ENVIRONMENTAL ASSESSMENT

Final 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 THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

March 19, 2008

I. AUTHORITY

Section 101(a)(5)(A) of the Marine Mammal Protection Act of 1972 (Act), as amended (16 U.S.C. § 1371), directs the U.S. Fish and Wildlife Service (Service) to allow, upon request, the incidental, but not intentional, take of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical area. 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. An LOA can 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 take - take events that are infrequent, unavoidable, or accidental. It does not mean that the taking must be unexpected.

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

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

Take - means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.

Harass - 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.

II. PROPOSED ACTION

A. 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.

In Alaska, oil and gas industry (Industry) activities occurring in Federal waters and on Federal lands are permitted by the Department of the Interior's Mineral Management Service (MMS) and the Bureau of Land Management (BLM), respectively, while these activities on State lands are permitted by the State of Alaska. Regardless of whether an activity is on State, Federal, or privately-owned land, a U.S. Army Corps of Engineers permit for work that occurs in waters of the U.S. (including wetlands) is also required. The Service is responsible for the management of Pacific walruses and polar bears, species which are protected under the Marine Mammal 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 (ESA), however the Service has recently proposed to list polar bears as threatened (discussed further below).

It is important to note that the issuance of incidental take regulations does not authorize the actual activities associated with oil and gas exploration or production. It is also important to note that this document is not evaluating the potential impacts of oil and gas exploration activities on walruses and polar bears. Rather, this EA examines 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. Furthermore, unlike the authorizations for Industry activities listed above, incidental take regulations (ITR) are issued for a specific length of time – in this case, a period of 5 years. This EA will be used to determine if the action (implementation of regulations for a period of 5 years) 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.

B. Purpose and Need

Although Section 101 of the Act placed a moratorium on the taking of marine mammals in U.S. waters, Section 101(a)(5)(A) allows the incidental, but not intentional, taking of marine mammals upon request by a U.S. citizen provided that certain findings are made. 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 could result in the

incidental take of walruses and polar bears through harassment and through human encounters with polar bears or walrus.

Between 2005 and 2007, the Service received several petitions to 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 (2007-2012). The initial request was submitted on August 5, 2005, by the Alaska Oil and Gas Association (AOGA) on behalf of its members[1]. 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. On November 22, 2006, Shell Offshore Inc. (SOI) provided an addendum AOGA's petition describing their 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 provided an addendum to its original petition referencing the Environmental Impact Statement prepared by U.S. Minerals Management Service (MMS) for the Chukchi Sea Planning Area: Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea (Chukchi Sea 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: (**http://alaska.fws.gov/fisheries/mmm/itr.htm**); the Final Chukchi Sea EIS is available at: http://www.mms.gov/alaska/ref/EIS%20EA/Chukchi_feis_Sale193/feis_193.htm

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 in their petitions, as well as projections of reasonably foreseeable exploratory activities for the period 2008–2013 described in the Chukchi Sea EIS were considered in our analyses.

C. Location

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", -

[1] AOGA members represented in the petition include: 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.

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.

Specific locations where oil and gas activity may occur within the next five years are largely speculative, and will be determined in part on the outcome of future Federal and State oil and gas lease sales.

D. Description of Activities

Oil and gas activities anticipated and considered in our analysis of incidental take regulations are based upon information provided by Industry during the timeframes of 2008-2013. Detailed descriptions are provided in Attachment 2, but briefly these activities include:

Marine Streamer 3D and 2D Seismic Surveys. The Industry conducts marine seismic surveys to locate geological structures potentially capable of containing petroleum accumulations. Air guns are the typical acoustic (sound) source for 2-dimensional and 3-dimensional (2D and 3D) seismic surveys. A group of air guns is usually deployed in an array to produce a more downward-focused sound signal. The air guns are fired at short, regular intervals, so the arrays emit pulsed rather than continuous sound. While most of the energy is focused downward and the short duration of each pulse limits the total energy into the water column, the sound can propagate horizontally for several kilometers. The size of the source-array can vary during the seismic survey. Vessels usually tow up to three source arrays, depending on the survey-design specifications. Most operations use a single source vessel; however, in a few instances, more than one source vessel is used. Typically, data are only collected between 25% and 30% of the time (or 6-8 hours a day). The MMS estimates that individual surveys could last between 20-30 days (with downtime) to cover a 520 km^2 (200 mi^2) area. Marine-streamer surveys require a largely ice-free environment to allow effective operation and maneuvering of the air gun arrays and long streamers. Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, the Service estimates that up to four seismic survey vessels could be operating simultaneously in the Chukchi Sea Region during the open water season.

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

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

90 days at different well sites. Drill ships operate only during the open-water season, and drifting ice can prevent their operation.

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

Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, the Service estimates that as many as 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.

Onshore seismic exploration and drilling. The CPAI petition describes conducting onshore seismic exploration and drilling over the next five years, including geotechnical site investigations, vibroseis, construction of ice pads, roads, and islands, and exploratory drilling. Geotechnical site investigations include shallow cores and soil borings to investigate soil conditions and stratigraphy. Vibroseis seismic operations are conducted both onshore and on nearshore ice using large trucks with vibrators that systematically put variable frequency energy into the earth. 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. A typical wintertime exploration seismic crew consists of 40 to 140 personnel.

On Federal lands, CPAI estimates drilling 3 to 6 onshore wells within the next five years. Drilling will likely include both well testing and VSPs. Three onshore wells are proposed for 2007. Drilling operations will require an estimated 32 to161km (20 to 100 mi) of ice roads, 32 to 480km (20 to 300 mi) of Rolligon trails, 1 to 4 airfields approximately 1500m (5000 ft) in length on lakes or tundra, rig storage on gravel, possibly at new sites in NW-NPR-A, with 1 to 5 camps, and 1 to 3 rigs operating in a given year.

E. Scope of Analysis

When the public proposes to conduct a specific activity requiring authorization from a Federal agency, the agency shall establish the scope of the EA. In this case, Industry has requested the Service to provide incidental take authorization under the MMPA. The purpose of establishing the scope of analysis is to address impacts of the specific activity(ies) requiring Service

authorization, as well as those portions of the entire project over which the Service may have sufficient control and responsibility to warrant a more comprehensive review.

Comments received from the public indicate that some commenters believe that the Service has sufficient control and responsibility over portions of the project beyond Service jurisdiction, e.g., where the environmental consequences of the larger action (i.e., the oil and gas exploration itself, or future work such as development and production) are essentially products of the MMPA authorization. It is important to note that the Service does not authorize the exploration activities *per se*, but rather the Service's role under the MMPA is to determine if incidental take should be allowed during the course of Industry pursuit of lawful activities. Also, it should be noted that the ITRs are not issued for an indefinite length of time, but rather are valid for only a specified length of time (five years) and then become null and void. The Service has concluded that there is limited Service control and responsibility associated with the oil and gas exploration activities themselves. Consequently, the scope of analysis for this proposed action will be limited primarily to the impacts and alternatives resulting related to the proposed activities that include: 1) marine–streamer 3D and 2D seismic surveys (vessels, airgun arrays, sir support from helicopters); 2) high resolution site clearance surveys (vessels, airgun arrays); 3) offshore drilling operations (vessels, drilling on seafloor, ice breakers, air support (helicopter); and 4) onshore seismic exploration and drilling (drilling of wells, ice roads, Rolligon trails, airfields, support vehicles and equipment, barging of equipment). Other project-related impacts not within the scope, or a direct product of Service authorization, will be summarized and/or identified in the cumulative effects section of this document.

III. ALTERNATIVES CONSIDERED

A. 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.

B. Alternative 2: (Preferred Alternative) – Issuance of 5-year Incidental Take Regulations with General Mitigation Measures and Additional Requirements

The preferred alternative is to promulgate ITRs which would authorize incidental take of small numbers of Pacific walruses and polar bears associated with oil and gas activities in the Chukchi Sea and adjacent Alaska coast. The intent of the preferred alternative is to provide petitioners an overall "umbrella" set of guidelines which, when followed, allow the oil and gas exploration activities described in II.D to be authorized under an LOA. The LOAs would include all of the general mitigation measures (as described in Section VI), as well as specify additional mitigation requirements, if necessary, that are tailored to the specific activity proposed by Industry. Conditioning LOAs would be done 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.

C. Alternatives not Considered Feasible or Practicable

Alternatives that the Service considered, but determined were not feasible, included: initiating an Incidental Harassment Authorization (IHA) program, separating Industry operations by the type of activity, as well as the location or timing of the activity, and promulgating separate rules for each type of activity.

In contrast to the "umbrella" type of authorization provided by a 5-year ITR, an IHA entails issuing individual authorizations for specific activities each year. During the 2006 and 2007 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. The IHA process has limitations in that authorizations are issued on a piecemeal basis (project by project), and consequently they generally do not provide the comprehensive coverage necessary to evaluate potential impacts from the various onshore and offshore oil and gas activities that may encounter walrus and polar bears during the next 5 years. While an IHA program is possible, it is not practicable and the Service believes that a 5-year ITR is a more thorough process for evaluating anticipated projects and the potential impacts, as well as a more efficient use of staff time.

Similar reasoning was used to evaluate alternatives that included separating Industry operations by type of activity, or by timing or location of activity. 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.

IV. AFFECTED ENVIRONMENT

A. Physical Environment

The physical attributes of the Chukchi Sea are described in the Chukchi Sea EIS (http://www.mms.gov/alaska/ref/EIS%20EA/Chukchi_feis_Sale193/feis_193.htm; pp. 107-132).

B. 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.

Pacific walrus (*Odobenus rosmarus divergens*)

Stock Definition and Range

Pacific walrus 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 Wrangell Island. As the ice edge advances southward in the fall, walruses reverse their migration and re-group on the Bering Sea pack-ice.

Population Status

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.

Estimating the abundance or population size of Pacific walrus has been an inherently problematic task. Previous efforts all conducted in the autumn (1975, 1980, 1985, and 1990), which are discussed below, have resulted in widely varying estimates that have been plagued with high variance and low confidence limits. Periodic surveys were conducted to provide information relative to population trend. The wide confidence intervals were later found to prohibit meaningful assessment of trends. The 1975, 1980, and 1985 surveys were predominately over sea ice habitat. In contrast the 1990 survey included a large number of walrus that were located on land haul outs, predominantly in the Russian sector, during a summer-fall year of, up to this point in time, extreme ice recession.

