ice floes, this has been a relatively rare occurrence.

Offshore Activities

In the open-water season, Industry activities will be generally limited to vessel-based exploration activities, such as seismic surveys and site clearance surveys. These activities avoid ice floes and the multi-year ice edge; however, they may contact a limited number of bears in open water.

Seismic exploration activities in the Chukchi Sea may affect polar bears in a number of ways. Seismic ships and icebreakers may be physical obstructions to polar bear movements, although these impacts are of short term and localized effect. Noise, sights and smells produced by exploration activities may repel or attract bears, either disrupting their natural behavior or endangering them by threatening the safety of seismic personnel.

Little research has been conducted on the effects of noise on polar bears. Polar bears are curious and tend to investigate novel sights, smells, and possibly noises. Noise produced by seismic

activities could elicit several different responses in polar bears. Noise may act as a deterrent to bears entering the area of operation, or the noise could potentially attract curious bears.

In general, little is known about the potential for seismic survey sounds to cause auditory impairment or other physical effects in polar bears. Available data suggest that such effects, if they occur at all, would be limited to short distances and probably to projects involving large airgun arrays. There is no evidence that airgun pulses can cause serious injury, or death, even in the case of large airgun arrays. Marine mammals that show behavioral avoidance of seismic vessels are especially unlikely to incur auditory impairment or other physical effects. Also, the planned monitoring and mitigation measures include shut-downs of the airguns, which will reduce any such effects that might otherwise occur. Polar bears normally swim with their heads above the surface, where underwater noises are weak or undetectable. Thus, it is doubtful that any single bear would be exposed to strong underwater seismic sounds long enough for significant disturbance to develop.

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

As already stated, polar bears spend the majority of their time on pack ice during the open-water season in the Chukchi Sea, which limits the chance of impacts from human and industry

activities. Researchers have observed that in some cases bears swim long distances during the open water period seeking either ice or land and may become vulnerable to exhaustion and storms with large waves because ice floes are dissipating and unavailable or unsuitable for use as haul outs or resting platforms. In the fall of 2004 four drowned polar bears were observed in the Beaufort Sea during a U.S. Minerals Management Service coastal aerial survey program.

Seismic activities avoid ice floes and the pack ice edge; however, they may contact bears in open water. It is unlikely that seismic exploration activities would result in more than temporary behavioral disturbance to polar bears.

Vessel traffic could result in short-term behavioral disturbance to polar bears. If a ship is surrounded by ice it is more likely that curious bears will approach. Any on-ice activities required by exploration activities create the opportunity for bear-human interactions. In relatively ice-free waters polar bears are less likely to approach ships, although they may be encountered on ice floes. For example, during the late 1980s, at the Belcher exploration drilling site, in the Beaufort Sea, in a period of little ice, a large floe threatened the drill rig at the site. After the floe was moved by an icebreaker, workers noticed a female bear with a cub-of-the-year and a lone adult swimming nearby. It was assumed these bears had been disturbed from the ice floe.

Ships and ice breakers may act as physical obstructions, altering or intercepting bear movements in the spring during the start-up period for exploration if they transit through a restricted lead system, such as the Chukchi Polyna. Polynas are important habitat for marine mammals, which

makes them important hunting areas for polar bears. A similar situation could occur in the fall when the pack ice begins to expand.

Routine aircraft traffic should have little to no effect on polar bears; however, extensive or repeated overflights of fixed-wing aircraft or helicopters could disturb polar bears. Behavioral reactions of polar bears should be limited to short-term changes in behavior that would have no long-term impact on individuals and no impacts on the polar bear population.

Onshore Activities

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

Noise disturbance can originate from either stationary or mobile sources. Stationary sources include exploratory drilling operations and their associated facilities. Mobile sources include ice road construction and associated vehicle traffic, including tracked vehicles and snowmobiles; aircraft traffic; and vibroseis programs.

Noise produced by stationary Industry activities could elicit several different responses in polar bears. The noise may act as a deterrent to bears entering the area, or the noise could potentially

attract bears. Attracting bears to these facilities, especially exploration facilities in the coastal or nearshore environment, could result in human–bear encounters, which could result in unintentional harassment, lethal take, or intentional hazing (under separate authorization) of the bear.

During the ice-covered season, noise and vibration from exploratory drilling facilities may deter females from denning in the surrounding area, even though polar bears have been known to den in close proximity to industrial activities. In 1991, two maternity dens were located on the south shore of a barrier island within 2.8 km (1.7 mi) of a production facility. Recently, industrial activities were initiated while two polar bears denned near those activities. During the ice-covered seasons of 2000-2001 and 2001-2002, dens known to be active were located within approximately 0.4 km and 0.8 km (0.25 mi and 0.5 mi) of remediation activities on Flaxman Island in the Beaufort Sea without any observed impact to the polar bears.

