PETITION FOR PROMULGATION OF REGULATIONS PURSUANT TO SECTION 101 (a) (5) OF THE MARINE MAMMAL PROTECTION ACT

Pacific Walrus (*Odobenus rosmarus divergens*)
Polar Bear (*Ursus maritimus*)

Prepared for:

Alaska Oil and Gas Association
121 W. Fireweed Lane, #207
Anchorage, AK 99503
(907) 272-1481

Prepared by:

Hoefler Consulting Group
3401 Minnesota Drive, Suite 300
Anchorage, AK 99503
(907) 563-2137

2005

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I. NATURE OF THE REQUEST

The Alaska Oil and Gas Association (AOGA) pursuant to Section 101 (a) (5) of the Marine Mammal Protection Act (MMPA), petitions the U.S. Fish and Wildlife Service (USFWS) to renew regulations for taking of marine mammals incidental to oil and gas exploration, development, and production operations and all associated activities on the Alaskan North Slope for the period of five years beginning in March 2006 (after the expiration of the current regulations on 30 March 2005) and extending through 2011. The geographic region of activity encompasses an area extending approximately from Icy Cape on the west to the Canning River on the east, and 40 km (25 mi) inland from the coast to approximately 64 km (40 mi) offshore including waters in the Chukchi and Beaufort Seas, and offshore of the Arctic National Wildlife Refuge (ANWR). This region includes all Alaska coastal areas on the North Slope (with the exception of the onshore in ANWR), state waters, and OCS waters east of Icy Cape to the Canadian border (Figure 1). Renewal of the regulations sought would allow the incidental, but not intentional, "taking" of small numbers of walruses (*Odobenus rosmarus divergens*) and polar bears (*Ursus maritimus*) in the event that "takes" occur from oil and gas activities in the aforementioned area.

For purposes of this petition, AOGA is requesting non-lethal incidental take during planned, legal activities. AOGA does not anticipate that exploration, development, or production activities will result in the taking of more than a small number of marine mammals. Furthermore, there would be no unmitigable adverse impact on the availability of polar bears and walruses for subsistence uses. Accordingly, this petition has been filed for the purpose of ensuring that there is no question that the activities described herein comply with the MMPA.

AOGA is a private, non-profit trade association whose 18-member companies represent the majority of oil and gas exploration, production, transportation, refining and marketing activities in Alaska. AOGA's members are as follows:

Agrium Kenai Nitrogen Operations
Alyeska Pipeline Service Company
Anadarko Petroleum Corporation
BP Exploration (Alaska) Inc.
Chevron Corporation
ConocoPhillips Alaska, Inc.
ExxonMobil Production Company
Flint Hills Resources, Inc.
XTO Energy, Inc
Forest Oil Corporation
Kerr-McGee Corporation
Marathon Oil Company
Petro Star, Inc.
PetroCanada Alaska Resources Inc.
Pioneer Natural Resources Alaska, Inc
Shell Offshore Inc
Tesoro Alaska Company
UNOCAL

This petition is being filed by AOGA on behalf of its members, but the expectation is that the regulations to be promulgated by USFWS from this petition will be applicable to any company conducting oil and gas exploration and development activities described herein. This petition requests an expansion of the geographic boundary depicted in previous submittals, including the August 3, 2004 petition to renew the incidental take regulations. The expanded boundary is described above and shown on Figure 1.

In 1976 the United States signed the International Agreement on the Conservation of Polar Bears (IACPB) as one of the five circumpolar countries (Canada, Norway, Denmark [Greenland], the former Soviet Union, and the United States). The IACPB seeks to protect ecosystems where polar bears live, restrict the taking of polar bears, and the commercial trade of polar bear parts. This request by AOGA is consistent with conservation and management measures stated in the IACPB.

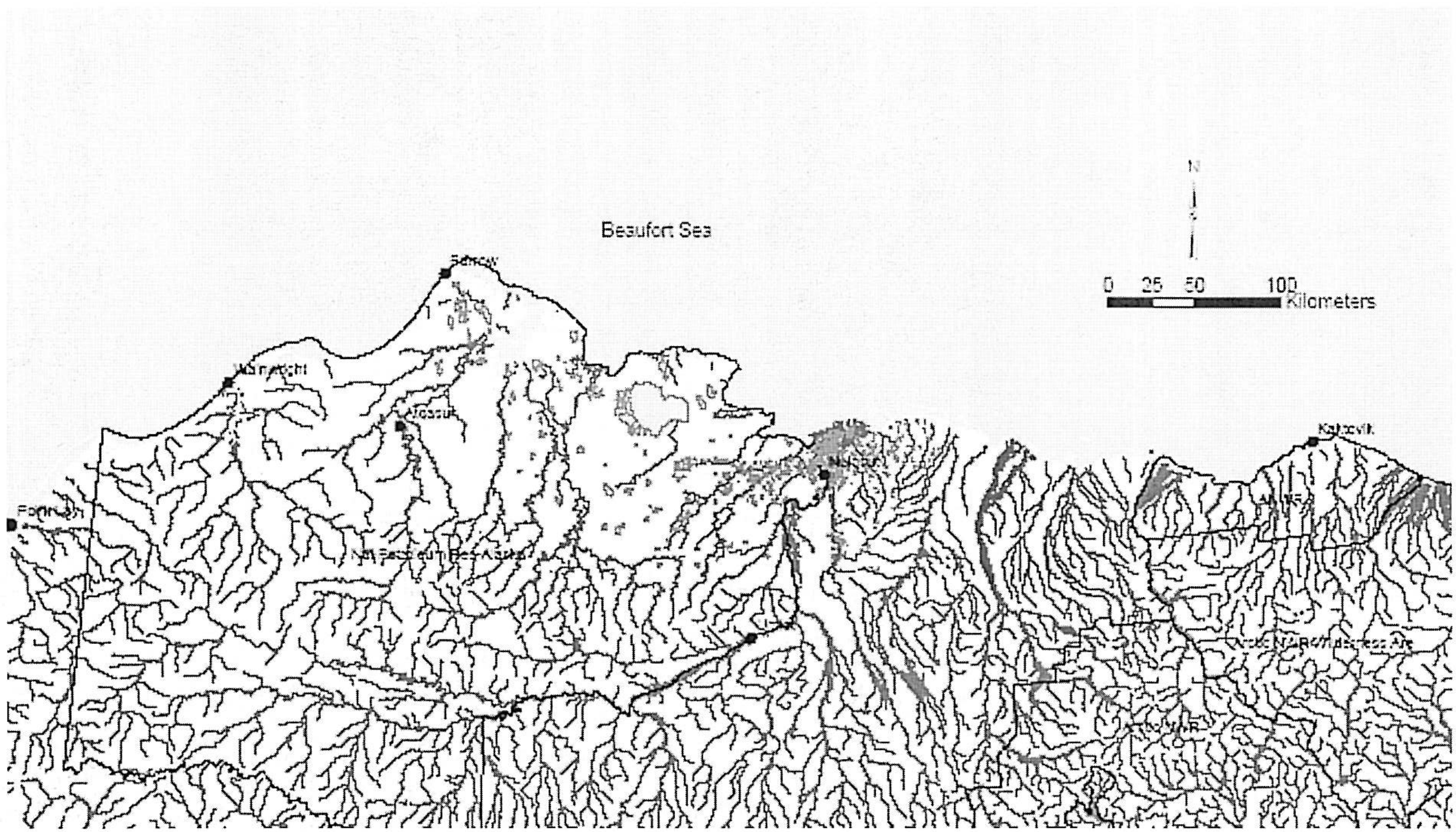


Figure 1. The geographic region of oil and gas activities on the Alaskan North Slope considered in this petition.

II. INFORMATION SUBMITTED IN RESPONSE TO THE REQUIREMENTS OF 50 C.F.R. § 18.27

The USFWS' regulations governing the issuance of regulations and letters of authorization permitting incidental takes under certain circumstances are codified at 50 C.F.R. § 18.27. Section 18.27 sets out eight specific items that must be addressed in requests for rulemaking pursuant to Section 101 (a) (5) of the MMPA, 16 U.S.C. § 1371(a) (5). Each of these items is addressed in detail below.

1. OPERATIONS TO BE CONDUCTED

A description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.

The scope of this petition is limited to the activities that will be conducted during the exploration (geophysical and drilling activities), development, production, decommissioning, rehabilitating, and abandonment phases of oil and gas facilities along the coast and offshore throughout the year within the area defined in the following section. Specific activities that may take place during the period the requested regulations are in effect are discussed below.

Oil and Gas Activity

Oil and gas exploration, development, and production activities have occurred on the Alaskan North Slope and in the nearshore Beaufort Sea region for more than 30 years. The Prudhoe Bay oil reservoir was discovered in 1968. Since the first State of Alaska lease sale of North Slope acreage in December 1964, the state has leased over 9 million acres in the North Slope/Beaufort Sea region. Active state leases north of the Brooks Range now total approximately 1,051, comprising 3.2 million acres. Federal oil and gas lease sales managed under the Minerals Management Service (MMS) lease program have been held within federal waters of the Alaskan Beaufort Sea. Sixty-four of the 722 tracts sold during these sales remain active. Approximately 31 wells, nine of which have been determined to be commercial, have been drilled in these offshore leases. Federal lease sales have also recently occurred in the NPR- A, which is managed by the Bureau of Land Management (BLM). Between 1975 and 1981, twenty-eight wells had been drilled in the NPR-A. Since the May 1999 lease sale, 19 wells have been drilled in the NE NPR-A.

Since the first production well was drilled in the Prudhoe Bay unit, more than 14 billion barrels of oil have been produced on the North Slope, and more than 2000 wells have been drilled. Total direct surface coverage measured in 2001 for oilfield related activities (gravel pads, roads, mine sites, and the Trans-Alaska Pipeline System [TAPS] north of the Brooks Range) is 8,690 hectares (21,727 acres) or approximately 0.1 percent of the Arctic Coastal Plain between the Colville and Canning rivers. There are approximately 1,807 km (1,123 mi) of pipelines and 579 km (360 mi) of gravel roads. Fifteen gravel mine sites cover approximately 640 hectares (1,600 acres), although only seven of these are currently in use. There are approximately 130 gravel pads within the currently producing oilfields.

Petroleum-related activities can include construction of ice roads for general support, seismic operations, drilling wells, construction of gravel roads and pads, construction of landing strips, drilling production and service wells, and installation of pipelines.

North Slope oil production peaked in 1988 at 2 million barrels per day. In FY2004, daily production was slightly less than 1 million barrels per day. Oil produced on the North Slope is transported south via the 1,288-km (800 mi) Trans-Alaska Pipeline System. Most of the oil arrives at the

Valdez tanker terminal where the oil is transferred to tankers for shipment to world markets. A small proportion of the oil is stored and refined in Alaska for local use.

The following sections provide background information on: geological and geophysical surveys, onshore and offshore exploratory drilling, development and production, and decommissioning and abandonment. Details are also provided for currently planned activities and possible future activities occurring within the timeframe of the proposed regulations.

Geological and Geophysical Surveys

Geophysical surveys are conducted to gather information about subsurface geology. Geophysical surveys can be divided into two classes: deep seismic and shallow hazard. Deep seismic surveys generally map deep strata beneath the surface of the earth (0.305 km to 6.1 km [0.2 to 3.7 mi] below ground level) in search of gas and oil-bearing rock formations. Shallow hazard surveys, also known as "site clearance" or "high resolution surveys" are conducted to gather information on near-surface hazards (up to 305 m [0.2 mi] below ground level), which could be encountered during drilling.

Geotechnical Site Investigation

Shallow cores provide information about soil conditions where onshore or offshore pipelines, structures, or other facilities are planned. Site investigations including archaeological, biological, and ecological aspects are required to develop foundation design criteria for any planned structure, and to determine the optimal facility location. Soil borings define the soil stratigraphy and geotechnical properties at selected points and may be integrated with seismic data to develop a regional model for predicting soil conditions in areas not sampled.

Reflection Seismic Exploration

Deep seismic and shallow hazard surveys use the "reflection" method of data acquisition. Reflection seismic exploration is the process of gathering information about the subsurface of the earth by measuring acoustic (sound or seismic) waves, which are generated on or near the surface. Acoustic waves reflect at boundaries in the earth that are characterized by acoustic impedance contrasts. The acoustic impedance of a rock layer is its density multiplied by its acoustic velocity. Geologists and geophysicists commonly attribute different rock characteristics to different acoustic impedances. Seismic exploration uses a controlled energy source to generate acoustic waves that travel through the earth (including sea ice and water, as well as subsea geologic formations), and then uses ground sensors to record the reflected energy transmitted back to the surface. Energy directed into the ground takes on numerous forms. When acoustic energy is generated, compression (p) and shear (s) waves form and travel in and on the earth. The compression and shear waves are affected by the geological formations of the earth as they travel in it and may be reflected, refracted, diffracted or transmitted when they reach a boundary represented by an acoustic impedance contrast.

The basic components of these survey types include an energy source (either acoustic or vibratory), which generates a seismic signal; hydrophones or geophones, which receive the reflected signal; and electronic equipment to amplify and record the signal. The number and placement of sensors, the energy sources, the spacing and placement of energy input locations, and the specific techniques of recording reflected energy are broadly grouped as "parameters" of a given exploration program.

In modern reflection seismology, many sensors are used to record each energy input event. The number of sensors used for each event varies widely according to the type of survey being conducted and the recording equipment available. Common numbers of groups of sensors are 240, 480, and 1040, and some new recording instruments may use as many as 4000 groups of sensors simultaneously. The sensors are normally placed in one or more long lines at specified intervals. In North America the common group placement intervals are multiples of 17 m (55 ft), 33.5 m (110 ft) and 67 m (220 ft).

Vibroseis

Vibroseis seismic operations use large trucks with vibrators that systematically put variable frequency energy into the earth. At least 1.2 m (4 ft) of sea ice is required to support heavy vehicles used to transport equipment offshore for exploration activities. These ice conditions generally exist from 1 January until 31 May in the Beaufort Sea. 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 cable.

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 a 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 *(e.g.,*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.

Airgun and Watergun Seismic Data Collection

These techniques use compressed air or water in a cylinder at a pressure of about 2,000 pounds per square inch (psi). The gun is discharged by an electrical signal that activates a solenoid valve. The air or water is vented through portals in the upper part of the cylinder creating a pressure wave- the seismic impulse. The intensity of the pressure wave is nearly proportional to the volume of the source array because all guns in the array are fired simultaneously. Reflections of this pressure wave from sub-surface layers are detected by a series of geophones or hydrophones.

Typically in summer for offshore seismic data collection, boats are used to pull an underwater array of air guns either followed by a set of sensor cables or past sensor cables that have been laid along the ocean floor.

Explosives Seismic Data Collection

Although explosives haven't been used on the North Slope for about 25 years, their use may still be applicable. The field procedures are essentially the same as outlined in the vibroseis section. Explosives are typically set on land at implanted depths of 15 to 30 m (49-98 ft). Charges of high velocity explosives of 15 to 45 kg (33-99 lb) are normally loaded into each hole or "shotpoint," and each shotpoint's charge is detonated individually by the recording crew to produce a seismic record. Current practice limits the use of the explosive method to onshore operations: however, it is widely believed that the Poulter method could potentially work on the sea ice. The Poulter method sets explosives 3-5 ft above the sea ice on sticks in a series to produce a seismic record. Alaska's Department of Natural Resources has limits for explosive use in seismic operations as follows:

- peak pressure rise of less than 2.5psi in water unless frozen.
- peak particle velocity of 0.5 inches/second in spawning beds during early incubation stages,
- offset distance from fish bearing lakes and streams depending on charge size: 1pound (lb) charge must be 37ft (9m), 2 lb offset by 52 ft (13m), 5lb by 82ft (20m), 10 lb by 116ft (28m), 25 lb by 184ft (45m), and 100 lb by 368ft (90m).

Vertical Seismic Profiles

Vertical Seismic Profiles (VSPs) involve lowering geophones into a hole on land and repeatedly activating the energy source. VSPs are elaborate checkshots that are used to calibrate seismic sections to well data (i.e., to correlate the reflections on the seismic data with formations seen during drilling). VSPs are a form of well logging, and they differ from the more conventional logging activities in that they are conducted off the drill pad. VSP operations are usually crewed by less than eight people. If conducted during winter, 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.