In 1975 an evaluation of aerial survey methods was conducted (Estes and Gilbert 1978). Aerial surveys were conducted over the eastern half of the Chukchi Sea (U.S. sector) during 5 days of effort covering 7,743 km and 30.2 flight hours. Four days of survey were allocated to ice covered areas and one day to the expanse of open water south of the iced edge. Walrus were unevenly distributed, patchy, and encountered more frequently in ice habitat of $\leq$ 75% concentrations. Estimates of abundance within the U.S. survey area, based on single day density estimates, ranged from 818 to 1,760 in the open-water area, and 2,475 to 100,568 in pack ice

sampled areas. For the 1975 surveys the joint US-Russian estimate was reported to be 221,350 animals (Estes and Gilbert 1978; Estes and Gol'tsev 1984).

In 1980, a coordinated U.S.-Russian aerial survey was conducted (Johnson et al. 1982). In the U.S. sector surveys were conducted on seven days and extended from the ice edge at the southern point continuing north to a point where the ice concentrations approximated 100%. Density estimates were developed using the same methods as reported by Estes and Gilbert (1978) for the 1975 survey data. Walrus were found throughout the area surveyed and the distribution showed extreme clustering with an area of high density between longitude 166^0 W and 171^0 W. Initially the estimates were 140,000 animals in the U.S. (Johnson et al. 1980) and 130,000 to 150,000 in the Russian sector (Fedoseev 1981). A reanalysis of the combined U.S. and Russian data provided an estimate of 246,360 animals (Johnson et al. 1982; Fedoseev 1984**)**.

In 1985, the 3rd U.S.-Russian joint walrus survey was conducted. In the U.S. sector surveys were flown on 9 days encountering over 10,000 animals. Few walrus were observed east of 161^0 or west of 170^0. On days when more walrus were in the water, they were found farther into the pack ice, and on days when nearly all walrus were hauled out on the ice they were close to the southern edge of the ice. The U.S. sector estimate of abundance, based on survey based on the number of groups encountered (and group size/density) from September 29 and October 1, was 63,487 (Gilbert 1986). In addition 15, 238 walrus, mainly males, were estimated to use U.S. haul outs in Bristol Bay far to the south. The Russians estimated either 54,080 or 115,531 walrus in the pack ice of their sector, depending on if a large aggregation encountered on survey transects was included excluded from the survey and abundance estimate (Fedoseev and Razlivalov 1986). This illustrates the symptomatic nature of clustered or patchy distributions of walrus noted earlier and the consequence on abundance estimates. In addition, the Russians counted 39,572 animals on their Bering Sea land haul-outs. The combined U.S.-Russian estimate was 234,020 walruses (Gilbert 1986; Gilbert 1989; Fedoseev and Razlivalov 1986**).**

In 1990, a fourth joint U.S.-Russian aerial survey was carried out in accordance to protocols of the 9th and 10th conferences of the Soviet-American Working Group on Marine Mammals under the frame work of the 1972 "Agreement on Cooperation in the Field of Environmental Protection." (Gilbert et al. 1992). Unlike previous surveys the 1990 aerial survey was preceded by experimental flights conducted by Russians in 1989 designed to employ a common survey design. Also unlike other surveys the previous sea ice study areas in 1990 were unexpectedly characterized by an extreme amount of open water caused by an unusual recession of pack ice. Aerial surveys on haul outs in the Russian sector were flown from September 3-10 and utilized aerial photographic cameras. Northern haul outs were resurveyed and photographed from September 16 through October 2. During the later period the pack ice areas and open water were also surveyed (Gilbert et al. 1992). In the U.S. coastal haul outs were surveyed from August 21 and September 6th and pack ice survey occurred from September 28 to October 5th. The total combined U.S. and Russian sectors population estimate was 201,039. Of this total the U.S. sector comprised of 7,522 walrus in Bristol Bay haul outs and unlike previous pack ice estimates in the U.S., Chukchi Sea when walrus were relatively abundant between 160^0 and 166^0, only 16,489 were estimate to be present on pack ice (Gilbert et al. 1992). The vast majority of walrus were located in the Russian sector 154,225 occupied land haul outs including 112,848 on Wrangel Island. Land haul outs in Kamchatka, Southern Chukotka, the Gulf of Anadyr, and the

north shore of Chukotka accounted for the remaining 41,377 animals. The Russian pack ice was remarkably sparse with an estimate of only 16,484 animals (Gilbert et al. 1992).

Efforts to survey the Pacific walrus population were suspended after 1990 due to unresolved problems with survey methods to address the patchy distribution of walrus and that resulted in population estimates with unacceptably large confidence intervals. In the spring of 2006, a joint US/Russia aerial survey to estimate the walrus population was carried out in the pack ice of the Bering Sea. This information is currently being analyzed and a current population estimate is expected in the near future.

Habitat

Walruses rely on floating pack-ice as a substrate for resting and giving birth. Walruses generally require ice thicknesses of 50 cm (20 in) or more to support their weight. Although walruses can break through ice up to 20 cm (8 in) 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 (30 mi) 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 Wrangell and Herald islands, which are considered important haul-out areas in September, especially in years when the pack-ice retreats far to the north.

Although capable of diving to deeper depths, walruses are generally found in shallow waters of 100 m (30 ft) 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 their dependent young that are not 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.

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 live to age 35–40 and remain reproductively active until relatively late in life (Garlich-Miller et al. 2006).

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.

Mortality

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.

Distributions and Abundance in the Chukchi Sea

Walruses are seasonably abundant in the Chukchi Sea. Their distribution is thought to be influenced primarily by the extent of the seasonal pack-ice, 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 ^{o}N, but in light ice years, the ice edge can retreat beyond 76 ^{o}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. Coastal haulouts in Chukotka Russia have seen regular and persistent use in recent years. Russian biologists report that several thousand animals have been observed resting at coastal haulout sites along the northern Chukotka coastline in late summer, and attribute the increased use of these coastal haulouts to diminishing sea ice habitat. A similar event was recorded along the Alaskan coastline in August–September 2007, when several thousand animals were reported along the Chukchi Sea coast between Barrow and Cape Lisburne. .The pack-ice usually advances rapidly southward in October, and most walruses are thought to have moved into the Bering Sea by mid–to-late November.

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^{o}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 Wrangell 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.

Polar bears (*Ursus maritimus*)
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 CS and SBS polar bear stocks are described below. A detailed description of the CS and SBS 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 seas stock (CS) – The CS is defined as those 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 telemetry studies, the western boundary of the population has been set near Chaunskaya Bay in northeastern Russia. The eastern boundary is 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. 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. The most recent population estimate for the CS population is 2,000 animals. This was based on extrapolation of aerial den surveys from the early 1990s; however, this crude estimate is currently considered to be of little value for management. Reliable estimates of population size based upon mark and recapture are not available for this region and measuring the population size remains a research challenge (Evans et al. 2003).

Legal harvesting activities for the CS stock are currently restricted to Native Alaskans in western Alaska, as long as this does not affect the sustainability of the polar bear population. . In Alaska, average annual harvest levels declined by approximately 50 percent 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 recent years a reportedly sizable illegal harvest has occurred in Russia, despite a ban on hunting that has been in place since 1956. 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. The unknown rate of illegal take makes the stable designation uncertain and tentative.

Until recently, the U.S. and Russia have managed the shared CS polar bear population independently. Now, Alaska and Russian bear researchers and managers are currently working to update and enhance the collective knowledge of polar bears in the CS stock. On September 21, 2007, the United States ratified the bilateral polar bear conservation agreement for the shared polar bear population, which had been signed on October 16, 2000. The purpose of the agreement is to assure long-term, science-based conservation of the polar bear population and includes binding harvest limits. Implementation of the agreement will unify management regimes and provide for harvest limits. The treaty calls for the active involvement of Native people and their organizations in future management programs. It will also enhance such long-term joint efforts as conservation of ecosystems and important habitats, harvest allocations based on sustainability, collection of biological information, and increased consultation and cooperation with state, local, and private interests.

In association with the ratification of the agreement, the Service recently sponsored a meeting of technical specialists from the United States and Russia to discuss future management, research, and conservation needs for the CS polar bear population. The goals of the meeting were to exchange information about current and future research activities and priorities, provide technical input concerning research and management needs for the implementation of the US/Russia Bilateral Agreement with specific regard to field research and conservation practices, and to initiate planning for managing the subsistence harvest in Alaska and Russia under the newly activated treaty. The primary challenge discussed by the group is the lack of population information (status and trends) to support determination of a sustainable harvest as called for by the US/Russia Bilateral Agreement. Information from this meeting will be shared at the first meeting of the Joint Commissioners.

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, suggest that the SBS region comprised a single population with a western boundary near Icy Cape, Alaska, and an eastern boundary near Pearce Point, Northwest Territories, Canada. Early estimates from the mid 1980s suggested the size of the SBS population was approximately 1,800 polar bears, although uneven sampling was known to compromise the accuracy of that estimate. A population analysis of the SBS stock was completed in June 2006 through joint research coordinated between the United States and Canada. That analysis indicated the population of the region between Icy Cape and Pearce Point is now approximately 1,500 polar bears (95 percent confidence intervals approximately 1,000–2,000). 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.

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 percent of the bears occurring in Barrow, Alaska, and Tuktoyaktuk, Northwest Territories, 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 western regions of their range in the Chukchi Sea (i.e., Wainwright and Point Lay) in lower proportions than the central portion of their range.

Management and conservation concerns for the CS and SBS polar bear populations include: climate change, which continues to increase both the expanse and duration of open water in summer and fall; human activities within the near-shore environment, including hydrocarbon development and production; atmospheric and oceanic transport of contaminants into the Arctic; and the potential for inadvertent over-harvest, should polar bear stocks become nutritionally-stressed or decline due to some combination of the afore-mentioned threats.

Today, habitat loss, illegal hunting, and, in particular, the diminishing extent, thickness and seasonal persistence of sea ice pose the most serious threats to polar bears worldwide. As a result of such concerns, the polar bear was proposed for listing as threatened under the Endangered Species Act in January 2007 (72 FR 1064). A decision on the proposed listing is scheduled to be announced in January, 2008. The Service will 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.

Habitat

Polar bears of the Chukchi Sea are subject to the movements and coverage of the pack-ice and annual ice as they are dependent on the ice as a platform for hunting and surviving. Historically, polar bears of the Chukchi Sea have spent most of their time on the annual ice in near-shore, shallow waters over the productive continental shelf, which is 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. During the ice-covered season, bears use the extent of the annual 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^{o} latitude, which was the farthest extent of the annual ice during 2006.