In contrast, information exists indicating that polar bears may have abandoned dens in the past due to exposure to human disturbance. For example, in January 1985, a female polar bear may have abandoned her den due to rolligon traffic, which occurred between 250 and 500 meters from the den site. Researcher disturbance created by camp proximity and associated noise, which occurred during a den emergence study in 2002 on the North Slope, may have caused a female bear and her cub(s) to abandon their den and move to the ice sooner than necessary. The female was observed later without the cub(s). While such events may have occurred, information indicates they have been infrequent and isolated.

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

As with offshore activities, routine aircraft traffic should have little to no effect on polar bears; however, extensive or repeated overflights of fixed-wing aircraft for monitoring purposes or helicopters used for re-supply of Industry operations could disturb polar bears. Behavioral reactions of non-denning polar bears should be limited to short-term changes in behavior and would have no long-term impact on individuals and no impacts on the polar bear population. In contrast, denning bears may abandon or depart their dens early in response to repeated noise such as that produced by extensive aircraft overflights. Mitigation measures, such as minimum flight elevations over polar bears or areas of concern and flight restrictions around known polar bear dens, will be required, as appropriate, to reduce the likelihood that bears are disturbed by aircraft.

Noise and vibrations produced by vibroseis activities during the ice-covered season could potentially result in impacts on polar bears. During this time of year, denning female bears as well as mobile, non-denning bears could be exposed to and affected differently by potential impacts from seismic activities. The best available scientific information indicates that female polar bears entering dens, or females in dens with cubs, are more sensitive than other age and sex groups to noises. Standardized

mitigation measures will be implemented to limit or minimize disturbance impacts to denning females. These Industry mitigation measures are currently in place and are implemented when necessary through LOAs in the Beaufort Sea.

In the case of exploratory seismic or drilling activities occurring around a known bear den, a standard condition of LOAs requires Industry projects to have developed a polar bear interaction plan and requires Industry to maintain a 1-mile buffer between industry activities and known denning sites to limit disturbance to the bear. In addition, we may require Industry to avoid working in known denning habitat until bears have left their dens. To further reduce the potential for disturbance to denning females, we have conducted research, in cooperation with Industry, to enable us to accurately detect active polar bear dens through the use of Forward Looking Infrared (FLIR) imagery.

FLIR imagery, as a mitigation tool, is used in cooperation with coastal polar bear denning habitat maps. Industry activity areas, such as coastal ice roads, are compared to polar bear denning habitat and transects are then created to survey the specific habitat within the industry area. FLIR heat signatures within a standardized den protocol are noted and further mitigation measures are placed around these locations. This can include the 1-mile exclusion zone or increased monitoring of the site. FLIR surveys are more effective at detecting polar bear dens than visual observations. The effectiveness increases when FLIR surveys are combined with site-specific, scent-trained dog surveys.

Based on these evaluations, the use of FLIR technology, coupled with trained dogs, to locate or verify occupied polar bear dens, is a viable technique that could help to minimize impacts of oil and

gas industry activities on denning polar bears. These techniques will continue to be required as conditions of LOAs when appropriate.

In addition, Industry has sponsored cooperative research evaluating transmission of noise and vibration through the ground, snow, ice, and air and the received levels of noise and vibration in polar bear dens. This information has been useful to refine site-specific mitigation measures and placement of facilities.

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

Human encounters can be dangerous for both the polar bear and the human. These can occur during an onshore vibroseis program or at a drilling facility. Whenever humans work in the habitat of the animal, there is a chance of an encounter, even though, historically, such encounters have been uncommon in association with Industry.

Encounters are more likely to occur during fall and winter periods when greater numbers of the bears are found in the coastal environment searching for food and possibly den sites later in the season. Potentially dangerous encounters are most likely to occur at coastal exploratory sites. In the Beaufort Sea, Industry has developed and uses devices to aid in detecting polar bears, including bear monitors, motion and infrared detection systems. Industry also takes steps to actively prevent bears from accessing facilities using safety gates and fences. The types of detection and exclusion systems are

implemented on a case-by-case basis and depends on the location and needs of the facility. Industry will implement these same mitigative measures in the Chukchi Sea region to minimize disturbance of polar bears.

Onshore drilling sites near the coastline could potentially attract polar bears. Polar bears use the coastline as a travel corridor. In the Beaufort Sea, the majority of polar bear observation occurred along the coastline. Most bears were observed as passing through the area; however, nearshore facilities could potentially increase the rate of human–bear encounters, which could result in increased incident of harassment of bears. Employee training and company policies will be implemented to reduce and mitigate such encounters.

Depending upon the circumstances, bears can be either repelled from or attracted to sounds, smells, or sights associated with onshore Industry activities. In the past, such interactions have been mitigated through conditions on the LOA, which require the applicant to develop a polar bear interaction plan for each operation. These plans outline the steps the applicant will take, such as garbage disposal and snow management procedures, to minimize impacts to polar bears by reducing the attraction of Industry activities to polar bears. Interaction plans also outline the chain of command for responding to a polar bear sighting. In addition to interaction plans, Industry personnel participate in polar bear interaction training while on site.