Environmental Studies

In addition to geological surveys, over the past 35 years there has been extensive research and studies conducted on geomorphology (permafrost), archaeology, vegetation, hydrology, and marine and terrestrial animal populations inhabiting the arctic coastal regions. Many studies are done in cooperation with scientists from federal, state, and local agencies; universities; and non-profit organizations. Several research programs are multi-year efforts with objectives to collect baseline data or to answer specific research questions. These data are necessary and help the industry incorporate mitigation measures associated with exploration and development plans through:

- Understanding the life cycles and natural variability of wildlife resources and plant communities;
- Assessing whether oilfield operations affect wildlife populations and plant communities, and if so, how;
- Identifying the location of important cultural and historical artifacts in order to avoid these areas during exploration and development; and
- Understanding the potential for impacts to tundra and aquatic resources through exploration activities.

For the next five years, many studies are planned or will continue in anticipation of exploration and development of Alaska's North Slope natural resources.

Onshore and Offshore Exploratory Drilling

There are currently three principal forms of exploratory drilling structures used in offshore exploration: artificial and natural islands, bottom-founded structures, and floating vessels. Onshore exploration in the Alaskan Arctic may be conducted from ice pads (single season or multi-season) and gravel pads. Table 1 provides construction options in support of development/ production activities.

Artificial Islands

Artificial islands are constructed in shallow offshore waters for use as drilling platforms. In the Arctic, artificial islands have been constructed from sand, gravel, and/or ice. Gravel islands can be constructed at various times of year. During summer, gravel and sand are removed from the sea floor or onshore pits and barged to the proposed site and deposited to form the island. In the winter, gravel is transported over ice roads from an onshore mine site to the island site. After the gravel island is constructed to its full size, slope protection systems are installed, as appropriate for local oceanographic conditions, to reduce ice gouging and erosion of the island. Once the island is complete, a drilling rig is transported to the island. Ninety people operate a typical rig site; approximately 20 may be assigned to work periodically outside the rig on the ice. Due to economic and engineering considerations, gravel island construction is generally restricted to waters less than 15 m (50 ft) deep.

Caisson-retained Island

Although Caisson-retained islands have not been used in the Alaskan Beaufort Sea, they are similar in construction and design to gravel islands with one significant exception. Rather than relying entirely on gravel for support, the island contains four or more floatable concrete or steel caissons, which rest on an underwater gravel berm or on the ocean floor in water less than 6 m (20 ft) deep. The berm is constructed with dredged or imported material to within 6 m (20 ft) of the sea surface. When each caisson is in place, the resulting concrete or steel ring is filled with sand to give the structure stability. This design, like the gravel island, permits drilling to occur all year. When drilling is completed, the center core of sand can be dredged out, the caissons refloated, and the structure moved to a new location. The berm is left to erode by the natural action of the ocean. Personnel numbers on a caisson-retained island would be equivalent to those on an artificial island.

Steel Drilling Caisson

The SDC, a bottom-founded structure, is a specific drilling unit constructed by modifying the forward section of an ocean-going Very Large Crude Carrier (VLCC). The main body of the structure is approximately 162 m (531 ft) long, 53 m (174 ft) wide, and 25 m (83 ft) high. The deck has been cantilevered to provide additional space. The stability of the system under ice loading is provided by water ballasting of the original cargo tanks. Shotcrete has been applied to the base of the unit to increase its coefficient of friction. The SDC is designed to conduct exploratory year-round drilling under arctic environmental conditions. On its first two deployments in the Canadian Beaufort, the SDC was supported by subsea gravel berms. For its third deployment in Harrison Bay in 1986, a steel component was constructed to support the SDC in lieu of the gravel berms. The steel base configuration adds 13 m (44 ft) to the design height of the structure and allows deployment of the SDC in 8 to 24-m (25-80-ft) water depths without bottom preparation. The SDC requires minimal support during the drilling season. It is typically stocked with supplies before being moved to a drillsite. Two or three tugs and/or supply vessels tow the SDC to or from the drillsite during open-water periods. Deployment and recovery of the SDC require less than one week each. Personnel (a maximum of 93) and some smaller equipment are transported to and from the SDC by helicopter. Fuel and larger items, if required, are transported by supply vessel.

Drillships

Drillships such as the CANMAR Explorer III are used in arctic waters deeper than 18 to 24 m (60-80 ft), because existing bottom-founded drilling structures are limited to water depths of up to about 24 m (80 ft). Since drillships can also drill in waters less than 24 m (80 ft) deep, there is some overlap in areas where drillships and bottom-founded structures can be used. Drillships such as the CANMAR

Explorer III are ice-reinforced and classified for use in the arctic environment. The CANMAR Explorer III carries a maximum of 103 people.

Drillships operate only during the open-water season, and drifting ice can prevent their operation. Upon reaching the drill site, the vessel is secured over the location by deploying anchors on as many as ten to twelve mooring lines. These lines are drawn taut to fix the ship's location and prevent significant movement. The drill pipe is encased in a riser that compensates for the vertical wave motion. The blowout preventer (BOP) is typically located at the seabed in a hole dug below the ice-scour depth. BOP placement is an important safety feature enabling the drillship to shut down operations and get underway rapidly without exposing the well.

One or more ice management vessels (icebreakers) generally support drillships to ensure ice does not encroach on operations. A barge and tug typically accompany the vessels to provide a standby safety vessel, oil spill response capabilities, and refueling support. Most supplies (including fuel) necessary to complete drilling activities are stored on the drillship and support vessels. Helicopters based at existing shore facilities routinely transfer personnel and additional equipment. Flights to a drillship average one or two per day.

Kulluk

The Kulluk floating drilling unit was designed for extended-season drilling in arctic waters of 18 to 185 m (59-607 ft) and can drill wells to depths of 6.1 km (20,000 ft). The Kulluk is capable of withstanding ice forces encountered during breakup and freeze-up, and this capability permits it to operate during periods well beyond those of an ordinary arctic-class drillship. The Kulluk can accommodate 104 people in 44 cabins.

The Kulluk's hull is made of modified high-tensile, low-temperature steel plates 3.8 cm (1.5 in) thick. All areas are double hulled to protect against puncture. A compartmentalized space inboard of the hull plates provides further protection from flooding. The inwardly sloping hull has a maximum diameter of 81 m (266 ft) at the top and a minimum diameter of 60 m (197 ft) near the bottom. Below the main hull, the double bottom is 32 m (105 ft) in diameter, with a circumferential outer-hull ice shield 44 m (144 ft) in diameter. The hull is divided into eight radial and two circumferential bulkheads, and three decks.

Ice Pads, Roads and Islands

Ice roads provide seasonal routes for heavy equipment and supplies to be moved to remote areas. These temporary, seasonal roads are constructed by spreading water from local sources (lakes or rivers) to create a rigid surface. For grounded ice roads in shallow (< 2 m) waters of the Beaufort Sea, seawater is initially used for the foundation and the ice road is eventually "capped" with freshwater, strengthening it. Floating ice roads may also be constructed in deeper water. Ice bridges may be constructed to provide winter access across frozen rivers; ice airstrips are built in the same manner as ice roads. Ice drilling pads are now commonly used for winter exploration pads. Ice pads are also built in a similar way to ice roads and airstrips. The thickness of ice roads, pads and bridges depends on the loads that must be supported and on terrain, and can range from 15 cm (6 in) to 3 m (10 ft.).

New designs for ice pads have allowed what used to be a single season structure to remain intact through summer, and thus, be used for multiple drilling seasons. Offshore ice islands and offshore ice roads are built using similar techniques to their onshore counterparts.

Table 1. Technical options for oil and gas activities in the Alaskan Beaufort and Chukchi Seas considered reasonable to support development/production activities.

Development / Components	Options	Reasons For Consideration
Oil and Gas Drilling Methods	• Directional Drilling Technology	• Can access multiple bottomhole locations for single surface locations. • Can access bottomhole locations with horizontal departures of up to nearly 6.4 km (4 mi) from surface locations.
Offshore Production Structures	• Bottom-founded Structures	• Owners have proposed to modify to accommodate development/production facilities. • Demonstrated long-term durability and is currently in good condition. • Working area could be modified to accommodate development/production systems, including 22 wells, and up to 35 wells with additional working area expanded.
	- Mobile Arctic Caisson	• Owners have proposed to modify to accommodate development/production facilities. • Designed for arctic conditions in water depths of 9 to 39.6 m (30- 130 ft). • Demonstrated durability and is currently in good condition. • Working area could be modified to accommodate development/production systems, including 40 wells.
	- Steel Drilling Caisson	• Owners have proposed to modify to accommodate development/production facilities. • Capable of operating in arctic conditions in water depths of 8 to 24 m. (25- 80 ft) • Demonstrated durability and is currently in good condition. • Working area could be modified to accommodate drilling and production systems, including 40 wells.
	- Man-made Gravel Island (Reuse of existing islands or construction of new island)	• Proven technology, 17 man-made gravel islands have been constructed in less than 20 m (65 ft) water depths for exploration drilling and production in the Alaskan Beaufort Sea since the mid-1970s. • Can withstand high lateral load ice forces without movement or damage. • Less expensive to design, construct, and maintain than other structures in water depths of 20 m (65 ft) or less.
	- Seafloor Templates and Related Structures	• Could be used in water depths greater than 61 m (200 ft) in the Alaskan Beaufort Sea, where ice grounding or gouging typically does not occur.
	• Bottom-founded Structures - New Purpose-Built and/or Proposed Structures	• Would be considered when no existing structures would satisfy the specific needs of a development/production program (water depth, ice forces, production facilities). • Would allow for placement as needed over the offshore reservoir. • Can be designed for any water depth, ice forces, and development/production facilities as needed.
	- Subsea Silos (Including silo protected templates)	• Although unproven in the Alaskan Beaufort Sea, conceptual design appears to address potential hazards and offers flexibility that may be suitable in some cases. • Can include a cap or cover plate over silo near the sea bottom for additional protection of wellheads and equipment from ice (Kuvlum). • Caisson-protected subsea templates have been used in other Arctic areas.

Development and Production

The presently developed North Slope oilfields are interconnected from Alpine in the west to Badami in the east. Badami and Alpine are connected to the rest of the oil fields via pipelines and ice roads during winter; no permanent roads connect these two fields. All current oilfield developments are onshore, with the exception of Northstar, although a few offshore reservoirs are accessed by onshore facilities or from facilities connected to the mainland by gravel causeways.

North Slope oilfield developments include a series of major fields and their associated satellite fields. In some cases a new oilfield discovery has been developed completely using existing oilfield facilities. Thus, the Prudhoe Bay oilfield unit encompasses the Prudhoe Bay, Lisburne, Niakuk, West Beach, North Prudhoe Bay, Pt. McIntyre, Borealis, Midnight Sun, Polaris, Aurora and Orion fields, while the Kuparuk oilfield development incorporates the Kuparuk, West Sak, Tarn, Palm, Tabasco and Meltwater oilfields (See attached Figure 2 for locations and Tables 2 - 3 for a summary of existing and future oil and gas development).

Prudhoe Bay

The Prudhoe Bay oilfield is the largest oilfield in North America and the 18th largest field worldwide. Approximately 9.6 billion barrels have been produced from a field originally estimated at 10 billion barrels of recoverable reserves. The latest estimate of recoverable oil is approximately 13 billion barrels from this field. The Prudhoe Bay field also contains an estimated 46 trillion cubic feet of natural gas, with approximately 26 trillion cubic feet of that deemed recoverable. More than 1,300 wells have been drilled in the Prudhoe Bay oilfield and several hundred more may be drilled to fully develop the reservoir.

Approximately 2,000 hectares (5,000 acres) have been affected due to the construction of roads, pads and airstrips within the Prudhoe Bay oilfield and its associated satellite fields, including approximately 350 km (218 mi) of roads, 341 km (212 mi) of pipelines, 6 gravel mine sites, 43 gravel pads and 106 reserve pits.

The Base Operations Center on the western side of the Prudhoe Bay oilfield can accommodate 476 people, the nearby Main Construction Camp can accommodate up to 680 people, and the Prudhoe Bay Operations Center on the eastern side of the field houses up to 488 people. Additional contract or construction personnel can be housed at facilities in nearby Deadhorse.

Kuparuk

The Kuparuk oilfield is the second-largest producing oilfield in North America. More than 2.6 billion barrels of oil are expected to be produced from the 6 billion-barrel oilfield. The Greater Kuparuk Area includes the satellite oilfields of Tarn, Palm, Tabasco, West Sak and Meltwater. These satellite fields have been developed using existing facilities. To date, nearly 900 wells have been drilled in the Greater Kuparuk Area. The total area directly affected by development in the Greater Kuparuk Area is approximately 603 hectares (1508 acres), including 167 km (104 mi) of gravel roads, 231 km (144 mi) of pipelines, 6 gravel mine sites, and over 50 gravel pads.

The Kuparuk Operations Center and Kuparuk Construction Camp are able to accommodate up to 1200 people. The Kuparuk Industrial Center is primarily used for personnel overflow during the winter in years with a large amount of construction.

Milne Point

Located approximately 56 km (35 mi) northwest of Prudhoe Bay, the Milne Point oilfield was discovered in 1969 and began production in 1985 (Figure 3). The field consists of more than 220 wells drilled from 12 gravel pads. Three satellite fields (Cascade, Schrader Bluff and Sag River) have been developed within the Milne Point Unit, mainly using existing infrastructure. An additional 300 wells may be needed to fully develop the Schrader Bluff reservoir. Milne Point and its satellites have resulted in the disturbance of 94.4 hectares (236 acres) of tundra, including 31 km (19 mi) of gravel roads, 64 km (40 mi) of pipelines and 1 gravel mine site. The Milne Point Operations Center has accommodations for up to 300 people.

Endicott

The Endicott oilfield is located approximately 16 km (10 mi) northeast of Prudhoe Bay (Figure 4). It is the first continuously producing offshore field in the Arctic. The Endicott oilfield was developed from two man-made gravel islands connected to the mainland by a gravel causeway. The operations center and processing facilities are located on the 18-hectare (45-acre) Main Production Island. Approximately 100 wells have been drilled to develop the field. Two satellite fields—Sag Delta North and Sag Delta—have also been developed using existing infrastructure. The Endicott development has disturbed 156.8 hectare (392 acres) of land with 25 km (15 mi) of roads, 47 km (29 mi) of pipelines and one gravel mine site. Approximately 100 people are housed at the Endicott Operations Center.

Badami

Production began from the Badami oilfield in 1998, but has not been continuous. The Badami field is located approximately 56 km (35 mi) east of Prudhoe Bay and is currently the most easterly oilfield development on the North Slope (Figure 4). Field development has resulted in the disturbance of approximately 34 hectares (85 acres) of tundra including 7 km (4.5 mi) of gravel roads, 56 km (35 mi) of pipeline, one gravel mine site and two gravel pads with a total of 50 wells. There is no permanent road connection from Badami to Prudhoe Bay. The pipeline connecting the Badami oilfield to the common carrier pipeline system at Endicott was built from an ice road. This field is currently in 'warm storage' status and not producing oil reserves at this time.

Alpine

Discovered in 1996, the Alpine oilfield began production in November 2000. Alpine is the westernmost oilfield on the North Slope, located 55 km (34 mi) west of the Kuparuk oilfield and just 13 km (8 mi) north of the village of Nuiqsut (Figure 5). Although the Alpine oilfield covers 16,000 hectares (40,000 acres), it has been developed from 38.8 hectares (97 acres) of pads. There are two drill sites and more than 112 wells. There is no permanent road connecting Alpine with the Kuparuk oilfield; small aircraft are used to provide supplies and crew changeovers. Major resupply activities occur in the winter, using the ice road that is constructed annually between the two fields. The Alpine base camp can house approximately 450 employees.