Polar bear distribution during the open-water season in the Chukchi Sea, where maximum open water occurs in September, is dependent upon the location of the ice edge, as well. The summer ice pack can be quite disjunct and segments can be driven by wind great distances carrying polar bears with them. For example, bears from both stocks overlap in their distribution around Point Barrow and can move into surrounding areas depending on ice conditions. Recent telemetry movement data is lacking for bears in the Chukchi Sea; however, an increased trend by polar bears to use coastal habitats in the fall during open-water and freeze-up conditions has been noted since 1992. Recently, the minimum sea ice extent in 2005 and 2007 suggest that bears will most likely be found during the open-water periods on the sea ice or along the Chukotka coast.

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 CS polar bears occurs in Russia on Wrangell Island, Herald Island, and certain locations on the northern Chukotka coast. In addition, due to changes in the formation of sea ice along the Chukotka coast, there are some indications that the Bear Islands (Medvezhiy Ostrova), near the Kolyma River estuary, have become a denning area for the CS stock as well.

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 is born. 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 can 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. Recent studies of the SBS indicate that the proportion of dens on pack ice have declined from approximately 60% in 1985-1994 to 40% 1998-2004.

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 can opportunistically scavenge marine mammal carcasses. 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. There are also reports of polar bears killing beluga whales (*Delphinapterus leucas*) trapped in the ice. Polar bears are also known to ingest anthropogenic, nonfood items including Styrofoam, plastic, antifreeze, and hydraulic and lubricating fluids.

Polar bears use the sea ice as a platform to hunt seals. Polar bears hunt seals using various means. They can hunt along leads and other areas of open water, by waiting at a breathing hole, or by breaking through the roof of a seal 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 polar bear distribution is as yet unknown, but it is suspected to be related to seal availability. Due to changing sea ice conditions the area of open water and proportion of marginal ice has increased and extends later in the fall. This may limit seal availability to polar bears as the most productive areas for seals appear to be over the shallower waters of the continental shelf.

Mortality

Polar bears are long-lived (up to 30 years), have no natural predators, and do not appear 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).

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 1300 km (800 mi). 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. 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).

C. ESA-listed species

The Service has recently published a proposed rule to list the polar bear as threatened under the ESA (72 FR 1064, January 9, 2007). The decision to list is still under review and consideration. Under section 7(a)(4) of the ESA, each Federal agency is required to confer with the Secretary on any agency action that is likely to jeopardize the continued existence of any species proposed to be listed under the ESA. The Service has made a determination that this rule does not pose any likelihood of jeopardy to the polar bear. However, in light of the proposed listing, additional mitigation measures may be required under the LOA process.

D. 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 by Alaska Natives for subsistence purposes. The harvest of these species plays an important role in the culture and economy of many coastal communities in Alaska and Chukotka. 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 walruses and polar bears 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. Under the terms of the MMPA, there are no restrictions on the number, season, or ages of walruses or polar bears 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 SBS stock of polar bears in 1988. Polar bears harvested from the communities 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 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. The MTRP reports are thought to generally underestimate total U.S. subsistence walrus harvest with one recent estimate are as low as 30 percent of actual harvest in Barrow. Polar bear harvests reported by the MTRP are believed to be as high as 80 percent of the actual subsistence harvest in the communities most affected by this regulation.

Table 1. Mean (± SD) number of polar bears and walruses harvested per year in 4 communities on the Chukchi Sea, 1990-2006, as recorded through the USFWS MTRP.

	Barrow	***Wainwright***	***Point Hope***	***Point Lay***
Polar bears	21.3 ± 8.9	6.8 ± 3.7	13.1 ± 4.8	2.3 ± 1.4
Walrus[1]	24.1 ± 14.6	44.2 ± 29.2	3.6 ± 5.1	2.2 ± 2.0

[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 animal distribution and ice conditions. Descriptive information on subsistence harvests of walruses and polar bears in each community is presented below.

Point Hope

Between 1990 and 2006, the average annual walrus harvest recorded through the MTRP at Point Hope was 3.6 (± 5.1, SD) animals per year. 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 percent) of the reported walrus harvest at Point Hope occurred in the months of June and September. 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.

Between 1990 and 2006, the average reported polar bear harvest at Point Hope was 13.1 ± 4.8 animals per year. Polar bear harvests typically occur from January to April. 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.

Point Lay

Point Lay hunters reported an average of 2.2 ± 2.0 walruses per year between 1990 and 2006. Based on MTRP data, walrus hunting in Point Lay peaks in June–July with 84.4 percent 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.

Between 1990 and 2006, the average reported polar bear harvest at Point Lay was 2.3 ± 1.4 animals per year. The only information on harvest locations comes from the MTRP database; all reported harvest occurred within 25 miles of Point Lay.

Wainwright

Wainwright hunters have consistently harvested more walruses than any other subsistence community on the North Slope. Between 1990 and 2006, the average reported walrus harvest in Wainwright was 44.2 ± 29.2 animals per year. A discrepancy between MTRP data and past household surveys is noted. Walruses are thought to represent approximately 40 percent of the communities' annual subsistence diet of marine mammals. Wainwright residents hunt walruses from June through August as the ice retreats northward. Walruses can be plentiful in the pack-ice near the village this time of year. Most (85.2 percent) of the harvest occurs in June and July. Most walrus hunting is thought to occur within 20 miles of the community, in all seaward directions.

Between 1990 and 2006, the average reported polar bear harvest at Wainwright was 6.8 ± 3.7 animals per year. Polar bears are harvested throughout much of the year, with peak harvests reported in May and December. Polar bear are often harvested coincidentally with beluga and bowhead whale harvests. MTRP data indicate that most hunting occurs within 10 miles of the community.

Barrow

Barrow is the northernmost community within the geographical region being considered. Most (88.6 percent) 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. Walrus hunters from Barrow sometimes range up to 60 miles from shore; however, most harvests reported through the MTRP have occurred within 30 miles of the community. Between 1990 and 2006, the average reported walrus harvest in Barrow was 24.1 ± 14.6 animals per year.

Between 1990 and 2006, the average reported polar bear harvest at Barrow was 21.3 ± 8.9 animals per year. The number of polar bears harvested in Barrow is thought to be influenced by ice conditions and the number of people out on the ice. Most (74 percent) of all polar bear harvests reported by Barrow residents occurred in February and March. Although relatively few people are thought to hunt specifically for polar bears, those that do hunt primarily between October and March. Hunting areas for polar bears overlap strongly with areas of bowhead subsistence hunting; particularly the area from Point Barrow South to Walakpa Lagoon where walrus and whale carcasses are known to concentrate polar bears.

V. ENVIRONMENTAL CONSEQUENCES

The impacts 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 issuing a 5-year ITR for oil and gas exploration activities in the Chukchi Sea and alternatives to that proposed action are presented.

A. Alternative 1 – No Action Alternative

If this alternative is implemented, no ITRs would be issued. Consequently, any takes resulting from the proposed exploration activities would not be authorized and any incidental takes would be a violation of the MMPA. However, because the ITRs do not explicitly permit or prohibit oil and gas activities, Industry could continue to conduct exploration activities as planned without the benefit of mitigation measures proposed by the Service. In that event, 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.

B. Alternative 2 (Preferred Alternative) – Issuance of 5-year Incidental Take Regulations with General Mitigation Measures and Additional Requirements

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.

Under this alternative, the general mitigation measures described in Section VI would be implemented to minimize potential adverse impacts from the proposed exploration activities, as well as provide data to continually improve our ability to evaluate the effects on walruses, polar bears and the subsistence use of these resources. The general mitigation measures provide an "umbrella" set of guidelines which, when followed, allow the specified Industry activities to proceed after the Service has assessed whether such activities will potentially have an unmitigable impact on subsistence use or more than a negligible impact on polar bears and walrus. The specific LOAs will also be conditioned, when necessary, 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.

1. Potential Impacts on Marine Mammals

Pacific Walrus

The proposed oil and gas exploration activities for the Chukchi Sea Region could result in disturbances to walruses. Potential effects of disturbances on walruses include: insufficient rest, increased stress and energy expenditure, interference with feeding, the masking communication, and impaired thermoregulation of calves spending too much time in the water. Prolonged or repeated disturbances could displace individuals or herds from preferred feeding or resting areas.

Disturbances events may cause walrus groups to abandon land or ice haulouts. Severe disturbance events occasionally result in trampling injuries or cow-calf separations, both of which are potentially fatal. Calves and young animals at the perimeter of the herds appear particularly vulnerable to trampling injuries. Under certain ice conditions, noise generated from exploration activities could potentially 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.

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.

Seismic/Noise

Hearing sensitivity is assumed to be within the 13 Hz and 1200 Hz range of their own (walrus) vocalizations (Kastelein et al. 2002). Seismic operations are expected to introduce substantial levels of noise into the marine environment. There are relatively few data available to evaluate the potential response of walruses to seismic operations. 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). Adoption of mitigation measures that include monitoring a 180 db ensonification exclusion zone is expected to minimize the potential for air-gun pulses to injure walruses during seismic operations. Furthermore, seismic surveys and high-resolution site clearance surveys occur primarily in open water conditions, and away from the pack ice. This will minimize their interactions with large concentrations of walruses utilizing sea ice habitats. Data from previous seismic monitoring programs indicate that seismic surveys do interact with small numbers of walruses swimming in open water. Potential adverse effects of seismic noise on swimming walruses can be reduced through the implementation of sufficient, practicable monitoring coupled with adaptive management responses (where the mitigation measures required are dependent on what is discovered during monitoring).

Consequently, with the adoption of mitigation measures as described in Section VI, the Service concludes that the only effect anticipated would be short-term behavioral alterations by a small number of walrus in the vicinity of the proposed project area. In addition, marine mammal

monitoring programs are expected to provide some insight into the response of walruses to various seismic operations from which future mitigation measures can be developed.

Vessel/Aircraft Disturbance

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 could "mask" ordinary communication between individuals. 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. The potential for disturbance events to result in animal injuries, mortalities or mother-calf separations is also of concern, and potential injuries increase with the size of affected walrus aggregations. 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 800 m (0.5 mi) (Brueggeman et al. 1990). Environmental variables such as wind speed and direction are also thought to 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 fixed-winged aircraft above 305 m (1,000 ft).

The physical presence of vessels and aircrafts engaged in seismic surveys and support activities could 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 expected to be temporary in nature. Therefore, the only effect anticipated would be short-term behavioral alterations by a small number of walrus in the vicinity of the proposed project area.