Employee training programs are designed to educate field personnel about the dangers of bear encounters and to implement safety procedures in the event of a bear sighting. The result of these polar bear interaction plans and training allows personnel on site to detect bears and respond safely and appropriately. Often, personnel are instructed to leave an area where bears

are seen. Many times polar bears are monitored until they move out of the area. Sometimes, this response involves deterring the bear from the site. If it is not possible to leave, in most cases bears can be displaced by using forms of deterrents, such as vehicles, vehicle horn, vehicle siren, vehicle lights, spot lights, or, if necessary, pyrotechnics (e.g., cracker shells). The purpose of these plans and training is to eliminate the potential for injury to personnel or lethal take of bears in defense of human life. Since the incidental take regulations have been in effect in the Beaufort Sea since 1993, there has been no known instance of a bear being killed or Industry personnel being injured by a bear as a result of Industry activities. The mitigation measures associated with the Beaufort Sea incidental take regulations have proven to minimize human–bear interactions and will be part of the requirements of future LOAs associated with the Chukchi Sea incidental take regulations, as appropriate.

There is the potential for Industry activity to contact polar bear dens as well. Known polar bear dens around the oil and gas activities are monitored by the Service, when practicable. Only a small percentage of the total active den locations are known in any year. Industry routinely coordinates with the Service to determine the location of Industry's activities relative to known dens. General LOA provisions will require Industry operations to avoid known polar bear dens by 1 mile. There is the possibility that an unknown den may be encountered during Industry activities. If a previously unknown den is identified, communication between Industry and the Service and the implementation of mitigation measures, such as the 1-mile exclusion area around known dens, would ensure that disturbance is minimized.

Effect on Prey Species

Ringed seals are the primary prey of polar bears and to a lesser extent, bearded seals. Industry will mainly have an effect on seals through the potential for contamination (oil spills) or industrial noise disturbance. Some effects of contamination from oil discharges for seals are described in the current Beaufort Sea incidental take regulations (FR 71 43926; sections, "Potential Impacts of Waste Product Discharge and Oil Spills on Pacific Walrus and Polar Bears," under the "Pacific Walrus" subsection). Studies have shown that seals can be displaced from certain areas, such as pupping lairs or haulouts, and abandon breathing holes near Industry activity. However, these disturbances appear to have minor effects and are short term. In the Chukchi Sea, offshore operations have the highest potential to impact seals; however, due to the seasonal aspect (occurring only during the open-water season) of offshore operations, the Service anticipates minimal disturbance to ringed and bearded seals. Prey availability is not expected to be significantly changed due to Industry activities.

Waste Discharge and Potential Oil Spills

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Individual polar bears can potentially be affected by Industry activities through waste product discharge and oil spills. Spills are unintentional releases of oil or petroleum products. In accordance with the National Pollutant Discharge Elimination System Permit Program, all North Slope oil companies must submit an oil spill contingency plan. It is illegal to discharge oil into the environment, and a reporting system requires operators to report spills. According to MMS, on the Beaufort and Chukchi OCS, the oil industry has drilled 35 exploratory wells. During the time of this drilling, industry has had 35 small spills totaling 26.7 bbl or 1,120 gallons (gal). Of the 26.7 bbl spilled, approximately 24 bbl were recovered or cleaned up. Many spills were small (< 50 barrels) by Industry standards. Larger spills (≥ 500 barrels) accounted for much of the annual volume. Five large spills occurred between 1985 and 1998 on the North Slope. These spills were terrestrial in

nature and posed minimal harm to walrus and polar bears. To date, no major exploratory offshore oil spills have occurred on the North Slope in either the Beaufort or Chukchi Seas.

Larger spills associated with Alaskan oil and gas activities on the North Slope have been production–related, and have occurred at production facility or pipeline connecting wells to the Trans-Alaska Pipeline System. MMS estimates the chance of a large (=1,000 bbl) oil spill from exploratory activities in the Chukchi Sea to be very low. For this rule, potential oil spills for exploration activities will likely occur with the marine vessels. These will most likely be localized and relatively small. Spills in the offshore or onshore environments classified as minor could occur during normal operations (e.g., transfer of fuel, handling of lubricants and liquid products, and general maintenance of equipment). Potential large spills in the Chukchi Sea region will likely be the result of drilling platforms. Drilling platforms have containment ability in case of a blowout and the amount of release is not expected to be at the same level as potential spills from production facilities.

The possibility of oil and waste product spills from Industry activities in the Chukchi Sea and the subsequent impacts on polar bears is a concern; however due to the type of Industry activity planned for the area, the potential for spills would be limited to the open-water season in the offshore. Hence, polar bears could encounter oil spills during the open-water and ice-covered seasons in offshore or onshore habitat. Although the majority of the Chukchi Sea polar bear population spends a large amount of their time offshore on the pack ice, some bears are likely to encounter oil from a spill regardless of the season and location.