Northstar

The Northstar oilfield was discovered in 1983. The offshore oilfield is located 6 km (4 mi) northwest of the Point McIntyre field and 10 km (6 mi) from Prudhoe Bay (Figure 3). The 15,360-hectare (38,400-acre) reservoir has now been developed from a 5-acre artificial island. Production from the Northstar reservoir began in late 2001. The 2-hectare (5-acre) island will eventually contain 16 producing wells, 5 gas injectors, and one waste disposal well. A subsea pipeline connects facilities to the Prudhoe Bay oilfield.

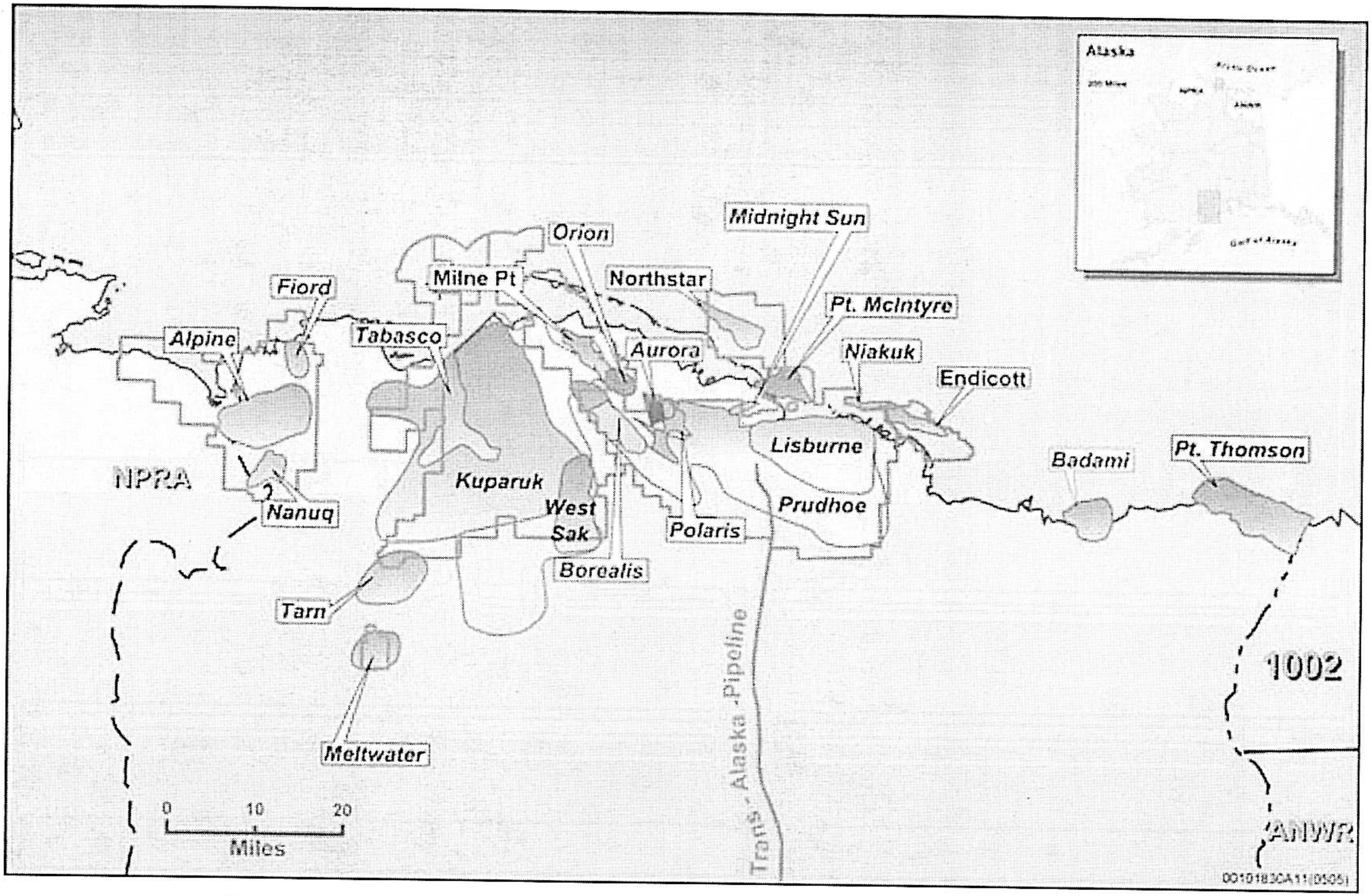


Figure 2. Location of North Slope oil fields.

TABLE 2. **Infrastructure Area (Acres) on North Slope (Not Including Dalton Highway)**

	2001 data / acres	hectares
Gravel roads and causeway		
Roads	2,745	1,111
Causeway	227	92
Total gravel road and causeway area	**2,971**	**1,202**
Airstrips (gravel or paved)	287	116
Offshore gravel pads, islands		
Exploration islands	53	21
Production islands	101	41
Total offshore gravel pad, island area	**155**	**63**
Gravel pads		
Production pads, drill sites	3,126	1,265
Processing facility pads	917	371
Support pads (camps, power stations)	1,463	592
Exploration site	305	123
Total gravel pad area	**5,817**	**2,354**
Total gravel footprint	**9,225**	**3,733**
Other affected areas		
Exploration site-disturbed area around gravel pad	645	261
Exploration airstrip-thin gravel, tundra scar	67	27
Peat roads	517	209
Tractor trail, tundra scar	258	104
Exploration roads-thin gravel, tundra scar	177	72
Gravel pad removed, site in process of recovery	100	41
Gravel pad removed, site is recovered	95	38
Total other affected area	**1,765**	**714**
Gravel mines		
In rivers	5,082	2,057
In tundra	1,283	519
Total gravel mine area	**6,364**	**2,576**
Total impacted area	**17,354**	**7,023**

Source: National Research Council, 2003

Oil Production Processes

Production Facilities

Oil production wells are grouped together at a number of locations surrounding each separation plant. New wells are drilled from these locations called well pads or drillsites. From the surface well-head, crude oil flows into the manifold building, which is also located on the well pad. The primary function of the manifold building is to combine production from many wells and transport it to separation facilities through flow lines.

At the separation or gathering centers, gas and water are removed from the oil. For example, in the Prudhoe Bay Unit, following the separation process, oil is routed by pipeline to Pump Station 1, which is the beginning of the Trans-Alaska Pipeline. The water is injected back into the underground rock formation to help maintain reservoir pressure and enhance recovery of petroleum products. The gas is routed to the Central Gas Facility (CGF) where natural gas liquids are extracted by a refrigeration process and sent down the Trans-Alaska Pipeline with the crude oil. Miscible gas liquids are also removed and used as an injectant for enhanced oil recovery. The remaining gas is routed to the Central Compressor Plant (CCP) where it is compressed for reinjection into the gas cap of the reservoir.

Each production facility has emergency gas-flaring capabilities to compensate for compressor failure. For example, on the WOA, these consist of seven 15-meter (50-foot) flares for each gathering center.

Production Wastes

Production wastes include drilling muds that are used to lubricate the well bore, and rock fragments known as cuttings, removed by the drill bit. Drilling muds are typically water-based mixtures of naturally occurring clays and weighting materials with small amounts of other additives. Traditionally these production wastes have been placed in 'reserve pits' built into the gravel drilling pads, however, most new developments have eliminated the need for reserve pits by grinding up the muds and cuttings and reinjecting them into confined geologic layers.

Other wastes generated by oilfield operations include well treatment fluids, spent chemicals used for processing crude oil, rig washwater, hydraulic fluids from rig equipment, and cooling waters. These wastes are disposed of by underground injection.

A small amount of hazardous waste is generated by production facilities. These wastes are handled in accordance with Environmental Protection Agency (EPA) regulations. Hazardous wastes are sent out of state by truck and barge to EPA-permitted disposal facilities in the contiguous United States.

Non-hazardous solid waste and sanitary wastes are also generated at North Slope Oilfield facilities. Solid wastes such as empty drums, paper products, wood, etc., are handled at the North Slope Borough landfill or incinerated. Disposable food waste is also handled at the North Slope Borough landfill facility, and predator-proof dumpsters have been installed in the oilfield to minimize wildlife attraction to these potential food sources. Sewage wastes are physically and chemically treated by wastewater treatment facilities. North Slope area facilities also operate various recycling programs. Paper products, wood, scrap metal, Styrofoam, cardboard, and other materials are collected and transported off the North Slope to appropriate recycling facilities.

Production Support Operations

Equipment and people associated with production operations are transported to and from the facilities by truck or bus, aircraft, hovercraft or barge towed by ship. Production material is transported to the North Slope by truck. Aircraft are used for movement of personnel, mail, rush-cargo, and perishable items. The sealift, a group of barges and tugs, is used to transport large or very heavy items.

Decommissioning and Abandonment

While no major oilfield has been decommissioned and abandoned to date, individual production pads and exploration sites have been subject to closeout and cleanup activities. Such activities may involve the removal of surface structures and equipment, abandoning the wells and removal of the wellhead, the installation of well monitoring equipment, the removal or cleanup of contaminated gravel and/or drilling waste, the removal or grading of gravel, and the planting and restoration of vegetation.

TABLE 3. Existing and Potential Oil and Gas Development Projects on the North Slope

Name	Type of Production	Reserve Location	Production Location	Year Discovered	Year In Production
		Existing Development and Production			
1. South Barrow	Gas	Onshore	Onshore	1949	1950
2. Prudhoe Bay	Oil	Onshore	Onshore	1967	1977
3. Lisburne	Oil	Onshore	Onshore	1967	1981
4. Kuparuk	Oil	Onshore/Offshore	Onshore	1969	1981
5. East Barrow	Gas	Onshore	Onshore	1974	1981
6. Milne Point	Oil	Onshore/Offshore	Onshore	1969	1985
7. Endicott	Oil	Offshore	Offshore	1978	1986
8. Sag Delta	Oil	Offshore	Onshore	1976	1989
9. Sag Delta North[1]	Oil	Offshore	Offshore	1982	1989
10. Schrader Bluff[2]	Oil	Onshore	Onshore	1969	1991
11.Walakpa	Gas	Onshore	Onshore	1980	1992
12. Pt McIntyre	Oil	Offshore	Offshore/Onshore	1988	1993
13. N. Prudhoe Bay	Oil	Onshore	Onshore	1970	1993
14. Niakuk	Oil	Offshore	Onshore	1985	1994
15. Sag River[3]	Oil	Onshore	Onshore	1969	1994
16. West Beach	Oil	Onshore/Offshore	Onshore	1976	1994
17. Cascade	Oil	Onshore	Onshore	1993	1996
18. West Sak[2]	Oil	Onshore	Onshore	1969	1997
19. Badami	Oil	Onshore/Offshore	Onshore	1990	1998
20. Eider[1]	Oil	Offshore	Offshore	1998	1998
21. Tarn	Oil	Onshore	Onshore	1991	1998
22. Tabasco[2]	Oil	Onshore	Onshore	1992	1998
23. Midnight Sun[4]	Oil	Onshore	Onshore	1998	1999
24. Alpine	Oil	Onshore	Onshore	1994	2000
25. Northstar	Oil	Offshore	Offshore	1984	2001
26. Aurora[4]	Oil	Onshore	Onshore	1999	2001
27. NW Eileen/Borealis	Oil	Onshore	Onshore	1999	2001
28. Polaris[4]	Oil	Onshore	Onshore	1999	2001
29. Meltwater	Oil	Onshore	Onshore	2000	2002
30. Palm	Oil	Onshore	Onshore	2001	2003
		Potential Developments on North Slope			
31. Ataruq	Oil	Onshore	Onshore	2005	2006
32. Nikaitchuq	Oil	Offshore	Offshore	2004	2006
33. CD-4 Nanuk/Nanuq[5]	Oil	Onshore	Onshore	1996	2006
34. CD-3 Fjord[5]	Oil	Onshore	Onshore	1992	2006
35. Ooguruk	Oil	Offshore	Offshore	1993	2007
36. Liberty	Oil	Offshore	Offshore	1983	2010
37. CD-6 Lookout[5]	Oil	Onshore	Onshore	2000	2008
38. CD-5 Alpine West[5]	Oil	Onshore	Onshore	2000	2010
39. CD-7 Spark[5]	Oil	Onshore	Onshore	2000	2010
40. Kalubik	Oil	Offshore	Onshore	1992	
41. Pete's Wicked	Oil	Onshore	Onshore	1997	
42. Sikukik	Oil	Onshore	Onshore	1988	
43. Gwydyr Bay	Oil	Onshore/Offshore	Onshore	1969	
44. Point Thomson	Oil & Gas	Onshore/Offshore	Onshore/Offshore	1977	
45. Mikkelson	Oil	Onshore	Onshore	1978	
46. Sourdough	Oil	Onshore	Onshore	1994	
47. Yukon Gold	Oil	Onshore	Onshore	1994	
48. Flaxman Island	Oil	Offshore	Offshore	1975	

Table 3. Continued

Name	Type of Production	Reserve Location	Production Location	Year Discovered	Year In Production
49. Sandpiper	Oil & Gas	Offshore	Offshore	1986	
50. Stinson	Oil	Offshore	Offshore	1990	
51. Hammerhead	Oil	Offshore	Offshore	1985	
52. Kuvlum	Oil	Offshore	Offshore	1987	
53. Hemi Springs	Oil	Onshore	Onshore	1984	
54. Ugnu	Oil	Onshore	Onshore	1984	
55. Umiat	Oil	Onshore	Onshore	1946	
56. Fish Creek	Oil	Onshore	Onshore	1946	
57. Simpson	Oil	Onshore	Onshore	1950	
58. East Kurupa	Gas	Onshore	Onshore	1976	
59. Meade	Gas	Onshore	Onshore	1950	
60. Gubik	Gas	Onshore	Onshore	1950	
61. Wolf Creek	Gas	Onshore	Onshore	1951	
62. Square Lake	Gas	Onshore	Onshore	1952	
63. E. Umiat	Gas	Onshore	Onshore	1964	
64. Kavik	Gas	Onshore	Onshore	1969	
65. Kemik	Gas	Onshore	Onshore	1972	

[1] Duck Island Unit Satellite
[2] Kuparuk River Unit Satellite
[3] Milne Point Unit Satellite
[4] Prudhoe Bay Unit Satellite
[5] Colville Unit/Alpine Satellite

Potential Oilfield Developments 2006-2011

It is generally speculative to discuss planned activities for the 2006-2011 period, for even those oilfields at an advanced stage of planning may not actually be constructed. For example, the Liberty oilfield was discovered in 1982 by Shell Oil Company and subsequently acquired by BP Exploration (Alaska) Inc. BP drilled a well from Tern Island in the winter of 1996/1997, and based on the results of that well, BP proceeded with plans to develop the reservoir. Construction activities were initially planned for the 1999-2000 winter season but were subsequently deferred. In early 2002, BP announced that it was suspending permit applications to develop the Liberty oilfield. In the fall of 2004 BP re-initiated permitting for Liberty with the signing of a Memorandum of Understanding for permit evaluation and the NEPA process.

Possible future development activities, which seem likely within the five-year period covered by the requested regulations, are discussed below and shown in Table 3. These include the Pt. Thomson, Alpine satellite developments, and areas in the NPR-A. Seismic exploration and exploratory drilling could occur at unidentified locations and potential new satellite oilfields across the North Slope in areas recently leased or in those areas subject to continuing evaluation. However, drilling activity is limited by rig availability. As of July 2004 a total of 24 drilling rigs were located on the North Slope. Currently, eleven drilling rigs are available for on-shore exploration and one rig is available for off-shore exploration (PI/Dwights PLUS Drilling Wire 2004).

Point Thomson

The Point Thomson reservoir is located both onshore and offshore, and it is approximately 32 km (20 mi) east of the Badami field. Development plans are currently being re-assessed. During the petition period the Point Thomson area will remain subject to field surveys and other evaluative programs, up to potential drilling activity.