Although seismic surveys are expected to occur in areas of open water away from the pack ice, support vessels and/or aircraft servicing seismic operations (one every two weeks) may encounter aggregations of walruses hauled out onto sea ice. The sight, sound or smell of humans and machines could potentially displace these animals from ice haulouts. However, 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. Therefore, the only effect anticipated would be short-term behavioral alterations by a small number of walrus in the vicinity of the proposed project area. Furthermore, adoption of mitigation measures that include an 800 m (0.5 mi) exclusion zones for marine vessels and aircraft around walrus groups observed on ice will reduce the intensity of disturbance events and minimize the potential for injuries to animals.

Offshore/Onshore Drilling / Human Disturbance

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 is also a stimulus for a flight response. The visual acuity of walruses is thought to be less than for other species of pinnipeds.

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 could 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 one km (0.6 mi) 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. The report 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 is 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. However, mitigation measures including: requirements for ice-scouting; surveys for walruses in the vicinity of active drilling operations; requirements for marine mammal observers onboard drill-ships and ice breakers; and operational restrictions near walrus aggregations will reduce potential interactions between walruses and drilling operations.

Drilling operations will be supported by supply vessels (one to three trips per week) and/or helicopters (one to three trips per day) depending upon the distance from shore. Support missions could 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 could be subjected to prolonged or repeated disturbances, and the most likely response will be for them to abandon the area. However, with adoption of mitigation measures that include identifying an 800 m (0.5 mi) operational exclusion zone around groups of hauled out walruses, as well as other measures described in Section VI, disturbances to walruses will be minimized. In the event that a prospective drill site occurs near important habitat areas, additional monitoring and mitigation measures will be required.

Oil/Fuel Spills

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 could impact several individuals.

Exposure to oil could 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. 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. Adoption of mitigation measures that require both oil spill prevention and response plans, both the risk and scale of potential spills would be reduced. Therefore, the Service concludes that any impacts associated with an operational spill are expected to be limited to a small numbers of animals.

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.

Seismic/Noise

Minimal research has been conducted on the effects of noise on polar bears, nor the potential for seismic survey sounds to cause auditory impairment or other physical effects in polar bears. Polar bears are curious and tend to investigate novel sights, smells, and possibly noises. Noise produced by seismic activities could elicit several different responses in polar bears. Noise may act as a deterrent to bears entering the area of operation, or the noise could potentially attract curious bears. Available data suggest that such effects, if they occur at all, would be limited to short distances and probably to projects involving large airgun arrays. There is no evidence that airgun pulses can cause serious injury, or death, even in the case of large airgun arrays. Marine mammals that show behavioral avoidance of seismic vessels are especially unlikely to incur auditory impairment or other physical effects. Polar bears normally swim with their heads above the surface, where underwater noises are weak or undetectable. Therefore, the Service concludes that it is unlikely that any single bear would be exposed to strong underwater seismic sounds long enough for significant disturbance to develop. Furthermore, with inclusion of the mitigation measures described in Section VI, including the mitigation measures that include power down or shut-down of the airguns if bears enter the 190 db ensonification zone, will reduce any adverse effects that might occur.

Vessel/Aircraft Disturbance

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. Noise, sights and smells produced by exploration activities may repel or attract bears, either disrupting their natural behavior or endangering them by threatening the safety of seismic personnel.

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

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

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

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

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

Offshore /Onshore Drilling / Human Disturbance

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. 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 proximity to industrial activities without any observed impact to the polar bears. For example, in 1991, two maternity dens were located on the south shore of a barrier island within 2.8 km (1.7 mi) of a production facility. 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 with no 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.

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.

Adoption of the following mitigation measures, as well as the other measures described in Section VI, will reduce potential impacts from drilling and human-induced disturbance: 1) development of a polar bear interaction plan; 2) maintenance of a 1-mile buffer between industry activities and known denning sites to limit disturbance to the bear; 3) avoidance of work in known denning habitat until bears have left their dens; 4) conducting research to enable accurate detection of active polar bear dens through the use of Forward Looking Infrared (FLIR) imagery; 4) use of FLIR technology, coupled with trained dogs, to locate or verify occupied polar bear dens; and 5) conducting research that evaluates transmission of noise and vibration through the ground, snow, ice, and air and the received levels of noise and vibration in polar bear dens. Furthermore, as part of the LOA application for seismic surveys during denning season, Industry provides the proposed seismic survey routes. To minimize the likelihood of disturbance to denning females, 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. Depending upon the circumstances, bears can be either repelled from or attracted to sounds, smells, or sights associated with onshore Industry activities. Adoption of mitigation measures to reduce these encounters include: 1) use of bear monitors, motion and infrared detection systems: 2) use of safety gates and fences; 3) development of a polar bear interaction plan for each operation that outlines steps the applicant will take, such as garbage disposal and snow management procedures; 4) outlining the chain of command for responding to a polar bear sighting; and 5) the requirement that personnel participate in polar bear interaction training.

In summary, with inclusion of the above mitigation requirements as well as all other measures described in Section VI, the Service concludes that only small numbers of polar bears would be potentially taken by harassment from drilling and human-induced disturbance.

Oil/Fuel Spills

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 Outer Continental Shelf (OCS), 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.

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.

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. According to MMS estimates, the chance of a large (≥1,000 bbl) oil spill from exploratory activities in the Chukchi Sea is 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, however 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.

Because of the limited nature of the authorized activities (exploration only); the existing Federal and State requirements for oil spill prevention and clean-up plans; the low probability of occurrence of a large spill; the historical evidence indicating that spills are relatively rare and when they do occur, are small in size and located in terrestrial environments; and the use of technologies such as blow-out prevention to prevent and/or minimize the effects of a spill, the Service concludes that operational spills would likely be of a relatively small volume, and any impacts associated with an operational spill are expected to be limited to a small numbers of animals.

2. Potential Impacts on the Physical Environment

The proposed project area is limited to the Chukchi Sea (see Figure 1). The proposed activities would: 1) use acoustic energy to study the substrate; 2) allow offshore drilling activities with stipulations in place that require plugging and capping of drill holes, and re-contouring the drill site as much as practicable; 3) onshore drilling, which could result in construction of ice pads, roads, and islands; and 4) vessels, ice breakers, and land transportation vehicles. A thorough discussion of impacts on the physical environment is found in the Chukchi Sea EIS (http://www.mms.gov/alaska/ref/EIS%20EA/Chukchi_feis_Sale193/feis_193.htm).

The geographic region contains a multitude of lands that are managed under various owners (e.g., National Wildlife Refuge lands, sensitive onshore areas, and private lands). The use of these lands will be dictated by those regulatory agencies with authority to permit the Industry activities. Once an Industry project has been permitted by the responsible agency, the Service will evaluate the project in regards to polar bears and walruses through a requested incidental take authorization, i.e., the LOA process provided by these regulations.

With inclusion of all appropriate mitigation measures described in Section VI, plus any other measures incorporated into an LOA, the Service has determined that the proposed action would result in no measurable impacts of the physical environment.

3. Potential Impacts on the Socio-economic Environment

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 could 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. Adoption of the following mitigation measures will minimize adverse impacts on subsistence uses: 1) a 40 km (25 mi) coastal deferral zone in which is expected to reduce the impacts of exploration activities on subsistence hunting; 2) restricting the dates of offshore seismic exploration from July 1 to November 30 to allow migrating marine mammals the opportunity to disperse from the coastal zone; and 3) a requirement that lessees consult with the subsistence communities of Barrow, Wainwright, Point Lay and Point Hope prior to submitting an operational plan for exploration activities. In addition to existing lease stipulations and mitigation measures, the Service has developed additional mitigation measures through ITRs (see Section VI below).

4. Cumulative Effects

Cumulative effects are defined as "the impacts on the environment which results from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future action regardless of what agency (Federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). It is important to note, however, that the duration of the ITRs is for a five year period. At the end of five years or earlier if necessary, the Service can reassess the impacts of the proposed action. This is especially important in light of the rapid and unprecedented environmental changes occurring as a result of climate change. Our analyses are

based upon the best scientific information available at this time. However, the global climate situation is changing in myriad unknown and unpredictable ways. With inclusion of the monitoring, reporting, and research components described in the mitigation measures in Section VI, the improved baseline data will provide insight from which mitigation measures can be adapted to accommodate new information, as well as help develop future measures.

The following events have contributed to current environmental conditions in the Chukchi Sea and could also cumulatively affect Pacific walrus and polar bear population status in the next five years:

Commercial and Subsistence Harvest—Walruses have an intrinsically low rate of reproduction and are thus limited in their capacity to respond to exploitation. 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, with many more animals struck and lost. The population was substantially depleted by the end of the century, and the industry collapsed in the early 1900s. Since 1930, the combined walrus harvests of the United States 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). Commercial hunting continued in Russia until 1991 under a quota system of up to 3,000 animals per year. 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. Although recent harvest levels are lower than historic highs, lack of information on current population size or trend precludes an assessment of sustainable harvest rates.

For polar bears, 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). One of the Service's management concerns is the possible inadvertent over-harvest of the CS or SBS stocks if the stocks become increasingly nutritionally-stressed or decline due to some combination of the following threats: 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; and/or changing atmospheric and oceanic transport of contaminants into the region. Additional information on the cumulative effects of oil and gas development on polar bears can be found in the draft Polar Bear Status Review at: http://alaska.fws.gov/fisheries/mmm/polarbear/issues.html.

Climate Change—Analysis of long-term environmental data sets indicates that substantial reductions in both the extent and thickness of the arctic sea-ice cover have occurred over the past 40 years. Record minimum sea ice extent was recorded in 2002, 2005 and again in 2007; sea ice cover in 2003 and 2004 was also substantially below the 20-year mean. Walruses rely on suitable sea ice as a substrate for resting between foraging bouts, calving, molting, isolation from predators, and protection from storm events. The juxtaposition of sea ice over shallow-shelf habitat suitable for benthic feeding is critically important to walruses. Recent trends in the Chukchi Sea have resulted in seasonal sea-ice retreat off the continental shelf and over deep Arctic Ocean waters, presenting significant adaptive challenges to walruses in the region. Reasonably foreseeable impacts to walruses as a result of diminishing sea ice cover include: shifts in range and abundance; increased vulnerability to predation and disturbance, declines in prey species; increased mortality rates resulting from storm events; and premature separation of females and dependent calves. Secondary effects on animal health and condition resulting from reductions in suitable foraging habitat may also influence survivorship and productivity. Future studies investigating walrus distributions, population status and trends, and habitat use patterns in the Chukchi Sea are critically important for responding to walrus conservation and management issues associated with changes in the sea ice environment.