The major concern regarding large oil spills is the impact a spill would have on the survival and recruitment of the Chukchi Sea polar bear population. Currently, this bear population is unknown. The population may be able to sustain the additional mortality caused by a large oil spill of a small number of bears, such as 1 to 5 individuals; however, the additive effect of a worst-case scenario, such as numerous bear deaths (i.e., in the range of 20 to 30) due to direct or indirect effects from a large oil spill may reduce population rates of recruitment or survival. Indirect effects may occur through a local reduction in seal productivity or scavenging of oiled seal carcasses coupled with the subsistence harvest and other potential impacts, both natural and human-induced. The removal of bears from the population would exceed sustainable levels, potentially causing a decline in the bear population and affecting bear productivity and subsistence use.

Small spills of oil or waste products throughout the year by Industry activities on land could potentially impact small numbers of bears. The effects of fouling fur or ingesting oil or wastes, depending on the amount of oil or wastes involved, could be short term or result in death. For example, in April 1988, a dead polar bear was found on Leavitt Island, in the Beaufort Sea, approximately 9.3 km (5 nautical miles) northeast of Oliktok Point. The cause of death was determined to be poisoning by a mixture that included ethylene glycol and Rhodamine B dye; however, the source of the mixture was unknown.

During the ice-covered season, mobile, non-denning bears would have a higher probability of encountering oil or other Industry wastes in the onshore environment than non-mobile, denning females as terrestrial and ocean habitats are available. Current management practices by

Industry, such as requiring the proper use, storage, and disposal of hazardous materials, minimize the potential occurrence of such incidents. In the event of an oil spill, it is also likely that polar bears would be intentionally hazed to keep them away from the area, further reducing the likelihood of impacting individuals or the population.

Oil exposure by polar bears could occur through the consumption of contaminated prey, and by grooming or nursing affecting motility, digestion, and absorption. Death could occur if a large amount of oil were ingested. Oiling can also cause thermoregulatory problems and damage to various systems, such as the respiratory and the central nervous systems, depending on the amount of exposure. Oil may also affect the prey base of polar bears where possible impacts from the loss of a food source could reduce recruitment or survival. A detailed description of exposure to oil by polar bears can be found in the Beaufort Sea Incidental Take Regulations (FR 71 43926).

3.4.2.1 Cumulative effects of proposed exploration activities on Polar bears

The Draft Polar Bear Status Review describes cumulative effects of oil and gas development on polar bears in Alaska. This document can be found at: http://alaska.fws.gov/fisheries/mmm/polarbear/issues.htm.

An extensive study of cumulative effects of oil and gas development on polar bears and seals in Alaska (NRC 2003) concluded that: 1) "Industrial activity in the marine waters of the Beaufort Sea has been limited and sporadic and likely has not caused serious cumulative effects to ringed seals or polar bears. 2) Careful mitigation can help to reduce the effects of oil and gas

development and their accumulation, especially if there is no major oil spill. However, the effects of full-scale industrial development of waters off the North Slope would accumulate through the displacement of polar bears and ringed seals from their habitats, increased mortality, and decreased reproductive success. 3) A major Beaufort Sea oil spill would have major effects on polar bears and ringed seals. 4) Climatic warming at predicted rates in the Beaufort Sea region is likely to have serious consequences for ringed seals and polar bears, and those effects will accumulate with the effects of oil and gas activities in the region. A detailed description of climate change and its potential effects on polar bears can be found at: http://alaska.fws.gov/fisheries/mmm/polarbear/issues.htm and http://www.fws.gov/. 5) Unless studies to address the potential accumulation of effects on North Slope polar bears or ringed seals are designed, funded, and conducted over long periods of time, it will be impossible to verify whether such effects occur, to measure them, or to explain their causes."

The proposed seismic surveys and exploratory drilling operations identified by the petitioners are likely to result in some incremental cumulative effects to polar bears through the potential exclusion or avoidance of polar bears from feeding, resting, or denning areas and disruption of important associated biological behaviors. However, the impact analysis of the likely range of effects and the likelihood of exposures resulting in adverse behavioral effects supports a conclusion that the activities would result in no more than temporary disturbance effects.

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3.4.4. Potential Effects of Proposed Oil and Gas Activities on Subsistence Uses of Pacific Walruses and Polar Bears

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Walruses and polar bear have cultural and subsistence significance to the Inupiat Eskimos inhabiting the north coast of Alaska. Four North Slope communities are considered within the potentially affected area: Point Hope, Point Lay, Wainwright, and Barrow. The open water season for oil and gas exploration activities coincides with peak walrus hunting activities in these villages. The subsistence harvest of polar bears can occur year round in the Chukchi Sea, depending on ice conditions, with peaks usually occurring in spring and fall.

Noise and disturbances associated with oil and gas exploration activities have the potential to adversely impact subsistence harvests of walruses and polar bears by displacing animals beyond the hunting range of these communities. Disturbances associated with exploration activities may also heighten the sensitivity of animals to humans with potential impacts to hunting success. Little information is available to predict the effects of exploration activities on the subsistence harvest of walruses and polar bears. Hunting success varies considerably from year to year because of variable ice and weather conditions.