Alpine Satellites Development

Developments of five drill sites are planned by CPAI in the immediate future. In September of 2004, BLM released the Final Environmental Impact Statement (FEIS) for this development. Two of the drill sites, CD-3 (also known as Fiord prospect or CD-North), and CD-4 (also known as the Nanuq prospect or CD-South), are in the Colville River Delta. The CD-3 drillsite is located north of CD-1 (Alpine facility) and is planned to be a roadless development accessed by using an airstrip or ice road. The remaining drill sites are planned to be connected to CD-1 by road. Three of the drill sites, CD-5 (also known as Alpine West prospect), CD-6 (Lookout prospect) and CD-7 (Spark Prospect), are in the Northeast NPR-A, an area bordered by the Beaufort Sea coast to the north, to the Brooks Range to the south. Gravel sources proposed for extraction are from an existing mine near Nuiqsut (owned by Arctic Slope Regional Corporation) and a new gravel mine site (Clover) near the Ublutuoch River in NPR-A. Construction of CD-3 and CD-4 drillsites began in winter 2005, with production startup for both drill sites in late summer 2006. The three NPR-A drill sites are scheduled for construction from the winter 2007 through 2010. All drill sites are scheduled to be in production by summer 2010.

Liberty

The Liberty prospect is located in Foggy Island Bay about 8 miles east of the Endicott development in federal waters. Following initial exploration efforts by Shell Western E&P Inc. in the mid 1980's, BP acquired the leases in 1996 and discovered oil with an exploration well drilled in 1997. BP's original proposal for the development as analyzed in the Final Environmental Impact Statement issued in 2002 was for a standalone drilling and production facility. However, that proposal was put on hold by BP pending further design and economic evaluation. In the fall of 2004 BP re-initiated permitting for Liberty with the signing of a Memorandum of Understanding for permit evaluation and the NEPA process.

Gwydyr Bay

Pioneer Natural Resources acquired several leases at the October 2003 State Lease Sale adjacent to and immediately north of the Prudhoe Bay Unit. Pioneer is evaluating development scenarios for relatively small hydrocarbon accumulations identified by several previously drilled exploration wells.

Oooguruk Unit

The Oooguruk Unit is located adjacent to and immediately northwest of the Kuparuk River Unit in shallow waters of the Beaufort Sea. The unit operator, Pioneer Natural Resources, is currently pursuing permitting of reservoirs encountered in exploration wells drilled in early 2002. An unmanned drillsite is planned for winter of 2006 approximately 4 miles offshore of the Colville River delta. Forty to 60 wells are planned to be drilled in 2007 from the Nuiqsut and Kuparuk Reservoirs. Development drilling will begin in 2007 with 40 to 60 drilled into the Nuiqsut and Kuparuk Reservoirs over a 3 year period.

Nikaitchuq Unit

The Nikaitchuq Unit is located at Spy Island, north of Oliktok Point and the Kuparuk River unit, and northwest of the Milne Point Unit. Operator Kerr-McGee Oil and Gas Corporation drilled exploratory wells from up to three locations on or immediately adjacent to Spy Island, 6.4 km (4 mi) north of Oliktok Point in 2004-2005. Kerr-McGee and their partner Armstrong are pursuing permitting of 20 wells from their onshore location and up to 50 wells off shore into the Schrader Bluff formation. . Production is expected to begin from the Oliktok Point Pad in May or June of 2006.

Potential Exploration Activities

Ataruq (Two Bits)

The Ataruq project is permitted for construction but not completely permitted for operation. This Kerr-McGee Oil and Gas Corporation project is located about 4.5 miles northwest of KRU Drill Site 2M. It includes a four mile gravel road and a single gravel pad with production facilities and up to 20 wells in secondary containment modules. The processed fluids will be transported to DS 2M via a pipe-in-a-pipe buried line within the access road. After drilling, the facility would be normally unmanned.

Nearshore Stratigraphic Test Well, Eastern Beaufort Sea

The State of Alaska awarded a contract to ASRC Energy Services to drill a stratigraphic test well at one of two potential locations in state waters offshore of the 1002 area of the Arctic National Wildlife Refuge (ANWR). One location is approximately 32.km (20 mi) southwest of Kaktovik near Anderson Point; the second is approximately 48 km (30 mi) southeast of Kaktovik near Angun Point. The locations are in water depths of 7.6–9 m (25-30 ft), and drilling operations will be conducted in winter utilizing the SDC, a mobile offshore drilling unit. Originally planned to take place during the 2004-2005 drilling season, no decision to move forward has yet been made.

Future Developments

State of Alaska Lease Sales

In 1996, the State of Alaska adopted an "areawide" approach to leasing. Under areawide leasing, the state annually offers all available state acreage not currently under lease within each area. North Slope Areawide Lease Sales are held annually in October. Five lease sales have been held to date. As of July, 2004, there are 777 active leases in this area, encompassing 971,267 hectares (2.4 million acres).

Beaufort Sea Areawide Lease Sales are held annually in October. Four lease sales have been held to date. As of July, 2004, there are 194 active leases in this area, encompassing 178,138 hectares (440,000 acres). The State of Alaska announced in July, 2004, that the October, 2004 sale will include acreage previously deferred from this sale area in state waters along the 1002 area of the Arctic National Wildlife Refuge (ANWR).

Northeast and Northwest Planning Area of NPRA

Two lease sales have been held in the northeast planning area of NPR-A. The 1999 lease sale sold 133 tracts, and the June 2002 sales sold 60 tracts. The June 2002 lease sale also awarded 123 tracts totaling 1,402,561 acres in the NW NPR-A. Total acreage awarded in the NE NPR-A, under these two lease sales, is 1.4 million acres. Seventeen exploratory wells have been drilled in the NE NPR-A to date.

The Record of Decision (ROD) for NPR-A Integrated Activity Plan/EIS was signed on January 22, 2004. The Northwest NPR-A Oil and Gas Lease Sale 2004 was held on June 2, 2004. High bids totaling $53,904,491 were received for 123 tracts covering approximately 567,609 hectares (1,402, 561 acres). All bids were accepted and 123 leases have been issued. Annual rentals for the leased tracts will be over $4 million.

On January 28, 2005, the BLM issued a FEIS for amendments to the northeast planning area, expanding the acreage available for leasing within this area. Under the adopted alternative all but approximately 86,200 hectares (213,000 acres) within the planning area will be made available for oil and gas leasing. The 86,200 hectares (213,000 acres) not available for leasing are located north of Teshekpuk Lake. The Record of Decision for this FEIS will likely be issued by the fourth quarter of 2005, thus the first lease sale could occur by the second quarter of 2006. Future lease sales would occur at 2 or 3-year intervals thereafter. Production from new leases issued from these sales is not projected to occur until 2018. A map of the area covered by the FEIS is attached.

OCS Lease Sales

In February, 2003, the Minerals Management Service issued the Final Environmental Impact Statement for three lease sales planned for the Beaufort Sea Planning Area in the outer continental shelf (OCS). Sale 186 was held in September, 2003, resulting in the leasing of 34 tracts. Sale 195 occurred March 30, 2005 where MMS offered 1,794 whole and partial blocks encompassing about 9.4 million acres. Sale 202 is scheduled for March, 2007. While the disposition of the leases purchased is highly speculative at this time, it is probable that at least some seismic exploration and possibly some exploratory drilling could take place during the five-year period of the proposed regulations.

The FEIS projected the first exploration well for Sale 186 will be drilled in 2004. However, no exploratory OCS drilling occurred in 2004. Therefore, it is reasonable to assume that the schedule of activities outlined in Table 4 will be delayed by at least one year for each activity.

Table 4. Representative OCS development schedule for MMS oil and gas lease Sales 186 and 195.

Year	Exploration Wells		Delineation Wells		Exploration Drilling Rigs	
	186	**195**	**186**	**195**	**186**	**195**
2004	1	-	-	-	1	-
2005	1	-	-	-	1	-
2006	1	-	2	-	2	-
2007	1	1	-	-	1	1
2008	1	1	2	-	2	1

Source: USDOI, MMS, Alaska OCS Region, (MMS 2002)

2. DATES AND DURATION AND REGION OF ACTIVITY

The dates and duration of such activity and the specific geographical region where it will occur.

Petitioner seeks incidental take regulations for a period of five years (2006 to 2011) commencing upon the 30 March, 2005 expiration date of the existing regulations covering the Alaskan North Slope. The geographic region of activity encompasses an area extending approximately from Icy Cape on the west to the Canning River on the east, and 40 km (25 mi) inland from the coast to approximately 64 km (40 mi) offshore including waters in the Chukchi and Beaufort Seas, and offshore of the Arctic National Wildlife Refuge (ANWR). This region includes all Alaska coastal areas on the North Slope (with the exception of the onshore in ANWR), state waters, and OCS waters east of Icy Cape to the Canadian border.

Activities to be conducted will occur on a year-round basis. Although the specific level of activity for the next five-year period cannot be fully known, anticipated operations have been outlined in the previous section. Activities over the next five-year period can be expected to involve continued operations in the existing, producing oilfields, in-fill drilling and maintenance activities to maximize production in the existing oilfields, seismic activities to determine the presence of new hydrocarbon deposits (both onshore and offshore), exploratory drilling both onshore and offshore to verify hydrocarbon accumulations, development of additional oilfields following exploratory activity, and cleanup activities from decommissioning, abandonment and closeout of exploration and/or production facilities.

The locations of these activities are assumed, for the purpose of this petition, to be approximately equally divided among the onshore and offshore tracts presently under lease and to be leased during the period under consideration. Remediation and closeout activities at abandoned exploratory well sites or production facilities could occur at up to 10 sites annually at various locations across the North Slope, where activities have been previously conducted.

Because of the large number of variables influencing exploration activity, any predictions of the exact dates and locations of the operations that will take place over the next five years would be highly speculative. The specific dates and durations of the individual operations and their geographic locations will, however, be set forth in detail when requests for Letters of Authorization (LOA) are submitted.

These data have been compiled from information supplied by AOGA Member Companies. These projections are also intended to encompass activities to be undertaken by companies not participating in this petition.

3(A). SPECIES, NUMBERS, AND TYPE OF TAKE

Based upon the best available scientific information: an estimate of the species and numbers of marine mammals likely to be taken by age, sex, and reproductive conditions, and the type of taking (e.g. disturbance by sound, injury or death resulting from collision, etc.) and the number of times such taking is likely to occur.

Walruses are extra-limital in the Beaufort Sea, and although individuals are occasionally seen in the Beaufort Sea, they do not occur in significant numbers east of Point Barrow (Sease and Chapman 1988, Fay 1982)). If walruses are observed, they would only be present from about May through September when the Beaufort Sea is not ice-covered . Polar bears occur within the proposed region of oil and gas activities described in this petition. They may occur during summer in coastal areas of the Alaskan North Slope; however, they typically prefer areas of offshore pack ice (Stirling 1988; Amstrup 1995). In late summer and fall, polar bears also occur in coastal areas near subsistence whaling activities. During the ice-covered season (October through April), polar bears occur throughout coastal and offshore areas of the Alaskan Beaufort Sea, including the land-fast ice (Amstrup 1995). Detailed descriptions of walrus and polar bear distribution and movement patterns are included in Section 3B. This section discusses the type and frequency of take that may occur for each species.

The MMPA defines "take" to mean "harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." (16 U.S.C. § 1362 [13]). AOGA anticipates all takes to be non-lethal, incidental takes by harassment (Level B). While AOGA does not anticipate any injury to or mortality of any marine mammal during the proposed activities, there is a slight possibility of a lethal take occurring. If a fatality or injury should occur, it would be incidental, accidental and non-intentional. Considerable effort will be made to avoid encounters that would risk either human or marine mammal lives. Takes, as defined by the MMPA, could result from encounters with humans, aircraft, ships and other vehicles, noise and vibration disturbances, contact with accidental oil spills or other wastes. A detailed discussion of noise and vibration activities is presented in Section 3C.

Pacific Walrus (*Odobenus rosmarus divergens*)

The Pacific walrus population is concentrated in the Bering and Chukchi Sea with small numbers present in the Beaufort Sea during the open water season, and none are present during the ice-covered season. Oil and gas exploration and production activities do have the potential to disturb small numbers of walruses during the open-water season in the region of activity. Any impact is anticipated to result from disturbance by noise, vessel traffic and contact with accidental releases of oil or waste products. No walruses have been injured or encountered by industry activities on the North Slope, and there have been no lethal takes to date. Any takes are expected to be non-lethal, temporary, and have negligible impacts to the population. No unmitigable adverse impacts on the availability of walrus for subsistence purposes are expected.

Noise Disturbance by Oil & Gas Activities

Small numbers of walruses could be potentially exposed to and subsequently disturbed by noise generated by oil and gas exploration, development, and production activities. The response of walruses to sound sources may be either avoidance or tolerance. Based on the known walrus distribution, it is unlikely that any walruses would be disturbed by stationary sources, such as the Northstar or Endicott production facilities. At most, only a few individual walruses might be impacted by such disturbance. In the Chukchi Sea area where walrus numbers are greater; the potential to disturb walruses during the open water season will be greater. There have been a total of seven walrus sightings in the Beaufort Sea by industry workers within recent years, with three of the walrus sightings occurring in 2004 in the Northstar Unit (USFWS Sighting Reports).

Noise produced by routine vessel traffic could potentially disturb walruses. However, walrus densities are highest along the edge of the pack ice (Sease and Chapman (1988), and vessel traffic typically avoids these areas by operating in the open water. The reactions of walruses to vessel traffic are highly dependent on distance, vessel speed, and possibly smell (Richardson et al. 1995; Fay et al. 1984), as well as previous exposure to hunting (D.G. Roseneau, in Malme et al. 1989). Walruses in water appear to be less readily disturbed by vessels than walruses hauled out on land or ice (Fay et al. 1984). Thus, vessel activities are likely to impact at most a few walruses. In addition, barges and vessels associated with the oil and gas activities described here will typically avoid travel near large ice floes or land where walruses are found whenever possible. Vessel noise from oil and gas activities is expected to have only a negligible short-term impact on individuals and no impact on the walrus population.

Icebreakers could unintentionally impact walruses at farther distances than routine vessel traffic (Fay et al. 1984). Walruses on ice have been observed to become alert and dive into the water when icebreakers passed over 2 km (1.2 mi) away (Fay et al. 1984; Brueggeman et al. 1990; 1991; 1992). In addition, Brueggeman et al. (1990) suggest that walruses on ice floes may avoid icebreakers by 10 to 15 km (6.2 to 9.3 mi). The low density of walruses in the Beaufort Sea suggests that icebreakers would have at most a negligible impact on the walrus population.

Aircraft overflights may disturb walruses. However, most aircraft traffic is in nearshore areas, where there are typically few to no walruses. Reactions to aircraft vary with range, aircraft type, and flight pattern, as well as walrus age, sex, and group size. Adult females, calves, and immature walruses tend to be more sensitive to aircraft disturbance (Loughrey 1959; Salter 1979). Due to the low density and distribution of walruses in the proposed region of activity, any impact caused by aircraft traffic is expected to be limited to few individuals, if any, and have at most a negligible impact on the population.

Open-water seismic exploration produces underwater sounds, typically with air-gun arrays that may be audible tens of kilometers from the source (Richardson et al. 1995). Such exploration activities could potentially disturb walruses at varying ranges. Recent open-water exploration has been conducted in nearshore ice-free areas covered by this petition and has not encountered any walruses. It is highly unlikely that walruses will be present in these areas; and therefore, seismic exploration would have no more than a negligible impact on the population.

Contact with Oil or Waste Products

The effects of oil on walruses are summarized in Section 3(C). The impacts associated with an oil spill would depend on the location, size of the spill, environmental conditions, and success of clean up measures. The impacts of a major oil spill are not considered here. The possibility of a major oil spill is considered when determining whether or not a permit is issued for construction and operation of production facilities. When the permits are issued, the assumption is that the probability of a major spill is small. However, a small spill of a few gallons of oil or other petroleum products is possible during oil and gas exploration and production activities in the Alaskan Beaufort. Such a spill could result from normal day-to-day operations, e.g. an accidental release during refueling or a leak from a vehicle. Due to current standard operating procedures during refueling, spill response vessels are typically stationed in close proximity to respond immediately to any such oil spill.