For polar bears, one conclusion of an extensive study of cumulative effects of oil and gas development on polar bears and seals in Alaska (NRC 2003) was that 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. 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. Nevertheless, 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. The Service believes that inclusion of the proposed mitigation measures that include adaptive components will allow reassessment of this conclusion if necessary.

Commercial Fishing and Marine Vessel Traffic—Available data suggest that presently walruses rarely interact with commercial fishing and marine vessel traffic. Walruses are normally closely associated with sea ice, which limits their interactions with fishing vessels and barge traffic. However, as previously noted, the temporal and seasonal extent of the sea ice is projected to diminish in the future. Commercial shipping through the Northwest Passage and Siberian arctic waters may develop in 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.

Polar bears also spend the majority of their time on pack ice during the open-water season, which limits their interaction with fishing vessels and barge traffic. However, polar bears are known to run from sources of noise and the sight of vessels. The effects of fleeing may be minimal if the event is short and the animal is otherwise unstressed, but a short run on a warm spring or summer day could overheat a polar bear. As with the walrus, if predictions for the decrease in

the temporal and seasonal extent of the sea are realized, more vessels may transit the area and vessels may encounter polar bears more frequently. Researchers have observed that in some cases bears swim long distances during the open water period seeking either ice or land. With diminished ice, swimming bears may become vulnerable to exhaustion and storms because ice floes are dissipating and unavailable or unsuitable for use as haul outs or resting platforms.

Past Offshore Oil and Gas Related Activities—Oil and gas related activities have been conducted in the Chukchi and Beaufort seas since the late 1960s. Much more oil and gas related activity has occurred in the Beaufort Sea than in the Chukchi Sea OCS. Pacific walruses do not normally range into the Beaufort Sea, and documented interactions between oil and gas activities and walruses have been minimal (see Results of Previous Monitoring Studies). The Chukchi Sea OCS has previously experienced some oil and gas exploration activity, but no development or production. Because of the transitory nature of past oil and gas activities in any given region, we do not think that any of these encounters had lasting effects on individuals or groups (see Results of Previous Monitoring Studies).

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 unmitigable 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.

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 U.S. Coast Guard Cutter 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.

In summary, there is no indication that any of these interactions resulted in more than a temporary change in behavior of individual animals.

Summary of Cumulative Effects –For both polar bear and Pacific walrus, hunting pressure, climate change, and the expansion of commercial activities into walrus habitat all have potential to impact walruses. Combined, these factors are expected to present significant challenges to future conservation and management efforts. The success of future management efforts will rely in part on continued investments in research investigating population status and trends and

habitat use patterns. The effectiveness of various mitigation measures and management actions will also need to be continually evaluated through monitoring programs and adjusted as necessary. Climate change is of particular concern, and will need to be considered in the evaluation of future proposed activities and as more information on polar bear and Pacific walrus population status becomes available.

Contribution of Proposed Activities to Cumulative Impacts— Proposed seismic surveys and exploratory drilling operations identified by the petitioners are likely to result in some incremental cumulative effects to polar bears and walruses through exclusion or disturbance, potentially disrupting important associated biological behaviors. However, relatively few polar bears and walruses are likely to interact with exploration activities in open sea conditions where most of the proposed activities are expected to occur. Required monitoring and mitigation measures, designed to minimize interactions between authorized projects and walruses or polar bears are also expected to limit the severity of any behavioral responses. Therefore, we conclude that the proposed exploration activities, as mitigated through the regulatory process, would contribute only a negligible increase over and above the effects of baseline activities currently occurring as well as future activities that are reasonably likely to occur within the 5-year period covered by the regulations.

VI. MITIGATION

There are several existing mitigation measures that apply to all exploration activities in the Chukchi Lease Sale Planning Area. They are briefly described below, but additional details are in the Chukchi Sea EIS (http://www.mms.gov/alaska (OCS EIS/EA MMS 2006-060)).

Orientation Program. This stipulation requires 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 is expected to help avoid damage or destruction of environmental, cultural, and archaeological resources through awareness and understanding of historical and cultural values. It will also help to minimize potential conflicts between subsistence hunting and gathering activities and oil and gas activities that may occur.

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

Site-Specific Monitoring Program for Marine Mammal Subsistence Resource. 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. The 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 is expected to help to reduce potential effects of exploration activities on walruses, polar bears and

the subsistence use of these resources. This will also contribute incremental and important information to ongoing walrus and polar bear research and monitoring efforts.

Conflict Avoidance Mechanisms to Protect Subsistence-Harvesting Activities.
This lease stipulation will help reduce potential conflicts between subsistence hunters and proposed oil and gas exploration activities. This will help 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. Protective measures, briefly described below, 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* (MMS, 2006) will reduce the potential for Level A Harassment (injury) of walruses and polar bears during seismic operations. The spatial separation of seismic operations will reduce potential cumulative effects of simultaneous operations. The monitoring program will 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. The measures include:

1) Spacing of Seismic Surveys - Operators must maintain a minimum spacing of 15 miles between the seismic-source vessels for separate simultaneous operations.
2) Exclusion Zone - A 180/190-decibel (dB) isopleth-exclusion zone (also called a safety zone) from the seismic-survey-sound source shall be free of marine mammals before the survey can begin and must remain free of mammals during the survey.
3) Monitoring of the Exclusion Zone - Trained marine mammal observers (MMOs) shall monitor the area around the survey for the presence of marine mammals to maintain a marine mammal-free exclusion zone and monitor for avoidance or take behaviors.
4) 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.
5) 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.
6) Temporal/Spatial/Operational Restrictions - Seismic-survey and associated support vessels shall observe an 800m (0.5-mi) safety radius around Pacific walrus groups hauled out onto land or ice. Aircraft shall be required to maintain a 300 m (1,000 ft) minimum altitude within 800 m

(0.5 mi) 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. In addition, following the mitigation, monitoring and reporting measures will be required by the Service for all LOAs issued under this ITR:

Mitigation Measures Associated with LOAs

In addition to the mitigation measures identified in the MMS issued exploration measures, the following mitigation, monitoring and reporting requirements would be required as conditions of an LOA:

A) Mitigation Requirements

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

(1) *Operating conditions for operational and support vessels.*

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

(ii) At all times, vessels must maintain the maximum distance possible from concentrations of walruses or polar bears. Under no circumstances, other than an emergency, should any vessel approach within a ½ mile radius of walruses or polar bears observed on land or ice.

(iii) Vessel operators must take every precaution to avoid harassment of concentrations of feeding walruses when a vessel is operating near these animals. Vessels should reduce speed and maintain a minimum ½ mile operational exclusion zone around feeding walrus groups. Vessels may not be operated in such a way as to separate members of a group of walruses from other members of the group. When weather conditions require, such as when visibility drops, vessels should adjust speed accordingly to avoid the likelihood of injury to walruses.

(iv)The transit of operational and support vessels through the specified geographic region is not authorized prior to July 1 and no later than November 30. This operating condition is intended to allow walruses the opportunity to disperse from the confines of the spring lead system and minimize interactions with subsistence walrus hunters. Exemption waivers to this operating condition may be issued by the Service on a case-by-case basis, based upon a review of seasonal ice conditions and available information on walrus and polar bear distributions in the area of interest.

(v) All vessels shall avoid areas of active or anticipated walrus hunting activity as determined through community consultations.

(2) *Operating conditions for aircraft.*

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

(ii) Under no circumstances, other than an emergency, should aircraft operate at an altitude lower than 300 m (1,000 ft) within 800 m (0.5 mi) of walruses or polar bears observed on ice or land. Helicopters may not hover or circle above such areas or within 800 m (0.5 mi) of such areas. When weather conditions do not allow a 300 m (1,000 ft) flying altitude, such as during severe storms or when cloud cover is low, aircraft may be operated below the 300 m (1,000 ft) altitude stipulated above. However, when aircraft are operated at altitudes below 300 m (1,000 ft) because of weather conditions, the operator must avoid areas of known walrus and polar bear concentrations and should take precautions to avoid flying directly over or within 800 m (0.5 mi) of these areas.

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

(3) *Additional mitigation measures for offshore exploration activities.*

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

(ii) To avoid significant additive and synergistic effects from multiple oil and gas exploration activities on foraging or migrating walruses, operators must maintain a minimum spacing of 24 km (15 mi) between all active seismic-source vessels and/or exploratory drilling operations.

(iii) No offshore exploration activities will be authorized within a 64 km (40 mi) radius of the communities of Barrow, Wainwright, Point Lay, or Point Hope, unless provided for in a Service approved, site-specific Plan of Cooperation as described in (a)(6) of this section.
(iv) Aerial-monitoring surveys or an equivalent monitoring program acceptable to the Service may be required to estimate the number of walruses and polar bears in a proposed project area.

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

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

(ii) Powerdown/Shutdown - Immediately power-down or shut-down the seismic airgun array and/or other acoustic sources whenever any walruses are sighted approaching close to or within the area delineated by the 180 dB re 1 μPa walrus exclusion zone, or polar bear are sighted approaching close to or within the area delineated by the 190 dB re 1 μPa polar bear exclusion zone. If the power-down operation can not reduce the received sound pressure level to

180dB re 1 μPa (walrus) or 190dB re 1 μPa (polar bears) the operator must immediately shut-down the seismic airgun array and/or other acoustic sources.

(iii). Emergency shut-down - If observations are made or credible reports are received that one or more walruses and/or polar bears are within the area of the seismic survey and are in an injured or mortal state, or are indicating acute distress due to seismic noise, the seismic airgun array will be immediately shut down and the Service Incidental Take Coordinator contacted. The airgun array will not be restarted until review and approval has been given by either the Service Incidental Take Coordinator or their designee.

(iv). Adaptive response for walrus aggregations - Whenever an aggregation of 12 or more walruses are detected within an acoustically verified 160dB re 1 μPa disturbance zone ahead of or perpendicular to the seismic vessel track, the holder of this LOA must: (A) Immediately power down the seismic airgun array and/or other acoustic sources to ensure sound pressure levels at the shortest distance to the aggregation do not exceed 160 dB re 1 μPa; and (B) Not proceed with powering up the seismic airgun array until it can be established that there are no walrus aggregations within the 160 dB zone based upon ship course, direction and distance from last sighting.

(5) *Additional mitigation measures for onshore exploration activities*

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

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

(b) A food and waste management plan;

(c) Personnel training materials and procedures;

(d) Site at-risk locations and situations;

(e) A snow management plan;

(f) Polar bear observation and reporting procedures; and

(g) Polar bear avoidance and encounter procedures.