The MMS and the petitioners believe that exploration activities can be conducted in a manner that will not result in an adverse impact on subsistence hunting of marine mammals in the Chukchi Sea. Lease Sale Area 193 includes a 25 mile coastal deferral zone which may reduce the impacts of exploration activities on subsistence hunting. Offshore seismic exploration will be restricted prior to July 1 to allow migrating marine mammals the opportunity to disperse from the coastal zone. It is noted that support vessels and aircrafts are expected to regularly transit the coastal deferral zone and have the potential to disturb marine mammals in coastal hunting areas. MMS Lease stipulations will require lessees to consult with the subsistence communities of

Barrow, Wainwright, Point Lay and Point Hope prior to submitting an operational plan for exploration activities. The intent of these consultations is to develop any further mitigation measures necessary to prevent unreasonable conflicts with subsistence hunting activities.

In addition to existing lease stipulations and mitigation measures, the Service could also develop additional mitigation measures through incidental take regulations. The following stipulations, intended to mitigate potential impacts to subsistence walrus and polar bear hunters from the proposed activities would apply to the incidental take authorization:

1.) Prior to receipt of a LOA, applicants will be required to contact and consult with the communities of Point Hope, Point Lay, Wainwright, and Barrow to identify any additional measures to be taken to minimize adverse impacts to subsistence hunters in these communities. A Plan of Cooperation (POC) will be developed if there is concern from community members that the proposed activities will impact subsistence uses of Pacific walruses or polar bears. The POC must address how applicants will work with the affected Native communities and what actions will be taken to avoid interference with subsistence hunting of walrus and polar bear. The Service will review the POC to ensure any potential adverse effects on the availability of the animals are minimized.

2.) Take authorization will not be granted for activities occurring within a 30-mile radius of Barrow, Wainwright, Point Hope or Point Lay, unless expressly authorized by these communities. This condition is intended to limit potential interactions between industry activities and subsistence hunting in near-shore environments.

3.) Offshore seismic exploration activities will only be authorized during the open-water season, which will not exceed the period of July 1 to November 30. This should allow the villages to participate in subsistence hunts for polar bears without interference and to minimize impacts to walrus during the spring migration.

4.) A 15-mile separation must be maintained between all active seismic surveys and/or exploratory drilling operations to mitigate cumulative impacts to resting, feeding and migrating walruses.

3.5. Current and Proposed Impacts of Oil and Gas Exploration Activities

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3.5.1. Current impacts

The Chukchi Sea OCS experienced similar levels of oil and gas exploration activity in the 1980s and early 1990s. These activities did not result in any population level impacts to walruses, polar bears or unmitigatable adverse impacts to the subsistence use of these resources. Exploration of the Chukchi shelf was discontinued after 1991 until 2006 when three seismic surveys were carried out during the open water season.

Marine mammal observers onboard the seismic and support vessels recorded a total of 1,186 walruses during the 2006 open water season. Three hundred and eighteen of the walruses sighted during seismic operations (27%) exhibited some form of behavioral response to the vessels (dispersal or diving). Most of the walruses sighted in 2006 were recorded by support vessels during ice-scouting missions. Seismic vessels, operating in open water conditions,

recorded 33 walruses in 2006. Marine mammal observers reported 19 incidents in which walruses were observed within a predetermined 190 db (safety) zone of ensonification, requiring the shutdown of airgun arrays. There is no indication that any of these interactions resulted in more than a temporary change in behavior of individual animals.

In 2006, four polar bears were sighted by support vessels during oil and gas seismic surveys. No bears were observed from seismic vessels. Three of the four bears were observed walking on ice and one animal was observed swimming. Two of the four reacted to the vessel. All 4 sightings occurred between Sept. 2 and Oct 3, 2006.

Five polar bear observations (11 individuals) were recorded during the University of Texas at Austin's marine geophysical survey performed by the USCGC Healy. This survey was located in the northern Chukchi Sea and Arctic Ocean. All bears were observed on the ice between July 21 and August 19, 2006. None of the polar bears were in the water where they could have received appreciable levels from operating airguns. The closest point of approach distances of bears from the USCGC Healy ranged from 780m to 2.5 km. One bear was observed approximately 575 m from a helicopter conducting ice reconnaissance. Four of the groups exhibited possible reactions to the helicopter or vessel. The seismic operations performed during the project are believed to have resulted in fewer animals being impacted than estimated prior to the survey, where the requested take of polar bears for this project was 55 bears.

3.5.2 Proposed impacts

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Based on our review of the proposed activities and mitigation measures, we conclude that, while incidental harassment of polar bears and walrus is reasonably likely to or reasonably expected to occur as a result of proposed activities, the overall impact would be negligible on polar bear and Pacific walrus populations. In addition, we find that most of the anticipated takes will be limited to non-lethal disturbances, affecting a relatively small number of animals and that most disturbances will be relatively short-term in duration. Furthermore, we do not expect the anticipated level of harassment from these proposed activities to affect the rates of recruitment or survival of Pacific walrus and polar bear populations.