If a small spill occurred at production facilities or by vessel traffic, walruses would not likely encounter the oil. Little or no contamination of benthic food organisms and bottom feeding habitats of walrus, bearded seals, and gray whales would be expected to occur, because little oil would be likely to reach offshore feeding areas. If a take did occur, it is very unlikely to be a lethal take because of the small amount of oil that would likely be involved. Thus, small oil spills would have a negligible short-term impact on individual walruses and no long-term impact on the walrus population.

Summary of Take Estimate for Oil and Gas Activities

Since walruses are typically not found or found in very small numbers in the region of oil and gas exploration described in the petition, the probability is low that the discussed activities, such as offshore drilling operations, seismic, and coastal activities, will affect walruses. Walruses observed in the region have typically been lone individuals, further reducing the number of potential takes expected. There were no walrus sightings during marine mammal monitoring of open-water seismic exploration activities in the Prudhoe Bay area in 1997-2001 (Harris et al 1997, 1998; Moulton and Lawson 2001; 2002). The reported subsistence harvest of walruses for Barrow for the 5-year period of 1994-1998 was

99 walruses (USDOI 2000a). In addition, between 1988 and 1998, Kaktovik harvested only one walrus (USDOI 2000b). Based on the available fisheries observer data, the estimated mortality rate incidental to commercial fisheries in Alaska is approximately 1.2 walrus per year; which is incidental to the average annual harvest levels in Alaska and Chukotka at 5,789 animals per year (USFWS Stock Report, 2002).

In light of this information and the low probability that the proposed activities will impact walruses, AOGA conservatively estimates no more than a small number of walruses will be taken during the five-year period of the proposed regulations. These takes would be unintentional and most likely non-lethal. Overall, the takes would have a negligible impact on individual walruses and no impact on the walrus population; it would have no unmitigable impact on the availability of walruses to subsistence hunters.

Polar Bear *(Ursus maritimus)*

Polar bears distribution is closely linked to the seasonal movement pattern of sea ice, which supports their primary prey, ringed seals (Amstrup and DeMaster, 1988). During the open-water season, polar bears generally prefer areas of heavy offshore pack ice (Stirling 1988; Amstrup 1995). Polar bears occasionally occur along coastlines throughout the year, and also occasionally in areas of landfast ice during the ice-covered season. Female polar bears sometimes den at terrestrial sites along the mainland coast and barrier islands in Alaska (Gardner et al. 1998; Amstrup 2000). Since the late 1980s, polar bears have been observed in greater numbers near coastal areas during late summer and fall in the central Beaufort Sea (Schliebe et al. 2001). This recent observation of bear behavior may be related to the 30-year moratorium on polar bear hunting and the recent success of subsistence whale harvests resulting in a reliable, annual food source that bears are consistently using (Schliebe et al. 2001). Thus, production facilities or industrial activities that are either offshore or along the coastline are most likely to encounter polar bears from fall to spring when ice is in the region of activity.

Open-Water Season

Noise Disturbance

Noise produced by oil and gas exploration, development, and production activities during the open-water season is unlikely to result in takes of polar bears [see Section 3(C) for a detailed description of noise]. During unusual years, pack ice could move into the area of activity and small numbers of polar bears could be potentially noise disturbance resulting in a take. Noise disturbance can originate from either stationary or moving sources. Stationary sources include coastal production facilities, or production facilities located either on offshore oil platforms, or on man-made or artificial islands. Moving sources include vessel and aircraft traffic, open-water seismic exploration, geotechnical surveys, drilling, dredging, and ice-breaking vessels. It is unlikely that any of these activities will impact more than a few polar bears. Any impacts caused by these activities are expected to have short term, temporary impacts on the individual and no impact on the population.

<u>Production Facilities</u>

Noise produced by production facilities 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 production facilities could result in a human/bear encounter, which could result in unintentional harassment, lethal take, or intentional hazing (under separate permit) of the bear.

Most bears seen near production facilities are casual visitors, and only a small fraction of those observed closely approach the facilities. There is no evidence that noise associated with production facilities displaces polar bears; in fact, bears commonly approached industrial sites in the Canadian

Beaufort Sea (Stirling 1988). In addition, small numbers of polar bears temporarily occur in Endicott and West Dock in Prudhoe Bay each year, where garbage and other attractants are carefully managed to discourage bears presence. A few bears will approach production facilities and people, particularly on artificial or natural islands. Based on past experiences, it is likely that no lethal takes will occur from polar bear encounters with humans at production facilities. However, the chance of a lethal take under exceptional circumstances is a possibility. Any disturbances resulting from human/bear encounters at production facilities would most likely be in the form of harassment.

Vessel Traffic

Vessel traffic, including ice-breaking, appears to have little impact on polar bears (Fay et al. 1984). Some bears walk, run, or swim away, but these reactions are brief and local, and other bears show no reaction or approach the vessels (Brueggeman et al. 1991). Vessel traffic could cause short-term behavioral disturbance only. During the open-water season, most polar bears remain offshore in the pack ice and are typically not present in the area of vessel traffic. Therefore, few if any bears should be disturbed by these activities. Moreover, vessels will change course to avoid disturbing bears whenever possible.

Aircraft Traffic

Repeated or extensive aircraft overflights could result in short-term behavioral disturbances to bears. However, reactions will vary among individuals and are not likely to be more than temporary and short-term to the individual. Pursuit or low-level over-flights will not occur by regularly scheduled or chartered air traffic. In addition, all pilots will be instructed to avoid flying over bears or otherwise making close approaches unless authorized to do so.

Seismic Exploration

It is highly unlikely that open-water seismic exploration activities or other geophysical surveys would cause more than temporary behavioral disturbance to polar bears. Polar bears normally swim with their heads above the surface, where underwater noises are weak or undetectable (Richardson et al. 1995). Although polar bears are typically far offshore in the pack ice during summer and fall, open-water seismic exploration activities have encountered small numbers of polar bears in the central Beaufort Sea in late summer or more likely in the late fall as freeze up begins and the pack ice move nearshore.

Contact with Oil or Waste Products

The effects of oil and other production wastes on polar bears are summarized in Section 3(C). Spills of petroleum products associated with production facilities are likely to be small (a few gallons or less) and would be cleaned up immediately. However, the development of offshore production facilities has increased the potential for large offshore oil spills. Anderson et al. (1999) modeled a large oil spill (3,600 barrels) for the Northstar production facility for the August and October period, months when an oil spill at Northstar would most likely impact polar bears. Normal weather conditions for the August spill scenario (open-water season) indicated that within eight hours of stopping the leak, only scattered thin sheens would be expected on the water surface; at least 25% of the oil was expected to evaporate, and the remainder would naturally disperse into the water column or on shore. This suggests that the oil would be dispersed in the water and not concentrated, possibly reducing the impact to marine mammals, such as polar bears.

Small amounts of oil or production wastes spilled around production facilities could be ingested by polar bears or could contact polar bear fur. The amount of oil or production wastes would be small. The effects of fouling the fur or of ingesting oil could be short term (i.e. the bear might regurgitate ingested oil); however, it is possible that some bears may ingest waste substances, which could result in death. Such incidents should be prevented by current management practices, which require the proper use, storage or disposal of hazardous materials. Only one such incident has occurred throughout the history of oil and gas exploration on the North Slope of Alaska (Amstrup et al. 1989). During the five-year period of these regulations, none to a few polar bears may be taken by non-lethal contact with oil or other chemicals. It is possible, but unlikely, that none to a few bears could be lethally taken by contact with oil or other chemicals. These takes would have a negligible impact on the polar bear population. In the event of an oil spill, it is also likely that polar bears would be deliberately hazed (under separate authority) to move them away from the area, and thus further reduce the likelihood of a lethal take.

Ice-covered Season

Noise and Vibration Disturbance

Noise and vibrations produced by oil and gas exploration and production activities during the ice-covered season could potentially impact polar bears (see Section 3C for a detailed description of noise). During this time of year, denning female bears as well as mobile, non-denning bears could be exposed and affected differently to potential impacts from oil and gas activities.

Production Facilities

Island production facilities are currently located within the landfast ice zone. Typically, polar bears use the active ice zone to hunt. Some non-denning polar bears occur in the landfast ice zone, near the nearshore production islands. During this time of year, the potential for human/bear encounters can increase; however, polar bear interaction plans and employee training reduce the number of encounters and the need for deliberately harassing bears. Bear interactions at production facilities should be limited to takes by disturbance or harassment of a few individuals and these takes would have no long-term impacts on individual bears and at most a negligible impact on the population.

During the ice-covered season, noise and vibration from production facilities may deter females from denning in the surrounding area. Polar bears have been known to den in close proximity to industrial activities. In 1991, two maternity dens were located on the south shore of a barrier island within 2.8 km (1.7 mi) of a production facility (Amstrup 1993). One bear was followed after abandoning her den in the spring, and her cubs were known to have survived for at least six months. Recently, female polar bears have denned close to industrial activities on Flaxman Island. During the ice-covered seasons of 2000-2001 and 2001-2002 active, known dens were located within approximately 0.4 km and 0.8 km (0.25 mi and 0.5 mi) of remediation activities without any observed impact to the polar bears (MacGillivray et. al. 2003)

Vibroseis

Polar bears could potentially be encountered during vibroseis programs. Noises and vibrations produced by vibroseis activities could potentially attract or disturb non-denning bears. Most takes during seismic exploration would be by disturbance or displacement. However, it is possible that bears may be attracted to mobile seismic camps. Human/bear encounters at these camps could result in harassment, and very rarely, fatalities of bears in defense of human life.

Vibroseis activities could disturb a limited number of denning females at close distances. Maternal den sites are located primarily in two areas: 1) land (including offshore barrier islands) and nearshore landfast ice, and 2) offshore pack ice (Amstrup 2000). Females in dens and with cubs are more likely to be disturbed than other sex and age groups of bears and the survival of cubs that prematurely emerge from dens due to natural disturbances is poor (Amstrup and Gardner 1994). Although Amstrup (1993) noted that 2 female polar bears prematurely abandoned their dens after vibroseis activities occurred nearby, no cause-and-effect relationship related to industrial activities could be proven and the bears may have naturally abandoned their dens due to unrelated reasons. Alternately, numerous bears in

Amstrup's (1993) study tolerated disturbances due to vibroseis activities near dens, which suggest tolerance to activities near dens probably varied with individuals. In addition, Blix and Lentfer (1992) measured noise and vibration levels of seismic and petroleum-related activities received in artificial polar bear dens. They found that snow suppressed most noise and vibrations. They also noted that only industry activity within 100 m from the den produced noise in the dens above background level.

While a few takes due to vibroseis could occur during the 5-year period governed by the proposed regulations, most takes would be by disturbance and would have no long-term impact on individual bears or the polar bear population. If a female bear and her cubs prematurely left a den because of disturbance, this may have short- to medium-term impacts on the cubs. Cubs that leave their dens prematurely may be physically stressed and have lower survival rates, occasionally causing death of a cub. The rare loss of a cub should have only negligible impacts on the population. Mitigation measures designed to further reduce the likelihood of takes are discussed in Section 6.

<u>Other On-Ice Activities</u>

Noise and vibration produced by additional on-ice activities could potentially cause disturbances of polar bears. These activities include: ice-road construction and associated vehicle traffic, geotechnical activities, and exploratory drilling. These activities could potentially result in temporary behavioral reactions in non-denning polar bears. In addition, bears could be attracted to these activities out of curiosity, which could lead to a human/bear encounter.

Noise and vibration produced by these activities could also potentially disturb denning females, causing them to abandon their dens. However, proper mitigation measures (see Section 6) can minimize such impacts. Overall, these activities should cause no more than small numbers of takes of polar bears by disturbance, and these takes should have no more than a negligible impact on the population. Lethal takes, while possible under exceptional circumstances, will be minimized through implementation of proper mitigation measures (Section 6).

<u>Aircraft Traffic</u>

Routine aircraft traffic should have little to no affect on polar bears. However, extensive or repeated overflights of fixed-wing aircraft or helicopters 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 polar bear populations. Mitigation measures are routinely implemented to reduce the likelihood of aircraft disturbing bears (Section 6). Amstrup (1993) reported that most bears in show dens continue to occupy their dens after close approaches by helicopters and other aircraft, since snow greatly attenuates the noise. Noise and vibrations produced by extensive aircraft overflights, however, could disturb denning bears, potentially causing them to abandon their dens or depart their dens prematurely. Cubs that leave their dens prematurely may be physically stressed and have lower survival rates, with the result being the occasional death of a cub. However, reactions among individuals will vary, and some individuals may not be affected.

Contact with Oil or Waste Products

The extent of the impact of an oil spill on the polar bear population depends on the location and size of the spill, environmental conditions, and the success of clean-up measures. Spills associated with winter exploration operations are typically small (1-50 barrels), and are cleaned up immediately. It is possible that non-denning bears could encounter small amounts of oil or other production wastes. Fouling of fur and ingestion of oil are unlikely to have long-term impacts on individual polar bears. However, there is the possibility that ingestion of certain wastes or oil could be hazardous and result in death. The nature of on-ice spills allows for effective and prompt cleanup, and therefore few if any bears would be affected by such an event. No impacts from small spills would occur to denning bears.

As additional offshore oil drilling occurs, the potential for large spills increases. Anderson et al. (1999) also modeled a 3,600-barrel oil spill at Northstar during October (transition to the ice-covered season). Weather conditions for the October spill scenario were within the normal range for the broken ice season. Anderson et al. (1999) concluded that during October, ice floes and growing ice strongly influence the behavior of oil. Ice dampens wave action, therefore suppressing natural dispersion of oil through the water column, and half the oil released might coat the undersides of floes drifting over the leak point. This oil would become entrapped in ice floes and reappear during spring melt. However, due to the relatively solitary nature of polar bears, few individuals would be impacted even by large oil spills, and such an event should have no more than a negligible impact on the polar bear population. It is also likely that oil spill response activities (and direct intentional hazing under a separate permit) would deter polar bears from closely approaching a spill site.

Abandonment and Rehabilitation

Impacts of abandonment and rehabilitation activities are expected to be similar to those for construction. Aircraft flights could disturb non-denning polar bears in winter. In spring or summer denning polar bears could be disturbed, and mortality caused to cubs abandoned or introduced to the inclement weather prematurely by activities within a mile of their dens if these dens were not detected and avoided as required by operating procedures. However, studies indicate that bears normally do not abandon dens exposed to aircraft noise (Amstrup 1995).

Summary of Take Estimate

Noise and vibration produced by oil and gas exploration, development, and production activities, as well as accidental oil spills or spill of other hazardous wastes and the resulting clean-up operations could potentially disturb polar bears. These disturbances are expected to be primarily short-term and temporary behavioral reactions, and should have no more than a negligible impact on the population. Although the effects of oil and gas industry activities over the past 30 years on polar bears have been minimal, noise and vibration are theorized to have the following effects on polar bears:

- Polar bears could be displaced from the immediate area of activity due to noise and vibrations.
- Polar bears could be attracted to sources of noise and vibrations out of curiosity, which could result in human/bear encounters.
- Denning females with cubs could prematurely abandon their dens due to noise and vibrations produced by certain industrial activities at close distances.
- Noise and vibration from stationary sources could keep females from denning in the vicinity of the source.

Contact with, or ingestion of oil could also potentially affect polar bears. Small oil spills are cleaned up immediately and should have little opportunity to affect polar bears. The probability of a large spill occurring is very small. However, if such a spill were to occur at an offshore oil facility, polar bears could come into contact with oil. The impact of a large spill would depend on the location and size of the spill, environmental factors, and the success of clean-up measures. Due to the low probability of a large spill combined with the solitary behavior and dispersed distribution of polar bears, AOGA does not expect any or no more than a few takes of polar bears due to contact with or ingestion of oil during the five-year period of the proposed regulations. The possibility of unintentional lethal takes is very low; however, if lethal takes do occur, they are expected to have a negligible impact on the population. Alternative actions would be used to avoid or discourage lethal takes including direct intentional hazing conducted under a separate permit.

Current waste and fluid management practices mitigate the possibility of polar bears coming into contact with these materials. Therefore, contacts with wastes and fluids are not expected to impact the polar bear population.