(i) Polar Bear Monitors – If deemed appropriate by the Service, holders of an LOA may be required to hire and train polar bear monitors to alert crew of the presence of polar bears and initiate adaptive mitigation responses.

(ii) Efforts to minimize disturbance around known polar bear dens. – Holders of an LOA must take efforts to limit disturbance around known polar bear dens.

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

(b) Exclusion zone around known polar bear dens – Operators must observe a 1-mile operational exclusion zone around all known polar bear dens during the denning season (November–April, or until the female and cubs leave the areas). Should previously unknown occupied dens be discovered within one mile of activities, work in the immediate area must cease and the Service Incidental Take Coordinator contacted for guidance.

The Service will evaluate these instances on a case-by-case basis to determine the appropriate action. Potential actions may range from cessation or modification of work to conducting additional monitoring, and the holder of the authorization must comply with any additional measures specified.

(6) *Mitigation measures for the subsistence use of walruses and polar bears*

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

(ii) Community Consultation – Prior to receipt of n LOA, applicants must consult with potentially affected communities and appropriate subsistence user organizations to discuss potential conflicts with subsistence walrus and polar bear hunting caused by the location, timing, and methods of proposed operations and support activities (see 18.114 (c) 4 for details). If community concerns suggest that the proposed activities may have an adverse impact on the subsistence uses of these species, the applicant must address conflict avoidance issues through a Plan of Cooperation as described below.

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

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

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

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

B) Monitoring Requirements

Depending on the sighting, timing and nature of proposed activities, holders of LOAs may be required to.

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

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

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

(2) *Develop and implement a site-specific, Service approved, Marine Mammal Monitoring and Mitigation Monitoring Plan (4MP)* to monitor and evaluate the effects of authorized activities on polar bears, walruses and the subsistence use of these resources.

(i) The 4MP must enumerate the number of walruses and polar bears encountered during specified exploration activities, estimate the number of incidental takes that occurred during specified exploration activities, and evaluate the effectiveness of prescribed mitigation measures. Applicants must fund an independent peer review of proposed monitoring plans and draft reports of monitoring results. This peer review will consist of independent reviewers who have knowledge and experience in statistics, marine mammal behavior, and the type and extent of the proposed operations. The applicant will provide the results of these peer reviews to the Service for consideration in final approval of monitoring plans and final reports. The Service will distribute copies of monitoring reports to appropriate resource management agencies and co-management organizations.

(3) *Cooperate with the Service and other designated Federal, State, and local agencies to monitor the impacts of oil and gas exploration activities in the Chukchi Sea on Pacific walruses or polar bears.*

(i) Where insufficient information exists to evaluate the potential effects of proposed activities on walruses, polar bears and the subsistence use of these resources, holders of letters of authorization may be required to fund or participate in joint monitoring and/or research efforts to address these information needs and insure the least practicable impact to these resources. Information needs in the Chukchi Sea include, but are not limited to:

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

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

C) Reporting Requirements

Holders of LOAs must report the results of specified monitoring activities to the Service.

(1) *In-season monitoring reports*

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

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

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

(c) Notifying the Service within 48 hrs of ending activity

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

(a) Date, time and location of each walrus sighting.

(b) Number of walruses: sex and age.

(c) Weather, visibility and ice conditions at the time of observation.

(d) Estimated range at closest approach.

(e) Industry activity at time of sighting.

(f) Behavior of animals sighted.

(g) Description of the encounter.

(h) Duration of the encounter.
(i) Actions taken.

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

(a) Date, time and location of observation.
(b) Number of bears: sex and age.
(c) Observer name and contact information.
(d) Weather, visibility and ice conditions at the time of observation.
(e) Estimated closest point of approach for bears from personnel and facilities.
(f) Industry activity at time of sighting, possible attractants present.
(g) Bear behavior.
(h) Description of the encounter.
(i) Duration of the encounter.
(j) Actions taken.

(iv) Notification of incident report. The operator must report (A) any incidental lethal take or injury of a polar bear or walrus; and, (B) observations of walruses or polar bears within prescribed mitigation-monitoring zones to the Service within 24 hours. Reports should include all information specified under the species observation report, as well as a full written description of the encounter and actions taken by the operator.

(2) *After action monitoring reports*

(i) 4MP reporting requirements – The results of monitoring efforts identified in the 4MP must be submitted to the Service for review within 90 days of completing the year's activities.. Results must include, but are not limited to the following information:

(a) A summary of monitoring effort including: total hours, total distances, and distribution through study period;
(b) Analysis of factors affecting the visibility and detectability of walruses and polar bears by specified monitoring;
(c) Analysis of the distribution, abundance and behavior of walrus and polar bear sightings in relation to date, location, ice conditions and operational state; and
(d) Estimates of take based on density estimates derived from monitoring and survey efforts.

VII. CONCLUSIONS

Based on the information contained in the MMS Chukchi Sea EIS, the best available scientific information, and information contained in this document, the Service has determined that the impact of exploration work as defined herein will result, at most, in Level B harassment of small numbers of polar bears and Pacific walruses. 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.

VIII. AGENCIES/PERSONS CONSULTED

Persons and Agencies consulted included the following:

U.S. Minerals Management Service
National Marine Fisheries Service
U.S. Geological Survey, Alaska Science Center
Alaska Oil and Gas Association
Shell Offshore, Incorporated
ConocoPhillips Alaska, Incorporated (CPAI)
Eskimo Walrus Commission
Nanuuq Commission
Alaska Eskimo Whaling Commission
North Slope Borough
Defenders of Wildlife
Marine Mammal Commission
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

IX. REFERENCES

Alaska Consultants, Inc. C. S. Courtnage, S .Braund, and Associates. 1984. Barrow Arch socioeconomic and sociocultural description. Tech Report No. 101. Anchorage, AK US Department of the Interior. Minerals Management Service. Alaska OCS Social and Economic studies program.

Angliss, R.P., and A.L. Lodge. 2002. Alaska Marine Mammal Stock Assessments, 2002. Final report. Seattle, WA: USDOC, NMFS, 193 pp.

Bockstoce, J.R., and D.B. Botkin. 1982. The harvest of Pacific walruses by the pelagic whaling industry, 1848 to 1914. Arctic and Alpine Research 14:183–188.

Braund, S. R. 1993a. North Slope subsistence study, Barrow 1987, 1988, and 1989. MMS 91-0086. Technical report 149.

Braund, S. R. 1993b. North Slope subsistence study, Wainwright 1988-1989. MMS 91-0073. Technical report 147.

Braund, S.R. and D.C. Burnham. 1984. Subsistence Economics and Marine Resource Use Patterns. In: Proceedings of a Synthesis Meeting: The Barrow Arch Environment and Possible Consequences of Planned Offshore Oil and Gas Development, Girdwood, Ak., Oct. 30-Nov. 1, 1983. Anchorage, AK: USDOI, MMS, Alaska OCS Region and USDOC, NOAA, National Ocean Service.

Brower, C.D., A. Carpenter, M.L. Branigan, W. Calvert, T. Evans, A.S. Fischbach, J.A. Nagy, S. Schliebe, and I. Stirling. 2002. The Polar bear management agreement for the Southern Beaufort Sea: An evaluation of the first ten years of a unique conservation agreement. Arctic 55(4): 362-372.

Brueggeman, J.J., C.I. Malme, R.A. Grotefendt, D.P. Volsen, J.J. Burns, D.G. Chapman, D.K. Ljungblad, and G.A. Green. 1990. 1989 Walrus Monitoring Program: The Klondike, Burger, and Popcorn Prospects in the Chukchi Sea. Report from Ebasco Environmental, Bellevue, Wa., for Shell Western E&P, Inc. Houston, Tx. 62 p.

Brueggeman, J.J., D.P. Volsen, R.A. Grotefendt, G.A. Green, J.J. Burns, D.K. Ljungblad. 1991. Final Report Shell Western E&P Inc. 1990 Walrus Monitoring Program: the Popcorn, Burger, and Crackerjack Prospects in the Chukchi Sea. Rep. from Ebasco Environmental, Bellevue, Wa., for Shell Western E&P, Inc. Houston, Tx. 54 p.

Burns, J.J. 1970. Remarks on the distribution and natural history of pagophilic pinnipeds in the Bering and Chukchi Seas. J. Mamm.51 (3):445-454.

Cooper, L.W., C.J. Ashjian, S.L. Smith, L.A. Codispoti, J.M. Grebmeir, R.G. Campbell, and E.B. Sherr. 2006. Rapid Seasonal Sea-Ice Retreat in the Arctic could be Affecting Pacific walrus (Odobenus rosmarus divergens) Recruitment. Aquatic Mammals 32:98-102.

Derocher, A.E., N.J. Lunn, and I. Stirling. 2004. Polar Bears in a Warming Climate. Integrative and Comparative Biology 44:163-176.

Durner, G.M., S.C. Amstrup, R. Neilson, and T. McDonald. 2004. Using discrete choice modeling to generate resource selection functions for polar bears in the Beaufort Sea. Pages 107-120 in S. Huzurbazar, ed., Resource Selection Methods and Applications. Omnipress, Madison, Wisconsin. 162 pp.

Evans, T.J., A. Fischbach, S. Schliebe, B. Manly, S. Kalxdorff, and G. York. 2003. Polar aerial survey in the Eastern Chukchi Sea: A Pilot Study. Arctic. 56(4):359-366.

Estes, J.A., and J.R. Gilbert. 1978. Evaluation of an aerial Survey of Pacific walrus (*Odobenus rosmarus divergens*). Journal Fisheries Research Board Canada. 35:1130-1140.

Estes, J.A. and V.N. Gol'tsev. 1984. Abundance and distribution of the Pacific walrus (*Odobenus rosmarus divergens*): results of the first Soviet-American joint aerial survey, autumn 1975. Pp. 67-76 *In* F.H. Fay and G.A. Fedoseev (*EDS.*), Soviet-American Cooperative Research on Marine Mammals, vol. 1, Pinnipeds. NOAA Technical Report, NMFS 12, 104 pp.

Fay, F.H. 1982. Ecology and biology of the Pacific walrus, Odobenus rosmarus divergens Illiger. North American Fauna. No. 74.

Fay, F.H., and C.E. Bowlby. 1994. The harvest of Pacific walrus, 1931-1989. USFWS R7 MMM Technical Report 94-2. U.S. Fish and Wildlife Service, Marine Mammals Management, Anchorage, AK. 44 pp.