Based on the best scientific information available, the type and timing of Industry activities, and the results of harvest data, including affected villages, the number of animals harvested, the season of the harvests, and the location of hunting areas, we find that the effects of the proposed exploratory activities in the Chukchi Sea region would not have an unmitigable adverse impact on the availability of walruses and polar bears for taking for subsistence uses during the period of the activities. In making this finding, we considered the following: (1) records on subsistence harvest from the Service's Marking, Tagging, and Reporting Program and historical data regarding the timing and location of harvests (2) effectiveness of mitigation measures stipulated by operational permits including requirements for community consultations and Plans of Cooperation, as appropriate, between the applicants and affected Native communities; and (3) anticipated effects of the applicants' proposed activities on the distribution and abundance of walruses and polar bears..

Chapter 4 - Environmental Consequences

The impact of Federal actions must be considered prior to implementation to determine whether the action will significantly affect the quality of the human environment. In this section, an analysis of the environmental impacts of promulgating incidental take regulations for oil and gas exploration activities in the Chukchi Sea and the adjacent west coast of Alaska and the alternatives to that proposed action is presented.

4.1. Alternative 1: No Action

If this alternative is implemented, no incidental take regulations would be issued. Because incidental take regulations do not explicitly permit or prohibit the proposed activity, it is likely that Industry would continue to conduct exploration activities as planned (see 1.3.5: Activities to be conducted and 1.3.6: Mitigation measures).

The proposed exploration activities may result in impacts on walruses, polar bears and subsistence users. Polar bear/human encounters are potentially dangerous for both polar bears and humans. Although potential impacts of exploration activities are fairly well known, the effects of these activities on Pacific walruses and polar bears are difficult to measure and disturbances are sometimes difficult to predict (NRC 2003).

4.2. Alternative 2: (Preferred Alternative) Promulgation of incidental take regulations with monitoring and reporting requirements, and additional mitigation measures

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Under this alternative, the Service would promulgate incidental take regulations for a five year period that would address the proposed oil and gas exploration activities outlined in the petition.

Section 101(a)(5)(A) of the Act states that the Secretary of the Interior may allow the incidental, but not intentional, taking of marine mammals provided regulations set forth requirements pertaining to the monitoring and reporting of such taking. Without incidental take regulations, industrial activities could still continue; however, the Service would have no formal means of communicating with Industry or have the ability to require monitoring and mitigation of specific activities and any form of "take" would be a violation of the Act.

Under this alternative, monitoring and reporting would be implemented to evaluate the effects of the proposed exploration activities on walruses, polar bears and the subsistence use of these resources. Prior to issuance of a Letter of Authorization, the applicant will be required to submit a monitoring and reporting plan to the Service. Upon review and approval of the submitted monitoring and reporting plan, the plan will become an integral part of the take authorization. The purpose of monitoring and reporting is to determine effects of authorized oil and gas seismic exploration activities on walruses and polar bears in the Chukchi Sea and the north western coast of Alaska. Plans will be required to identify the methods used to determine and assess the effects of the authorized activity on walruses and polar bears. Monitoring and reporting plans would be reviewed annually, and modifications made, if necessary, based upon interpretation of results.

LOAs may also be conditioned on a case-by-case basis to afford additional protection to sensitive areas, such as areas frequented by feeding or resting animals and important subsistence hunting areas. Any mitigation measures addressing impacts to marine mammals identified in MMPA Incidental Take Authorizations would supersede any such related mitigation measures in

the relevant MMS permit. The following mitigation measures would function to provide further protection to walruses and polar bears from exploration activities in the Chukchi Sea.

1.) 180-dB (safety) monitoring zone for walruses will be established and monitored in the Chukchi Sea during all offshore seismic operations. Whenever a walrus is observed during an aerial or vessel monitoring program within the 180-dB safety zone, the seismic operation will not commence or will shut down immediately, until such time that the monitoring program can establish that walruses are no longer present within the safety zone.
2.) A 160-dB (harassment) monitoring zone for walruses will be established and monitored in the Chukchi Sea during all seismic surveys. Whenever an aggregation of walruses (12 or more) are observed during an aerial or vessel monitoring program within the 160-dB harassment zone, the seismic operation will not commence or will shut down immediately, until such time that the monitoring program can establish that walruses are no longer present within the harassment zone.
3.) Seismic-surveys, drilling operations and associated support vessels and aircrafts shall observe a ½-mile exclusion zone around any walruses or polar bears sighted on ice.
4.) Aircraft shall be required to maintain a 1,000-foot minimum altitude within ½ mile of around any walruses or polar bears sighted on land or ice.
5.) Seismic-survey operators shall notify MMS, NMFS, and the Service in the event of any loss of cable, streamer, or other equipment that could pose a danger to marine mammals.
6.) To avoid significant additive and synergistic effects from simultaneous exploration activities that might interfere with the normal migration, feeding or resting behaviors of

walruses and polar bears, the Service and MMS will annually review seismic survey plans and may require special restrictions, such as additional temporal or spatial separations.

7.) Dedicated aerial and/or vessel surveys, if determined by the Service to be appropriate and necessary, shall be conducted in association with off-shore drilling operations to detect aggregations of walruses and/or polar bears. The protocols for these aerial and vessel monitoring programs will be specified in the MMPA authorizations granted by the Service.