AOGA conservatively estimates that no more than a small number of polar bears will be taken during the five-year period of the proposed regulations. These takes would be unintentional and non-lethal. However, it is possible that a few unintentional lethal takes could occur under low probability circumstances. For example, a scenario of an unintentional lethal take could be a road accident where a vehicle strikes and kills a polar bear. Overall, takes would have no more than a negligible impact on the polar bear population and no unmitigable impact on their availability to subsistence hunters.

3(B). STATUS, DISTRUBUTION AND SEASONAL DISTRIBUTION OF AFFECTED SPECIES OR STOCKS OF MARINE MAMMALS

A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks likely to be affected by such activities.

The following species under the jurisdiction of the USFWS can be expected in the region of proposed activity: Pacific walrus and polar bear. These two species are discussed in this section and are the species for which general regulations governing incidental takes of small numbers of marine mammals are sought.

Pacific Walrus (*Odobenus rosmarus divergens*)

Population Status

Pacific walruses are found throughout Arctic waters, typically associated with the offshore pack ice (Dyke et al. 1999). The Pacific walrus stock is found throughout the northern Bering and Chukchi seas, and is not considered a "strategic stock." Limited numbers of walruses inhabit the Beaufort Sea during the open-water season but walruses are considered extralimital east of Point Barrow (Fay 1982).

Estimates of the pre-exploitation population of the Pacific walrus range from 200,000-400,000 animals (USDOC 2000a). Over the past 150 years, the population has been depleted by over-harvesting and then periodically allowed to recover (Fay et al. 1989). The Pacific walrus population was estimated at 201,000 animals in 1990, which was reported by Hills and Gilbert (1994). The most current minimum population estimate is 188,316 walruses (USDOC 2000a). This estimate is conservative, because a portion of the Chukchi Sea was not surveyed due to lack of ice. While the current population status unknown, there is no published information to suggest a major shift in the population size.

Distribution and Seasonal Migration

The Pacific walrus inhabits the moving pack ice over the shallow waters of the continental shelf of the Bering and Chukchi Seas. They have been known to travel east to the southern coast of Banks Island, Northwest Territories (Harington 1968), and northwest to the most northwest coast of Wrangel Island (Nikulin 1941). They are rare in the Alaskan Beaufort Sea east of Barrow. Walruses migrate north and south following the annual advance and retreat of the pack ice. (Figure 6)

Pacific walruses use 26 major haul out sites in Russia and five on the west coast of Alaska (Gilbert 1999). Of the five haul out sites used in Alaska, males mainly occupy Round Island and Cape Pierce during the summer (Hill 1992; Jefferson et al. 1993), the Punuk Islands are only used in late autumn (Fay and Kelly 1980), males use Cape Seniavin in the spring and autumn (Frost et al. 1982), and St. Matthew Island is seldom used. There are no known haulout sites from Pt. Barrow to Demarcation Point on the Beaufort Sea coast

The migration pattern of the Pacific walrus is not completely known. During winter, large concentrations of walruses occur south of the Bering Strait and southwest of St. Lawrence Island near the ice edge. Smaller concentrations occur east of the Pribilof Islands and southwest of Cape Navarin along the Koryak coast. Fay (1982) suggested those adult females, their young, and a few adult males winter in the center of the pack ice while juveniles and sub-adults occupy the periphery. These animals follow the retreating ice in spring and summer, and as a result congregated between Barrow, Alaska and Wrangel Island in the Chukchi Sea. Walrus sightings in the Beaufort Sea have consisted solely of widely scattered individuals and small groups. While walruses have certainly been encountered and are present in the Beaufort Sea, there were only five sightings of walruses between 146° and 150°W during Minerals Management Service (MMS) and LGL aerial surveys conducted from 1979 to 1995 (LGL and Greeneridge 1996).

Feeding Ecology

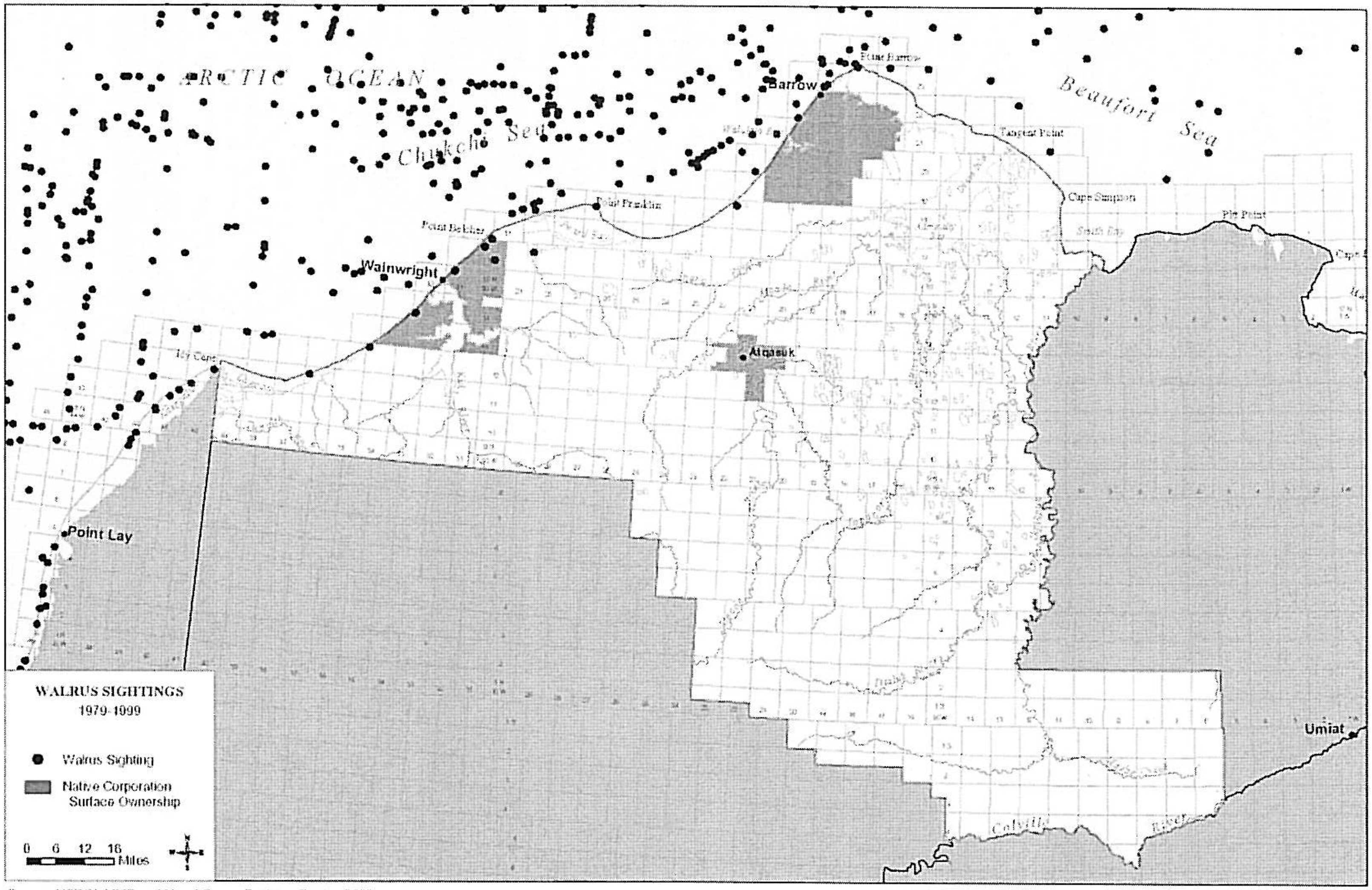
The Pacific walrus mainly feeds on bivalve mollusks obtained from bottom sediments along the shallow continental shelf, typically at depths of 80 m (262 ft) or less (Fay 1982) (Figure 7). Walruses feed on a variety of benthic invertebrates, such as: worms, snails, shrimp, and some slow-moving fish (Jefferson et al. 1993). However, some walruses have been reported to feed on seals and small whales (Jefferson et al. 1993), and even on seabirds (Gjertz 1990). They mainly feed between June and November when the young are growing and adult females are accumulating fat stores for the breeding season (Fay 1982).

Hauling out on moving ice provides significant advantages for foraging walruses, including proximity to varying food supplies, and relative freedom from disturbance when resting (Fay 1974). Since the walrus feeds on benthic invertebrates, which are slow to reproduce, this continually moving ice facilitates their feeding over a larger area without much effort.

Reproduction

Male walruses reach sexual maturity between 8-10 years, but usually do not breed until age 15 (Fay 1985). Females reach sexual maturity around 6 to 8 years of age (Fay 1985).

Mating usually occurs between January and March. Implantation is delayed until June or July (Fay 1982). Gestation lasts 11 months (a total of 15 months after mating) and birth occurs between April and June during the annual northward migration. Calves weigh about 63 kg (139 lb) at birth and are usually weaned by age two (Fay 1982). Females give birth to one calf every two or more years (Fay 1982). This reproductive rate is much lower than other pinnipeds; however, some walruses may live to age 35 – 40 and remain reproductively active until age 26 (Fay 1982; Born 2001).



Source: USDOI, MMS and Naval Ocean Systems Center, 2002

Figure 6. Walrus Sightings Onshore and Offshore of NW NPR-A (1979-1988).

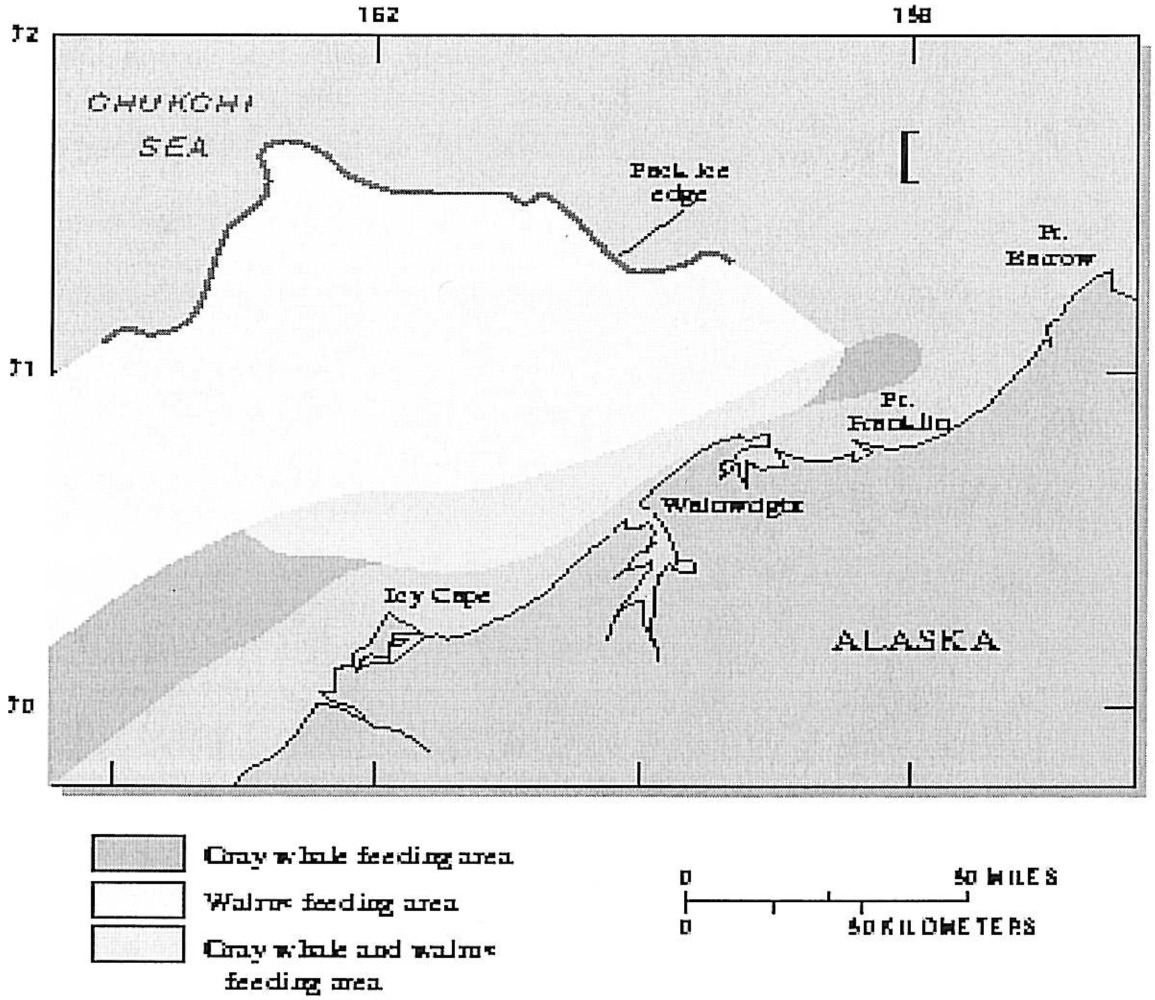


Figure 7. Areas of the northeast Chukchi Sea containing gray whale feeding pits and walrus feeding furrows.

Source: USGS 1996 fact sheet.

Polar Bear (*Ursus maritimus*)

Population Status

Polar bears have a circumpolar distribution throughout the northern hemisphere (Amstrup et al. 1986) and occur in relatively low densities throughout most ice-covered areas (DeMaster and Stirling 1981). Polar bears are divided into six major populations and many sub-populations based on mark-and-recapture studies (Lentfer 1983), radio telemetry studies (Amstrup and Gardner 1994), and morphometrics (Manning 1971; Wilson 1976). Polar bears found in or around Alaska belong to either the Beaufort Sea (northern Alaska), or Chukchi/Bering Seas populations.

Current world population estimates for the polar bear range from approximately 20,000 to 30,000 bears (Deroucher et al. 1998). Amstrup (1995) estimated the minimum population of polar bears for the Beaufort Sea to be approximately 1,800 individuals. There is little reliable data on the population status of polar bears in the Bering/Chukchi Sea; an original estimate was derived by subtracting the total estimated Alaska polar bear population from the Beaufort Sea population, thus yielding an estimate of 1,200-3,200 animals (Amstrup 1995). In August 2000, a line transect survey was conducted in the eastern Chukchi Sea and western Beaufort to estimate polar bear density and to assess the logistical feasibility of using ship based aerial surveys to develop polar bear population estimates. The density of bears was estimated as 1 bear per 147 km^2 (Evans et.al. 2003). Additional aerial surveys in late fall, using dedicated icebreakers, would be required to achieve the number of sightings, survey effort, coverage, and precision needed for more effective monitoring of population trends in the Chukchi Sea.

Since neither Alaskan population is threatened, and only minimal subsistence harvesting occurs, both populations are thought to be stable or increasing slightly (USDOC 2000b,c). Polar bear populations located in the Southern Beaufort Sea have been estimated to have an annual growth rate of 2.2% – 2.4% with an annual harvest of only 1.9% (Amstrup 1995). Currently, neither stock is listed as "depleted" under the MMPA, or as "threatened" or "endangered" under the ESA (USDOC 2000b,c). Polar bear populations are protected under the Marine Mammal Protection Act of 1972, as well as by the IACPB, ratified in 1976. Countries participating in the latter treaty include: Canada, Denmark, Norway, Russia (former USSR), and the USA. Article II of the agreement states, "Each contracting party …shall manage polar bear populations in accordance with sound conservation practices based on the best scientific data."

Distribution and Movement

Polar bears occur throughout most of the ice covered arctic regions. They have been known to travel as far south as the Pribilof Islands and as far north as approximately 13 nautical miles (89° 46.5" N) from the Geographic North Pole (van Meurs and Splettstoesser 2003). The two most important factors influencing polar bear distribution in Alaska are sea ice and food availability. Polar bears migrate south with the advance and north with the retreat of sea ice each fall/winter and spring/summer, respectively. Seasonal distribution of polar bears is largely restricted by the southern edge of the pack ice. During winter, polar bears concentrate along the northern coastline for denning and feeding (Amstrup and Gardner 1994); then they retreat with the ice during the summer.