Fay, F.H., L.L. Eberhardt, B.P. Kelly, J.J. Burns and L.T. Quakenbush. 1997. Status of the Pacific walrus population, 1950-1989. Marine Mammal Science 13:537–565.

Fay, F.H. and C. Ray. 1968. Influence of climate on the distribution of walruses, Odobenus rosmarus (Linnaeus). I. Evidence from thermoregulation behavior. Zoologica 53:1-18.

Fay, F.H., B.P. Kelly and J.L. Sease. 1989. Managing the exploitation of Pacific walruses: a tragedy of delayed response and poor communication. Marine Mammal Science 5:1–16.

Fay, F.H., B.P. Kelly, P.H. Gehnrich, J.L. Sease and A.A. Hoover. 1986. Modern populations, migrations, demography, trophics, and historical status of the Pacific walrus. NOAA/OCSEAP, Envir. Assess. Alaskan Cont. Shelf, Final Rep. Prin. Invest. 37:231-376. NTIS PB87-107546.

Fay, F.H., B.P. Kelly, P.H. Gehnrich, J.L. Sease and A.A. Hoover. 1984. Modern populations, migration, demography, trophics, and historical status of the Pacific walrus. Outer Cont. Shelf Environ. Asses. Program, Final Rep. Princ. Invest., NOAA, Anchorage, AK 37:231-376. 693 p. OCS Study MMS 86-0021; NTIS PB87-107546.

Fedoseev, G.A. 1981. Aerovisual survey of walruses and bowhead whales in the Eastern Arctic and the Bering Sea. Research Works on Marine Mammals of the Northern Pacific Ocean in 1980-1981. Moscow. VNIRO. pp 25-37.

Fedoseev, G.A. 1984. Present status of the population of walruses (*Odobenus rosmarus*) in the eastern Arctic and Bering Sea. Pp 73-85 *In* V.E. Rodin, A.S. Perlov, A.A. Berzin, G.M. Gavrilov, A.I. Shevchenko, N.S. Fadeev, and E.B. Kucheriavenko (*EDS.*), Marine Mammals of the Far East. TINRO, Vladivostok.

Fedoseev, G.A. and Y.V. Razlivalov. 1986. Distribution and numbers of walruses in the Eastern Arctic and Bering Sea in autumn 1985. Research Works on Marine Mammals of the Northern Pacific Ocean in 1984-1985. Moscow. VNIRO. pp 93-98.

Fuller, A.S. and J.C. George. 1997. Evaluation of Subsistence Harvest Data from the North Slope Borough 1993 Census for Eight North Slope Villages: for the Calendar Year 1992. Barrow, AK: North Slope Borough, Dept. of Wildlife Management.

Garlich-Miller, J. and C. Pungowiyi. 1999. Proceedings of a workshop concerning walrus harvest monitoring in Alaska and Chukotka. USFWS R7 MMM Technical Report 99-1. U.S. Fish and Wildlife Service, Marine Mammals Management, Anchorage, AK, 59 pp.

Garlich-Miller, J. L., L.T. Quakenbush and J.F. Bromaghin. 2006. Trends in age structure and Productivity of Pacific walruses Harvested in the Bering Strait region of Alaska, 1952–2002. Marine Mammal Science 22: 880–896.

Garner, G.W., S. T. Knick, and D.C. Douglas. 1990. Seasonal movements of adult female polar bears in the Bering and Chukchi Seas. International Conference of Bear Research and Management: 219-226.

Gehnrich, P.H. 1984. Nutritional and behavioral aspects of reproduction in walruses. Unpubl. M.S. Thesis. Univer. Alaska, Fairbanks. AK. 147pp.

Gilbert, J.R. 1999. Review of previous Pacific walrus surveys to develop improved survey designs. *In:* Garner, G.W., S.C. Amstrup, J.L. Laake, B.F.J. Manly, L.L. McDonald, and D.G. Robertson (*EDS*). Marine Mammal Survey and Assessment Methods. A. A. Balkema, Rotterdam. 287 pp.

Gilbert, J.R. 1989. Aerial census of Pacific walrus in the Chukchi Sea, 1985. Marine Mammal Science 5(1):17-28.

Gilbert, J.R., G.A. Fedoseev, D. Seagars, E. Razlivalov, and A. LaChugin. 1992. Aerial census of Pacific walrus, 1990. USFWS R7/MMM Technical Report 92-1; 33pp.

International Union for the Conservation of Nature and Natural Resources (IUCN/SSC). *In prep*. Polar bears. Proceedings of the 14th Working Meeting of the IUCN/SSC Polar Bear Specialist Group. IUCN, Gland Switzerland and Cambridge, UK.

Johnson, A.M., J. Burns, W. Dusenberry, and R. Jones. 1982. Aerial survey of pacific walrus. U.S Fish and Wildlife Service, Denver Wildlife Research Center, Anchorage, Alaska. 44 pp.

Kalxdorff, S.B. and A. Fischbach. 1998. Distribution and abundance of marine mammal carcasses on beaches in the Bering, Chukchi, and Beaufort Seas, Alaska 1995-1997. Unpublished Report MMM 98-1, U.S Fish and Wildlife Service, Marine Mammals Management, Anchorage, Alaska. 27 pp.

Kastak, D., B.L. Southall, R.J. Schusterman and C.R. Kastak. 2005. Underwater temporary threshold shift in pinnipeds: effects of noise level and duration. J. Acoust. Soc. Am. 118 (5): 3154–3163.

Kastelein, R. A., P. Mosterd, B. van Santen, M. Hagedoorn, and D. de Haan. 2002. Underwater audiogram of a Pacific walrus (*Odobenus rosmarus divergens*) measured with narrow-band frequency-modulated signals. J. Acoust. Soc. Am. 112(5):2173-2182.

Lovvorn, J.R., Richman, S.E., Grebmeier, J.M., Cooper, L.W., 2003. Diet and body condition of spectacled eiders wintering in pack ice of the Bering Sea. Polar Biology 26, 259–267.

MMS. 1990. Chukchi Sea Oil and gas lease sale 126. Vol. I. Draft EIS. MMS 90-0095.

MMS. 2006. Chukchi Sea Planning Area Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea. Draft Environmental Impact Statement. OCS EIS/EA, MMS 2006-060. 2 Volumes. Department of the Interior, Minerals Management Service, Alaska Region. 140 pp.

NASA. 2005. Arctic Sea Ice Continues to Decline, Arctic Temperatures Continue to Rise In 2005.

National Research Council of the National Academies (NRC). 2003. Cumulative Environmental effects of Oil and Gas Activities on Alaska's North Slope. The National Academies press, Washington, D.C., U.S.A. 288 pp.

North Slope Borough Contract Staff. 1979. Native livelihood and dependence: A study of land values through time. Field Study (National Petroleum Reserve in Alaska 105(c) Land Use Study (US) 1. Anchorage, AK: USDOI, BLM, NPR-A, Work Group 1, 166 pp.

Pedersen, S. 1979. Regional subsistence land use. North Slope Borough, Alaska. Occasional paper No. 21. Anthropology and historic preservation, cooperative park studies unit.

Ray, G. Carleton, Jerry McCormick-Ray, Peter Berg, and Howard E. Epstein. 2006. Pacific walrus: Benthic bioturbator of Beringia. *Journal of Experimental Marine Biology and Ecology* 330(1): 403-419.

Ray, C.E. 1971. Polar bear and mammoth on the Pribilof Islands. Arctic 24:9-19.

Sease, J.L., and D.G. Chapman. 1988. Pacific Walrus, *Odobenus rosmarus divergens*, Pages 17-38. In J.W. Lentfer, ed. Selected Marine Mammals of Alaska, Species Accounts with Research and Management Recommendations. Marine Mammal Commission, Washington, D.C.

Stroeve, J.C., M.C. Serreze, F. Fetterer, T. Arbetter, W. Meier, J. Maslanik, and K. Knowles. 2005. Tracking the Arctic's Shrinking Ice Cover: Another Extreme September Minimum in 2004. *Geophysical Research Letters* 32:L04501.

Tynan, C.T., and D.P. DeMaster. 1997. Observations and predictions of Arctic climate change: Potential effects on marine mammals. Arctic 50:308–322.

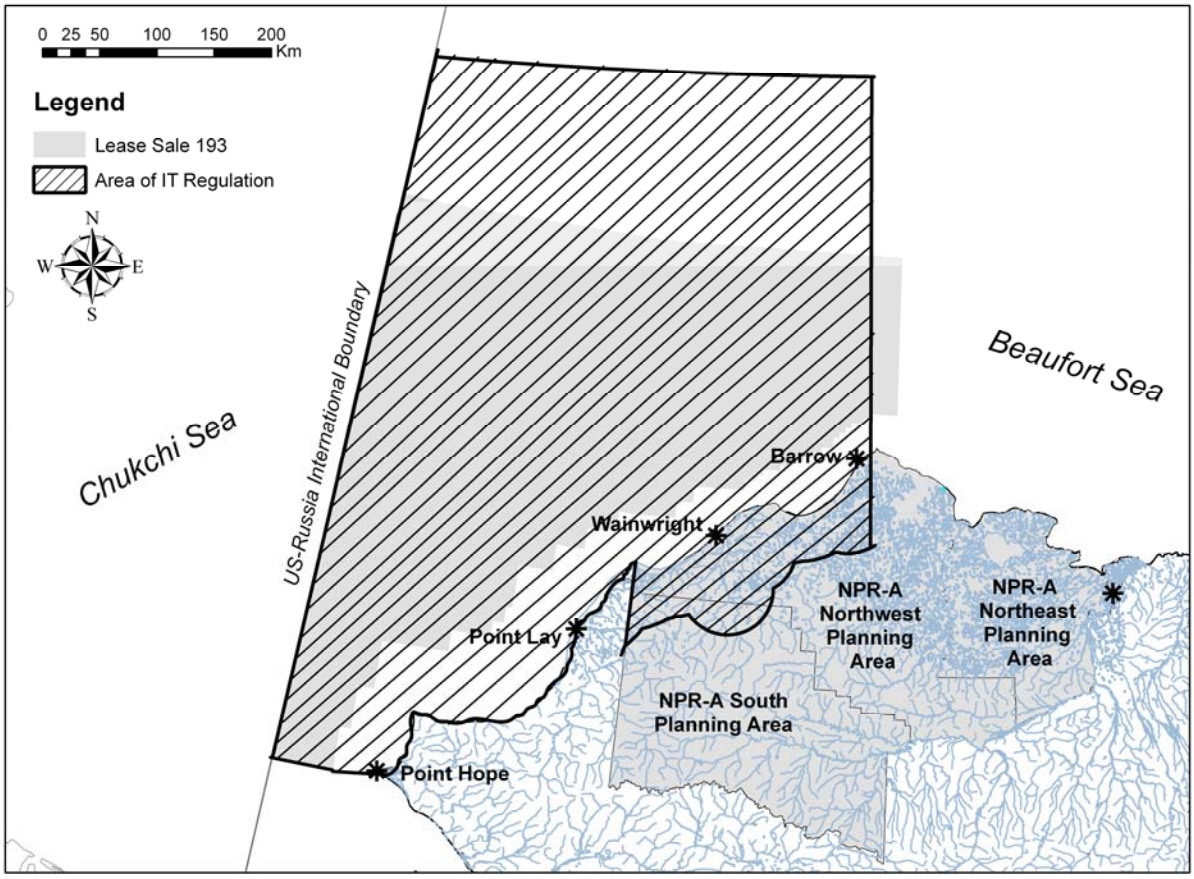

Figure 1: The geographic area of the Chukchi Sea and onshore coastal areas covered by the requested incidental take regulations.