The following mitigation measures would function to reduce potential impacts to subsistence walrus and polar bear hunters from exploration activities in the Chukchi Sea and adjacent lands on the west coast of Alaska.

1.) Prior to receipt of an LOA, applicants will be required to contact and consult with the communities of Point Hope, Point Lay, Wainwright, and Barrow to identify any additional measures to be taken to minimize adverse impacts to subsistence hunters in these communities. A Plan of Cooperation (POC) will be developed if there is concern from community members that the proposed activities will impact subsistence uses of Pacific walruses or polar bears. The POC must address how applicants will work with the affected Native communities and what actions will be taken to avoid interference with subsistence hunting of walrus and polar bear. The Service will review the POC to ensure any potential adverse effects on the availability of the animals are minimized.

2.) Take authorization will not be granted for seismic surveys or exploratory drilling activities within a 30-mile radius of Barrow, Wainwright, Point Hope or Point Lay,

unless expressly authorized by these communities. This condition is intended to limit potential interactions between industry activities and subsistence walrus hunting in near-shore environments.

3.) Exploration activities will only be authorized during the open-water season, which will not exceed the period of July 1 to November 30. This should allow the villages to participate in subsistence hunts for polar bears without interference and to minimize impacts to walrus during migration.

4.3. Conclusions

Based on our review of these factors, we conclude that, while incidental harassment of polar bears and walrus is reasonably likely to or reasonably expected to occur as a result of proposed activities, the overall impact would be negligible on polar bear and Pacific walrus populations. In addition, we find that most of the anticipated takes will be limited to non-lethal disturbances, affecting a relatively small number of animals and most disturbances will be relatively short-term in duration. Furthermore, we do not expect the anticipated level of harassment from these proposed activities to affect the rates of recruitment or survival of Pacific walrus and polar bear populations. In consideration of the operational mitigation measures stipulated by the MMS, and the additional protective measures associated with MMPA incidental take regulations, we conclude that the specified activity will not have an unmitigable adverse impact on the availability of walruses or polar bears for subsistence uses.

Chapter 5 - Agencies/Persons Consulted

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Persons and Agencies consulted included the following:

U.S. Minerals Management Service

National Marine Fisheries Service

Alaska Oil and Gas Association

Shell Offshore, Incorporated

Conoco Phillips Alaska, Incorporated (CPAI)

Eskimo Walrus Commission

Nannuq Commission

Alaska Eskimo Whaling Commission

North Slope Borough

Defenders of Wildlife

Marine Mammal Commission

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Arctic Connections

National Wildlife Federation

Greenpeace

Center for Biological Diversity

Audubon Alaska

Trustees for Alaska

Sierra Club, Alaska Chapter

Earthjustice

Wilderness Society, Anchorage

Northern Alaska Environmental Center

Friends of Animals

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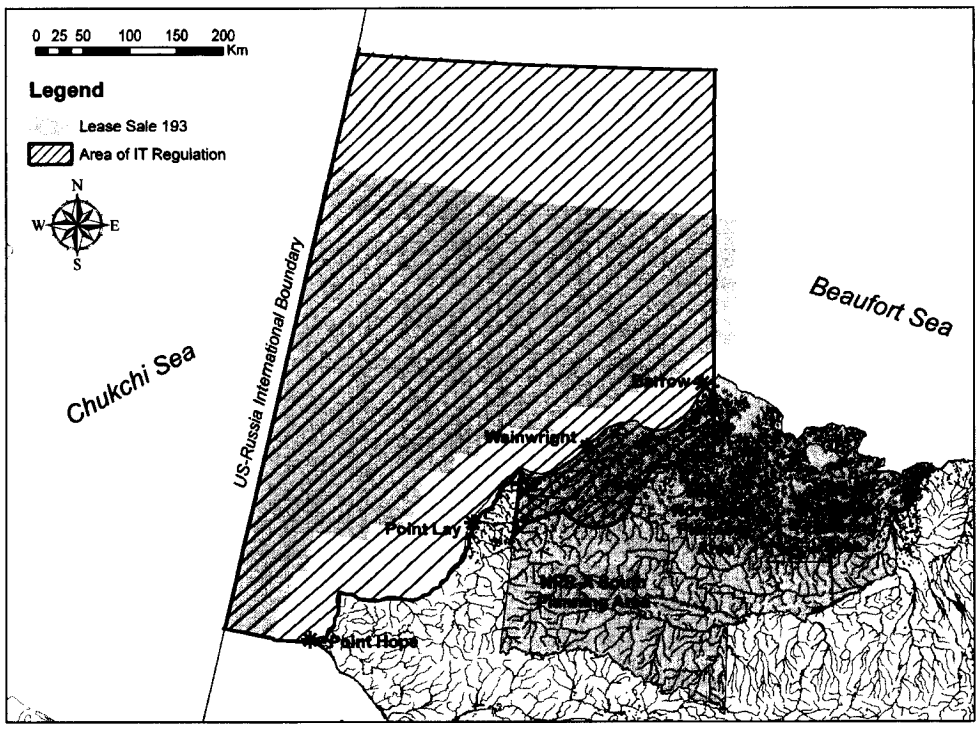