In recent years, polar bears have consistently arrived at Cross and Barter islands in late August. These two islands are the main bowhead whaling centers during the autumn hunts conducted by the communities of Nuiqsut and Kaktovik. Polar bears arrive one to two weeks ahead of the hunt and remain near these sites for several weeks to a month or more and scavenge the remains of whale carcasses harvested by subsistence whalers. In 2000, a 3-year USFWS study sponsored by BP was initiated to determine the polar bear distribution associated with the Beaufort Sea coastal environment during fall, which included the coastline and barrier islands from Harrison Bay to Barter Island. Single counts along the coastline near Kaktovik have documented at least 33 bears (and probably many more) present at one time (Schliebe et al. 2001).

The Southern Beaufort Sea population ranges from the Baillie Islands, Canada, in the east to Point Hope, Alaska, in the west. The Bering/Chukchi Sea population ranges from Point Barrow, Alaska in the east to the Eastern Siberian Sea in the west (Figure 8). These two populations overlap between Point Hope and Point Barrow, Alaska, centered near Point Lay (Amstrup 1995). Both of these populations have been extensively studied by tracking the movement of tagged females (Gardner et al. 1990). Radio-tracking studies indicate significant movement within populations, and occasional movement between populations (Gardner et al. 1990; Amstrup 1995). For example, a female polar bear within sight of the Prudhoe Bay oilfields was captured, fitted with a satellite-tracking collar, and her movements monitored for 576 days. She traveled north and then south to Greenland, traversing approximately 7,162 km (4,450 mi) in 576 days (Durner and Amstrup 1995).

A recent study tracked female polar bears to determine seasonal movements and use of sea ice habitat in the Beaufort Sea. Polar bears tended toward relatively shallow regions with ice concentrations less than 90%, and composed of ice floes 2-10 km (6,564 – 32,820 ft) in diameter during spring (Durner et al., 2004). Prey densities are highest in the shallow regions and this is where the proportion of multiyear ice is low (Kingsley et al., 1985, Stirling et al. 1982). Selection for large ice flows was also observed in the Canadian high Arctic during spring (Ferguson et al., 2000).

Surveys of polar bear locations during summer found 75% of the bears in waters 355 m (1,165 ft) deep or deeper, even though this is outside the area of greatest prey abundance (Stirling et al. 1977, Stirling et al. 1982, Hardwood and Stirling 1992, Gjertz et al. 2000). Minimum ice cover and low prey availability, in deeper water , resulted in a tendency for polar bears to decrease their activity to their lowest level of movements and to conserve energy (Armstrup et al., 2000, Ferguson et al. 2001).

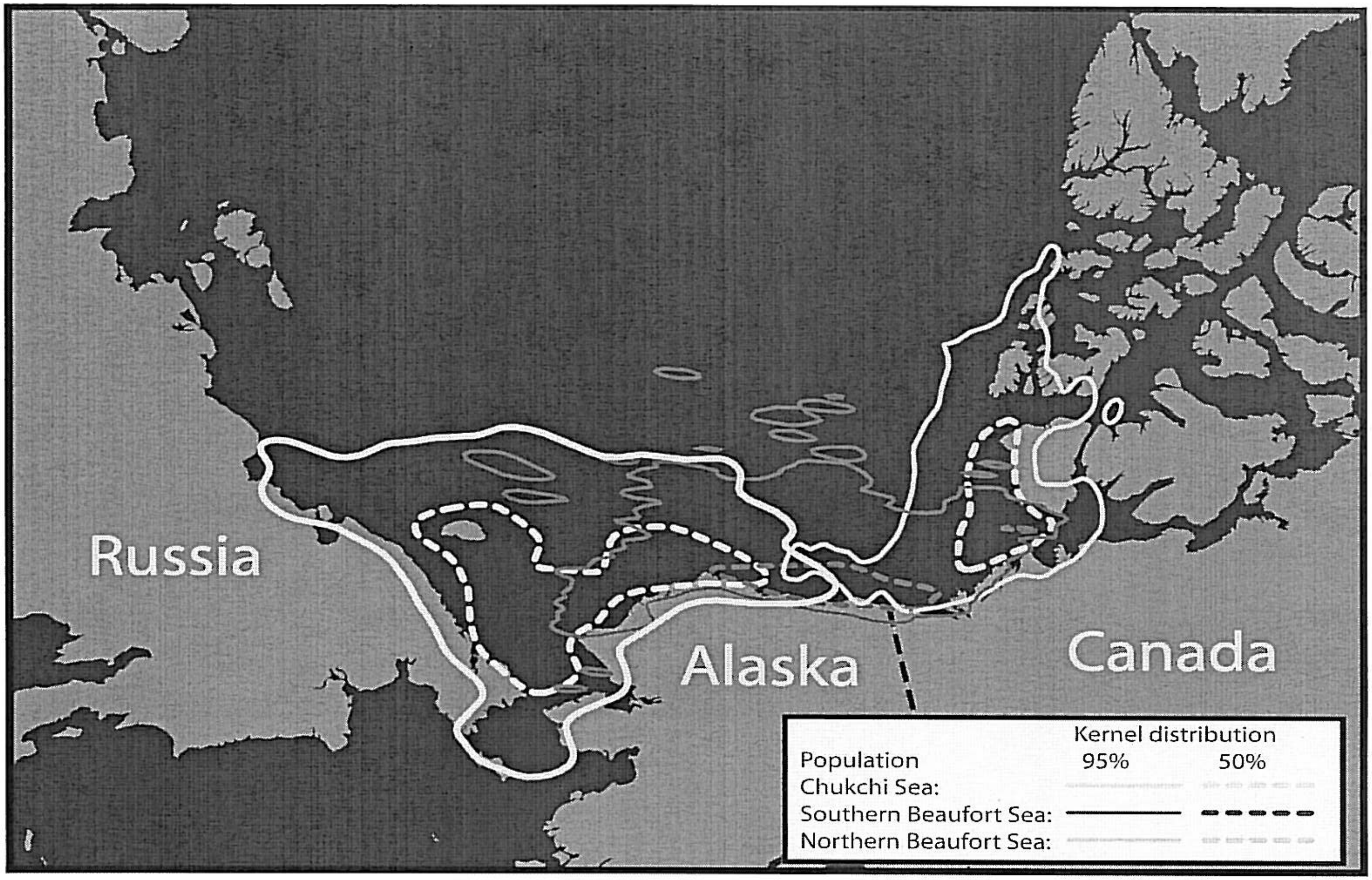
During autumn, polar bears returned to areas of shallow depths (less than 189 m), high ice concentration and close to an ice interface (Durner et al., 2004). This is consistent with field observations of polar bears near Prudhoe Bay (Durner, pers. Obs.) and in two regions in Canada (Ferguson et al., 2000). Shallow areas with high ice concentrations and within a distance of less than 20 km to a polygon edge have high probability of polar bear use (Durner et al., 2004).

Winter habitat use is also relative to water depth and similar to that observed in the other seasons. Seventy-five percent of bear observations in winter occurred in waters less than 130 m (427 ft) deep (Durner et al., 2004). Formation of fast ice off shore and parallel to coastlines (Smith and Rigby 1981) create leads and openings used by seals, their primary prey. Hence accessibility of prey is highest there and polar bears respond by selecting active ice (Ferguson et al., 2001).

The models used in the study may help predict the seasonal distribution of polar bears in the Beaufort Sea, which may allow managers to extrapolate how many polar bears might be affected by environmental changes (Durner et al., 2004).

Feeding Ecology

Polar bears usually forage in areas where there are high concentrations of ringed seals (*Phoca hispida*) and bearded seals (*Erignathus barbatus*; Larsen 1985; Stirling and McEwan 1975). This includes areas of land-fast ice, as well as moving pack ice. Polar bears are opportunistic feeders and feed on a variety of foods and carcasses including beluga whales, arctic cod, geese and their eggs, walruses, bowhead whales, and reindeer (Smith 1985; Jefferson et al. 1993; Smith and Hill 1996; Derocher et al.



Intensity of use or boundary contours (50% and 95%) for 3 polar bear populations occupying the Beaufort Sea region. Populations were identified by clustering satellite radiotelemetry locations and applying a 2-D kernel smoother to identify population boundary contours. Source: USGS, ASC. See: Amstrup, S.C., T.L. McDonald, and G.M. Durner. 2004. Using satellite radiotelemetry data to delineate and manage wildlife populations. Wildlife Society Bulletin 32(3): 661-679.

Figure 8: Alaskan Polar Bear Distribution

2000). Lunn and Stenhouse (1985) report possible cannibalism among polar bears. Scat and various other samples collected by Derocher et al. (1993a) indicate that some polar bears feed on terrestrial vegetation during the ice-free period in Hudson Bay.

Polar bears' main preys are ringed seals but they also take bearded seals. They often consume only the blubber of seals, and abandon the remaining meat and carcass, which is then consumed by other animals (Stirling and McEwan 1975). Ringed seal blubber contains most of the energy conten: 67% for yearlings and 75% for adults (Stirling and McEwan 1975). Data from Øritsland et al. (1981) and Hurst et al. (1982), suggest that an entire one-year-old seal would provide the energy requirements of a polar bear for 3.7 days, while the blubber alone would provide energy requirements for 2.7 days (Stirling and McEwan 1975).

In recent years, significant numbers of polar bears in northern Alaska have begun to arrive near sites where subsistence hunters haul out harvested bowhead whales. Bears feed on the discarded bowhead carcasses, which may provide a substantial proportion of their annual energy requirements.

Adult males often displace young adults and females from their kills (Stirling and McEwan 1975). Polar bears hunt along pressure ridges in the fast ice and often break into seal birth lairs to take newborn pups (Stirling and Archibald 1977; Furgal et al. 1996).

Reproduction

Females give birth to 1 to 3 cubs an average of every 3.6 years (Jefferson et al. 1993; Lentfer et al. 1980). Cubs remain with their mothers for 1.4 to 3.4 years (Derocher et al. 1993b; Ramsay and Stirling 1988). Mating occurs from April to June followed by a delayed implantation during September to December. Females give birth usually the following December or January (Harington 1968; Jefferson et al. 1993). In general, females 6 years of age or older successfully wean more young than younger bears; however, females as young as 4 years old can produce offspring (Ramsay and Stirling 1988). An examination of reproductive rates of polar bears indicated that only 5% of four-year-old females had cubs, whereas 50% of five year-old females had cubs (Ramsay and Stirling 1988). Females that were over 20 years had a very high rate of cub loss or did not successfully reproduce. The maximum reproductive age reported for Alaskan polar bears is 18 years (Amstrup and DeMaster 1988).

Denning

Female polar bears usually enter maternity dens from late October through early November. These dens are excavated in accumulations of snow on land in coastal areas, on stable parts of offshore pack ice, or on land-fast ice (Figure 9). In a study of 90 radio-collared female polar bears conducted from 1981 to 1991 in the Beaufort Sea, 48 (53%) of the dens were located on pack ice, 38 (42%) were on land, and 4 (4%) were on land-fast ice (Amstrup and Gardner 1994).

In the central Beaufort Sea, Amstrup and Gardner (1994) found that polar bear dens were concentrated near or north of the Beaufort Sea coastline in eastern Alaska and the Yukon Territory. In the eastern Beaufort Sea maternal dens occur on the coast of Banks Island, but less frequently along the mainland coast (Stirling and Andriashek 1992). In Alaska, the majority of suitable terrestrial denning habitat is located within the Arctic National Wildlife Refuge (ANWR; Amstrup and Gardner 1994; Amstrup 2000). Of 22 terrestrial dens examined on the coastal plain of northern Alaska, dens were located on or associated with pronounced landscapes (primarily coastal and river banks, but also a lake shore and an abandoned oil field gravel pad) that were readily distinguishable from the surrounding terrain in summer and catch snow in the early winter (Durner et al., 2003).

In the Beaufort and Chukchi Sea, polar bears den on the pack ice and on land (Amstrup and Gardner 1994). More than 80% of maternal dens found on land by radiotelemetry in the Alaskan

Beaufort Sea were within 10 km of the coast and over 60% are right on the coast or on coastal barrier islands (S.C. Amstrup, unpublished data). Amstrup and Gardner (1994) reported that during 1982 to 1991 a higher proportion of polar bears denned on the offshore pack ice (53%) than in terrestrial locations (47%). Pack ice is a mobile denning platform, and den sites can drift up to 1,000 km (621 mi) during winter (Amstrup 2000). Cub production between female bears using the two substrates was not significantly different (Amstrup and Gardner 1994). Of the 28 females that had dens on pack ice, 16 produced 26 cubs (0.93 cubs/den), whereas 21 of the 31 females that denned on land produced 33 cubs (1.1/cubs den; Amstrup and Gardner 1994).

Polar bear distribution is strongly tied to sea ice dynamics (Garner et al., 1990; Amstrup, 1995; Amstrup et al., 2000). Although polar bears in the Chukchi and southern Beaufort Seas generally move with the pack ice as it advances in winter and recedes in summer, the specific factors that determine their distribution, movement, and denning on the ice are not completely understood. Satellite telemetry from radio-collared females show a higher percentage of polar bears in the Chukchi Sea area den on sea ice than on land (Figure 9). Despite observed and hypothetical risks, production of cubs from dens at sea was not significantly different than that from dens on land (Amstrup and Gardner, 1994) and sea ice denning has obviously been maintained as a successful reproductive strategy in the Beaufort and Chukchi Sea area.

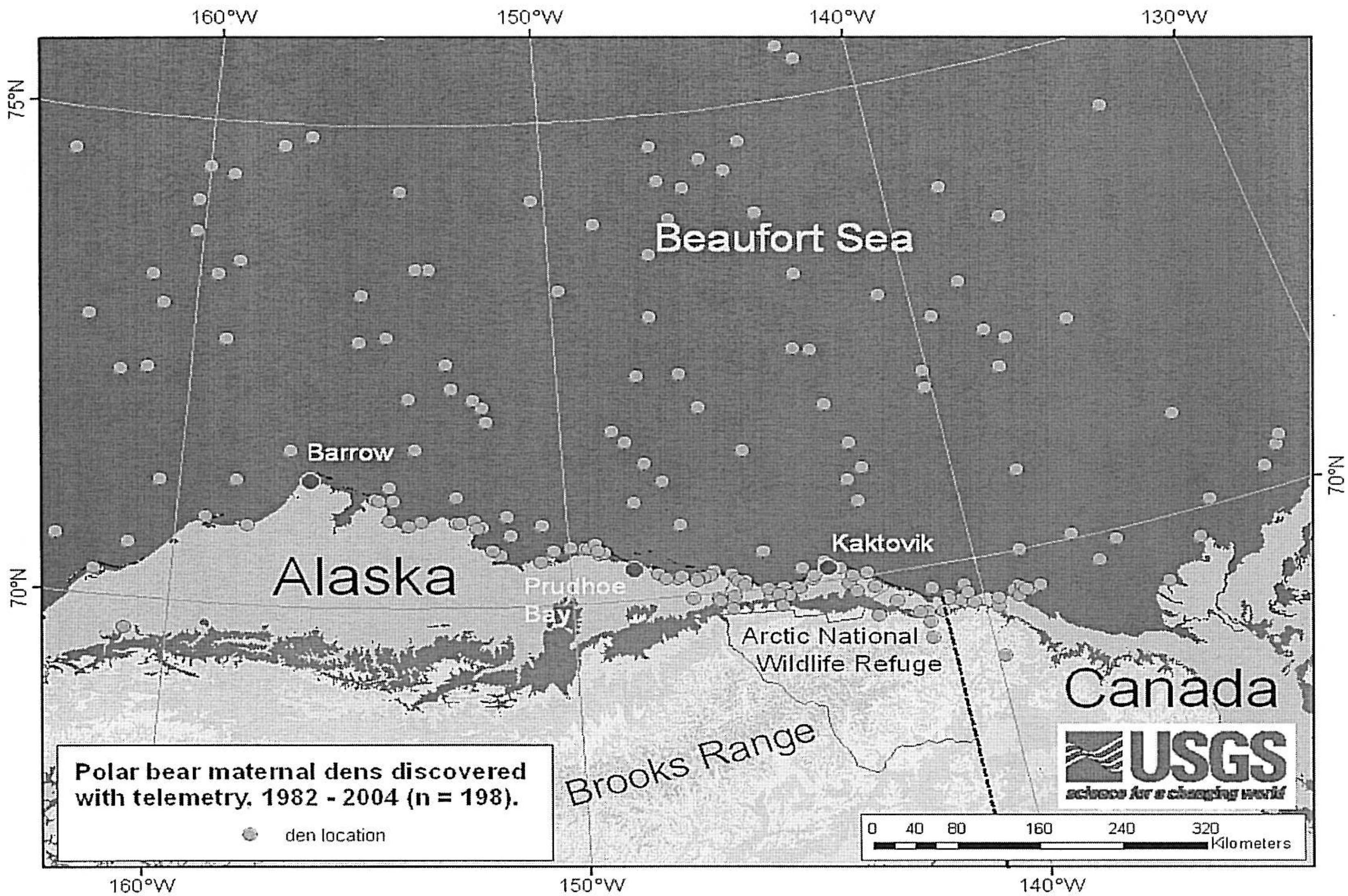


Figure 9: Alaskan Polar Bear Den Locations
Source: USGS 2005

3(C). ANTICIPATED IMPACT ON SPECIES OR STOCKS

The anticipated impact of the activity upon the species or stocks.