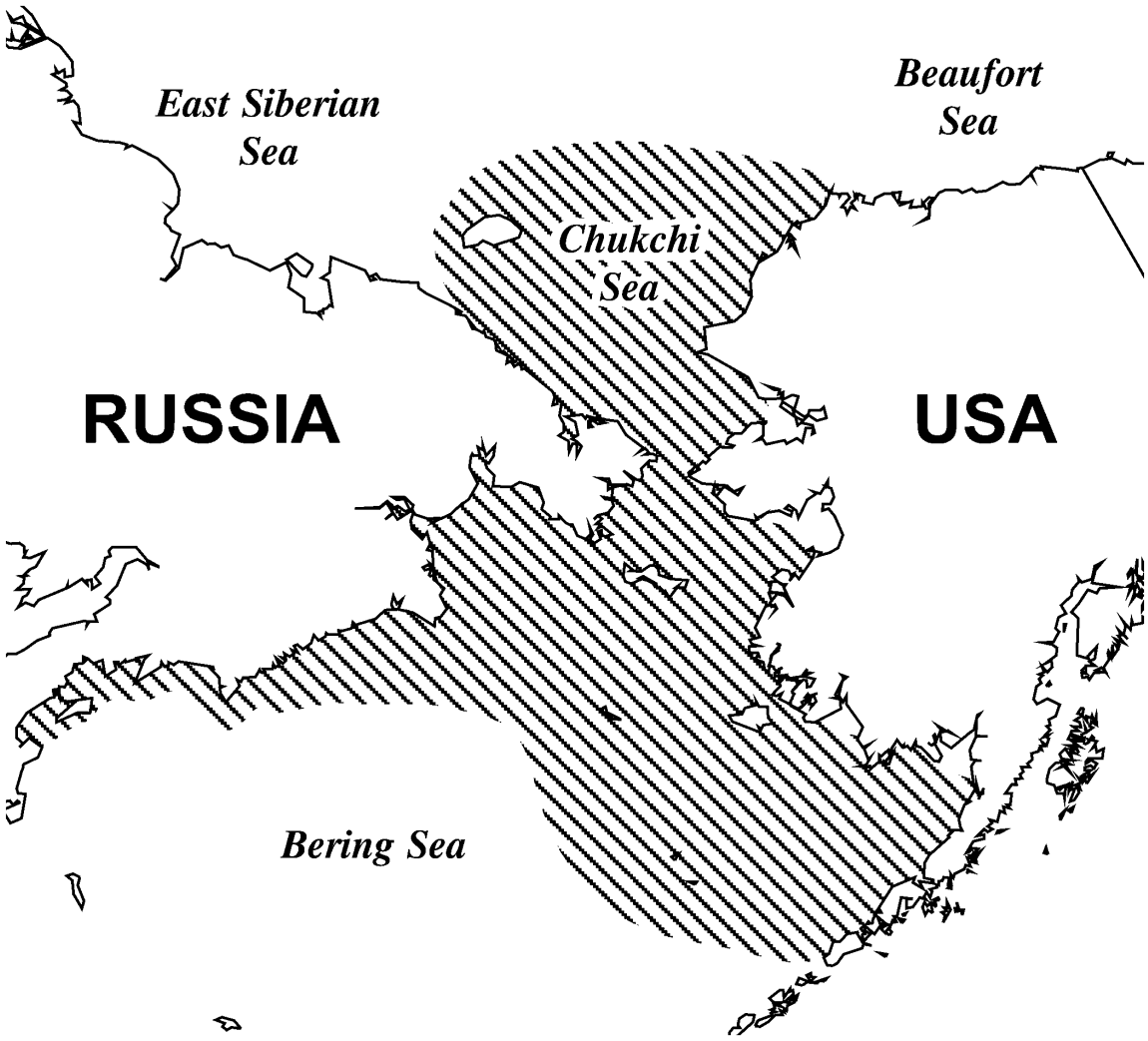

Figure 2. Distribution of Pacific walruses.

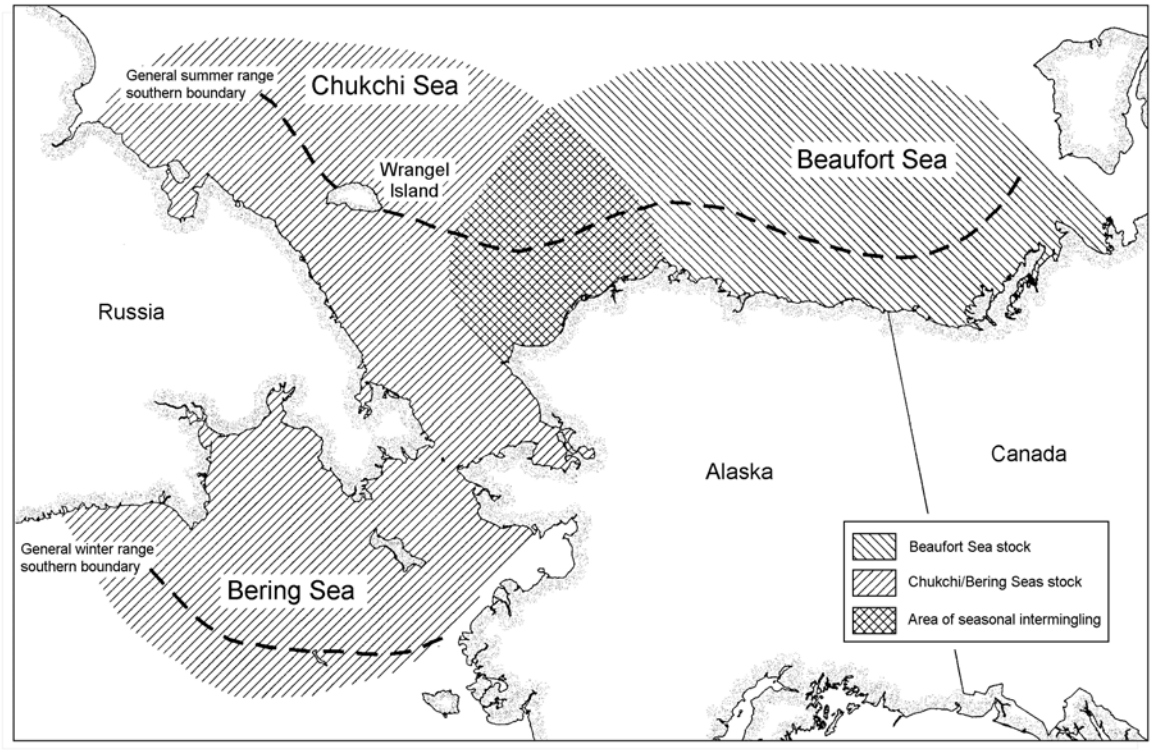

Figure 3. Stock boundaries for polar bears in Alaska.

Attachment 2

Detailed descriptions of activities authorized by the ITR

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 percent and 30 percent of the time (or 6-8 hours a day) because of equipment or weather problems. In addition to downtime due to weather, sea conditions, turning between lines, and equipment maintenance, surveys could be suspended to avoid interactions with biological resources. The U.S. Minerals Management Service (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 Outer Continental Shelf 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 is expected to decrease over time as data is collected over the prime prospects and these prospects are tested by drilling.

Based upon information provided by the petitioners, and estimates prepared by the MMS in the Chukchi Sea EIS, the U.S. Fish and Wildlife Service estimates that, in any given year during the specified time frame, 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. The 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 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 30 m 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. Drill ships operate only during the open-water season, and drifting ice can prevent their operation.

Upon reaching a drill site, the drill ship 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. Placement of the BOP is an important safety feature enabling the drill ship to shut down operations and get underway rapidly without exposing the well. One or more ice management vessels (icebreakers) generally support drill ships to ensure ice does not encroach on operations. A barge and tug typically accompany the vessels to provide a standby safety vessel, oil spill response capabilities, and refueling support. Most supplies (including fuel) necessary to complete drilling activities are stored on the drill ship and support vessels.

Helicopter servicing of drill ships can occur as frequently as one to two 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 915 m to 4,500 m (3,000-15,000 ft) in the subsurface. Based on the characteristics of the geologic plays, it is assumed that exploration wells will average 2,400 m (8,000 ft). For the assumed drilling depths, a typical exploration well will use 430 metric tons (475 tons) of dry mud and produce 545 metric tons (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.

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 January 1 until May 31. The exploration techniques are most commonly used on landfast ice, but they can be used in areas of stable offshore pack ice. 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.

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 five 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 three to five wells could be drilled in this area within the next five years. In support of these activities, CPAI estimates that the following associated infrastructure would be required: 32 to 480 km (20-100 mi) of ice roads, 32 to 480 km (20-300 mi) of Rolligon trails, one to two airfields, of approximately 1,500 m (5,000 ft) 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 three to six onshore wells within the next five years. Drilling will likely include both well testing and VSPs. Three onshore wells are proposed for 2007. Drilling operations will require an estimated 32 to 480 km (20 to 100 mi) of ice roads, 32 to 480 km (20 to 300 mi) of Rolligon trails, one to four airfields approximately 1,500 m (5,000 ft) in length on lakes or tundra, rig storage on gravel, possibly at new sites in NW-NPR-A., one to five camps, and one to three rigs operating in a given area.