Figure 1: The geographic area of the Chukchi Sea and onshore coastal areas covered by the requested incidental take regulations

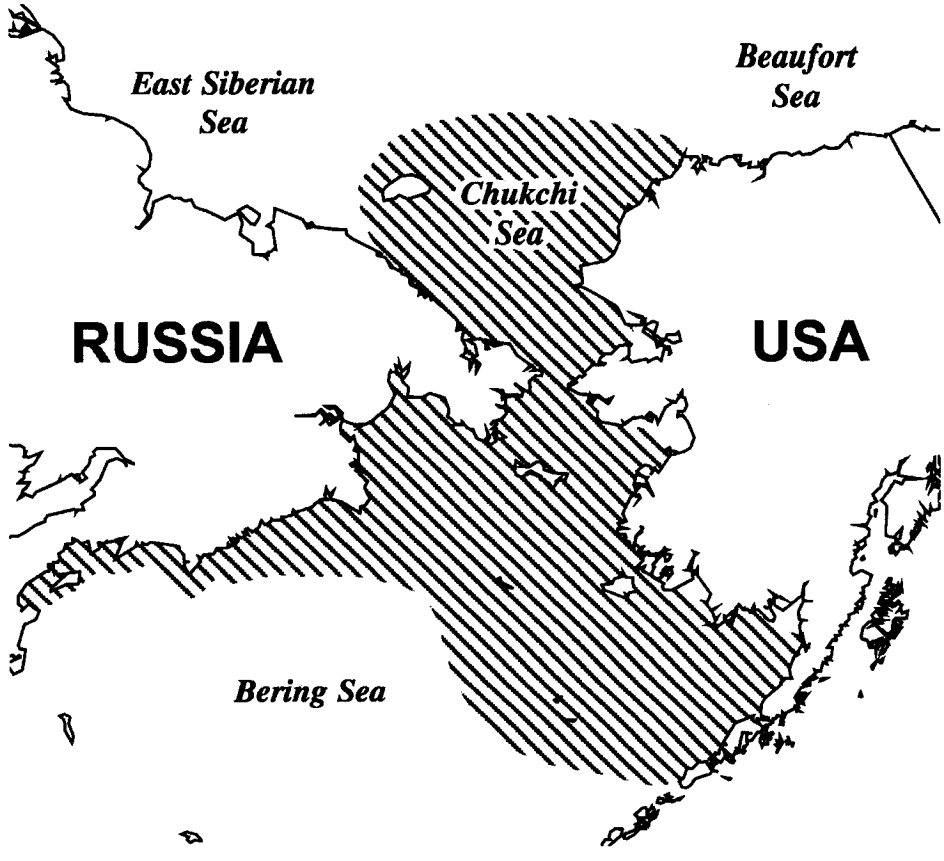

Figure 2. Distribution of Pacific walruses.

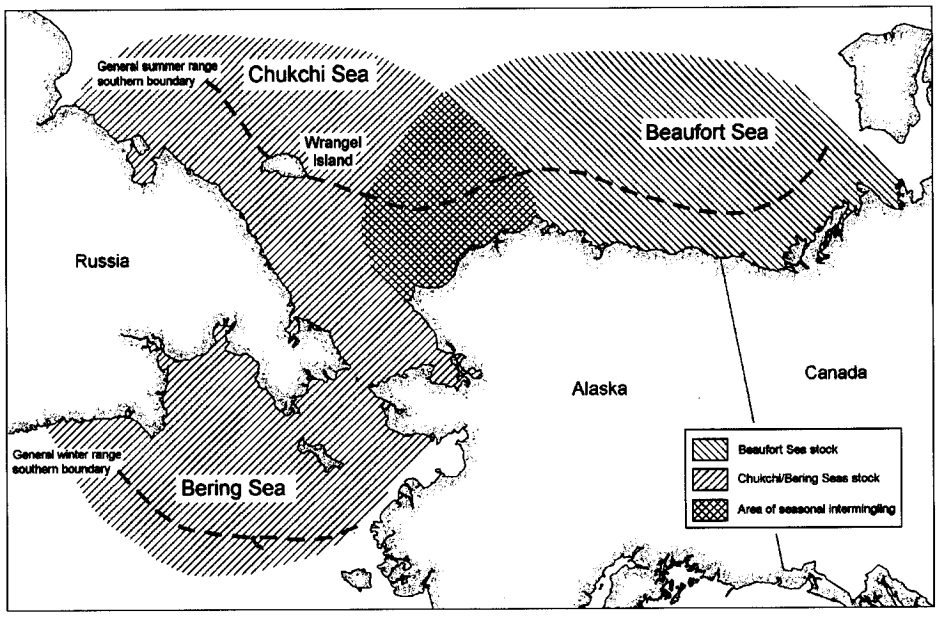

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Figure 3. Stock boundaries for polar bears in Alaska.