This petition directly addresses the polar bear and Pacific walrus, neither of which are listed as threatened or endangered under the ESA, but both of which are protected under the MMPA. It should be noted that February 16, 2005, the Center for Biological Diversity petitioned the USFWS to list the polar bear as threatened under the ESA due to the potential reduction in available sea ice due to global climate change. The USFWS Marine Mammal Division is currently responding to this petition, and the polar bear remains unlisted at this time. Oil and gas exploration, development, and production activities could potentially impact individuals of these species because of noise and vibrations, human/animal encounters, and contact with oil, fluids, or waste product contaminants. Polar bears and walruses are likely to occur only in small numbers near offshore oil exploration or production activities as well as shore-based production facilities. Therefore, AOGA anticipates the impacts to these populations will be no more than negligible. In addition, it is highly unlikely that these activities will have any long-term impacts on individuals based on the record of North Slope oil and gas industry interactions with polar bears during the past 30 years. However, it is possible, although extremely unlikely, that a few polar bear and/or walrus fatalities may occur due to industrial activities during the five-year period governed by the proposed regulations.

Noise

The effects of noise on marine mammals are highly variable (Richardson et al. 1995). They could range from: (1) the noise may have no effect because it is too weak to be heard by the animal; (2) the noise may be audible but not strong enough to elicit a behavioral response; (3) the noise may elicit a behavioral response; (4) The animal may become habituated to the noise if repeated; (5) the noise could be strong enough to mask the hearing ability of the marine mammal; and (6) the noise may be loud enough to cause temporary or permanent reduction in hearing sensitivity.

The way in which noise impacts marine mammals depends partly on the propagating characteristics of the noise, the propagation medium, environmental factors, and ambient noise levels. Noise and vibrations propagate differently through snow, ice, water, land, and air. No information exists regarding marine mammal responses to vibrations, man-made or otherwise.

Ambient Noise

Ambient noise is the background sound of physical and biological origin, excluding sounds from specific identifiable sources. Industrial noises are only distinguishable from sounds of other animals if they exceed the ambient noise levels at corresponding frequencies. Marine mammals are adapted to natural ambient noise in their environment. Therefore, ambient levels are important for understanding the natural environmental variation that influences an animal's ability to detect relevant mammal calls, man-made sounds, and other relevant sounds.

Underwater ambient noise sources include wind and waves, ice, and sounds of other marine mammals. In the arctic environment, wind has the greatest influence on the overall ambient noise levels, due to its effect on the ice and water. In addition, during spring bearded seal calls contribute significantly to ambient noise levels. Ambient noise in the Beaufort Sea has been recorded during periods with no industrial activities from Northstar and Sandpiper islands (Davis et al. 1985; Johnson et al. 1986). LGL and Greeneridge (1996) analyzed these data and calculated the percentile levels for broadband (20-1000 Hz) ambient noise during the open water season shown in Table 5. The median ambient noise levels for both islands were the same.

TABLE 5. Percentile broadband underwater ambient noise levels in dB re 1 µPa (20-1000 Hz).

Percentiles	Seal Island	Sandpiper Island
5%	84	87
50%	94	94
95%	111	113

Additional data on ambient underwater noise levels in the Prudhoe Bay area indicate a range in median broadband (20-1000 Hz) levels from 95 to 106 dB (LGL and Greeneridge 1996; Greene 1997; Greene 1998). Ambient noise levels recorded 11.1 km (6 n mi) from Northstar Island during the 2000 open-water season, were typically 90-110 dB re 1µPa (Greene et al. 2001); these levels were consistent with ambient noise levels expected for the region (Burgess and Greene 1999). Recordings were made during a wide range of environmental conditions, including storms. It is assumed that all marine mammals in this region, including both polar bears and walruses, are accustomed to similar levels of ambient underwater noise as those recorded at various locations in the nearshore Beaufort Sea area.

Ambient noise levels in the air over the Beaufort Sea are expected to be dominated by breaking of ice during the ice-covered and broken ice seasons and by breaking waves during the open water season.

Hearing Abilities of Walruses and Polar Bears

The hearing abilities of animals are dependent on the following (Richardson et al. 1995): (1) absolute hearing threshold (the level of sound barely audible in the absence of ambient noise), (2) critical ratio (the signal-to-noise ratio required to detect a tonal sound in the presence of background noise), (3) the ability to localize sound direction at the frequencies under consideration, and (4) the ability to discriminate among sounds of different frequencies and intensities.

There have been no studies specifically testing the hearing abilities of polar bears or walruses. However, underwater audiograms have been obtained for phocinid seals, such as ringed, harbor, and harp seals that may be similar to hearing abilities of walruses. Below 30-50 kHz, the hearing threshold of phocinids is essentially flat down to at least 1 kHz, and ranges between 60 and 85 dB re 1 µPa. Measurements for a harbor seal indicate that below 1 kHz, its thresholds deteriorate gradually to 96 dB re 1 µPa at 100 Hz (Kastak and Schusterman 1998). In-air hearing of phocinid seals is less sensitive than underwater hearing, and the upper frequency limit is lower (about 20 kHz). It is unknown if walruses have similar hearing abilities to phocinids, but it is thought that walrus hearing could be more sensitive to lower frequencies than other seals given the low frequency sounds produced by walruses (Schevill et al. 1966; Ray and Watkins 1975). Based on morphological studies of various seal species, Repenning (1972) suggested that walrus hearing is most similar to northern fur seals (*Callorhinus ursinus*). Northern fur seal underwater hearing is more sensitive than harbor seals (*Phoca vitulina*) below 16 kHz, and it drops off above 28 kHz with an upper limit of 40 kHz (Moore and Schusterman 1987).

Potential sources of noise disturbance

During the open-water season, there are a variety of sources, which produce noises that could potentially disturb both walruses and polar bears. These include production facilities, geotechnical and geophysical exploration, exploratory drilling, and vessel and aircraft traffic.

During the ice-covered season, polar bears could be disturbed by noise produced by the proposed oil and gas industry activities. Potential sources of noise disturbance during the ice-covered season include production facilities, ice road and ice pad construction, vibroseis, exploratory drilling, and on-ice vehicle and aircraft traffic.

Underwater Propagation

Water depth, bottom substrate, and water properties affect the way sound propagates underwater (Richardson et al. 1995). In deep water, variation in water properties with depth greatly influences sound propagation, whereas in shallow water, interactions with the surface and bottom have significant effects. The area impacted by man-made noise can vary greatly depending on these factors.

During the ice-covered season, received levels of sounds produced by the construction of Northstar Island were recorded and summarized by Blackwell and Greene (2001). Overall broadband (10-10,000 Hz) received levels for underwater sounds produced by the loudest activity (impact driving of 20" well conductor pipes and 42"well insulator pipes) were 155 dB re 1 μPa rms at a distance of 200 m (660 ft).

During the open-water season, operational sounds propagating from Northstar Island were recorded (Greene et al. 2001; Blackwell and Greene 2001). Peak overall broadband (10-10,000 Hz) received levels of underwater sound were 139 dB re 1μPa rms at 0.46 km (0.25 n mi).

In-Air Propagation

Sound originating from an airborne source propagates differently through the air than sound originating from a source on ice or land. For example, sound originating from an aircraft is affected by spherical spreading and by absorption of sound energy by air molecules (Richardson et al. 1995). Sound originating from a land- or ice-based source is affected by the ground (or ice), as well as by refraction caused by wind and temperature gradients. Weather variables, such as wind, can inversely influence sound propagation and received levels.

Airborne sounds were recorded during the 2001 open-water season at Northstar Island (Blackwell and Greene 2001). They found that overall broadband (10-8000 Hz) A-weighted levels of airborne sound from ongoing activities at Northstar ranged from 54 to 58 dBA re 20 μPa at a range of 0.46 km (0.25 n mi), and from 47 to 48 dBA re 20 μPa at 1.85 km (1 n mi). However, higher levels occurred during periods of increased activities, such as helicopter traffic. Some sounds were detectable as far as 3.7 km (2.0 n mi) away on calm days. Airborne sounds and vibrations from industrial activities were measured as they were received in artificial polar bear dens on Flaxman Island during February 2002. Measurements were taken as part of a study to determine potential impacts of petroleum-related activities to denning polar bears (LGL and Jasco unpubl. data).

Potential Impact on Pacific Walrus (*Odobenus rosmarus divergens*)

Oil and gas exploration, development, and production activities could impact Pacific walrus in the same way that these activities impact polar bears. Walruses occur in low numbers in the Beaufort Sea and even lower numbers in coastal and nearshore areas where most exploration and production activities occur during the open-water season. Hence, impacts are expected to be no more than negligible to the walrus population.

Noise Disturbance

Reactions of pinnipeds and other marine mammals to noise sources, particularly mobile sources, such as marine vessels, vary. Reactions depend on the individual's prior exposure to the disturbance source and their need or desire to be in the particular habitat or area where they are exposed to the noise and visual presence of the disturbance sources. Walruses are typically more sensitive to disturbance when hauled out on land or ice than when they are in the water. In addition, females and young are generally more sensitive to disturbance than adult males (Salter 1979; Richardson et al. 1995).

Stationary Sources

It is highly improbable that the noise from stationary sources would impact many walruses. Currently, Endicott, the saltwater treatment plant, and Northstar are the only offshore facilities that could potentially produce noise that could disturb walruses. However, walruses are rare in the vicinity of these facilities. Future offshore production facilities will cumulatively produce more noise and could increase the potential to disturb walruses, but any reactions to the low source levels produced are expected to be short-term and highly localized. Any impacts should be negligible to individuals and there should be no impacts on the walrus population.

Mobile Sources

Open-water seismic exploration produces underwater sounds, typically with airgun arrays that may be audible tens of kilometers from the source (Richardson et al. 1995). Such exploration activities could potentially disturb walruses at varying ranges. With pinnipeds, hearing damage could occur if near the source of the sound levels. It is likely that walrus hearing and sensitivities are similar to pinnipeds at close range, and therefore, it is possible that walruses within the 190 dB re 1 μPa safety radius of seismic activities could suffer temporary hearing affects, however, the use of acoustic safety radii and monitoring programs are designed to ensure that marine mammals are not exposed to potentially harmful noise levels. Previous open-water seismic exploration has been conducted in nearshore ice-free areas. It is highly unlikely that walruses will be present in these areas, and therefore, it is not expected that seismic exploration would disturb many walruses or have more than a negligible impact on the population.

Vessel Traffic

Noise produced by routine vessel traffic could potentially impact walruses. However, walrus densities are highest along the edge of the pack ice, and vessels typically avoid these areas. The reactions of walruses to vessel traffic are highly dependent on distance, ship speed, and possibly smell (Fay et al. 1984; Richardson et al. 1995), as well as previous exposure to hunting (D.G. Roseneau, in Malme et al. 1989). Furthermore, walruses in water appear to be less readily disturbed by vessels than walruses hauled out on land or ice (Fay et al. 1984). Fay (1981) also reported on the reactions of walruses swimming in open water to vessels and to vessel noise. Walruses in the water, in contrast to those on ice, showed little concern about an approaching vessel unless the ship was actually about to run over them. Even then, they simply dove and swam away. Fay observed that when a ship was stationary, walruses often swam to within 20 m (66 ft). Frequently, they dove under the ship and emerged on the other side.

Boat traffic could temporarily interrupt the movement of walruses, or displace some animals when the vessels pass through the area. However, this displacement would probably be short-term and would last no more than a few hours at most. Vessel traffic should typically cause no more than a short-term impact on individuals and no impact on the walrus population.

Icebreakers could potentially disturb walruses at farther distances than routine vessel traffic (Fay et al. 1984). Walruses on ice have been observed to become alert and dive into the water when icebreakers passed over 2 km (1.2 mi) away (Fay et al. 1984; Brueggeman et al. 1990; 1991; 1992). In addition, Brueggeman et al. (1990) have suggested that walruses on ice floes may avoid icebreakers by 10 to 15 km (6.2 to 9.3 mi).

Aircraft Traffic

Aircraft overflights could impact walruses hauled out on land and ice, and less so in the water. However, most aircraft traffic is in nearshore areas of the Beaufort Sea, where there are typically few to no walruses. Reactions to aircraft vary with range, aircraft type, and flight pattern, as well as walrus age, sex, and group size (Salter 1979). Adult females, calves, and immature walruses tend to be more sensitive to aircraft disturbance (Loughrey 1959; Salter 1979). Aircraft flights directly over walruses hauled out on land or ice may cause stampedes, which have been known to cause death of calves (Johnson et al. 1989; Ovsyanikov et al. 1994). However, Salter (1979) observed that even after severe disturbances, walruses hauled out on land returned within 9 hours. Due to the low density and distribution of walruses in the proposed region of activity, aircraft traffic is expected to impact only a few walruses and have no impact on the population.

Accidental Oil Spills

An accidental oil spill in the nearshore or offshore waters of the Alaskan Beaufort Sea could impact individual walruses during the open-water season. The probability that small spills from vessel and operational activities in the Beaufort Sea would impact walruses is low. During the open-water period, oil could drift offshore and encounter walruses. During the ice-covered period, spilled oil would be incorporated into the thickening sea ice. During spring melt, the oil will then travel to the surface of the ice, via brine channels (Wadhams 2000), where it can be collected by spill response activities. Very few walruses are found in the Beaufort Sea east of Pt. Barrow and low to moderate numbers are found along the pack-ice edge northwest of Prudhoe Bay. Thus, the probability of walruses encountering oil, from an oil spill from production activities, is low and the impact to the population is expected to be negligible.

Actual Impacts on Pacific walrus

The actual impact to Pacific walruses in the central Beaufort Sea from oil and gas activities has been minimal. During a 5-year marine mammal monitoring program (1993-1997) in the Beaufort Sea and the adjacent northern coast only two Pacific walrus were encountered. Both were sighted in 1996 during an open-water seismic program (USFWS 1998). Neither walrus sighting involved a take as defined by the MMPA.

Potential Impact on Polar Bears (*Ursus maritimus*)

Oil and gas exploration and production activities could impact polar bears in various ways. Some of these impacts could result from the following: (1) noise from stationary operations, construction activities, vehicle traffic, vessel traffic, aircraft traffic, and geophysical and geological exploration activities; (2) physical obstruction, such as a seawater treatment plant, a causeway, or an artificial island; (3) human/animal encounters; and (4) accidental oil spills or contact with hazardous materials or production wastes. Polar bears typically occur in low numbers in coastal and nearshore areas, particularly during most of the open water season, where most exploration and production activities occur. Hence, a small number of bears could be temporarily affected by these activities but impacts to the population are expected to be no more than negligible.

Noise Disturbance

Noise caused by oil and gas exploration and production activities should have only short-term behavioral impacts on individual polar bears, and no impacts on the population. Female polar bears with cubs, especially in dens, are thought to be more sensitive than other age and sex groups to noises. It is assumed that polar bears, like most animals would avoid sources of extremely loud noises. They commonly approach industrial sites (Stirling 1988) and ships (Fay et al. 1986).

Stationary Sources

Stationary sources of airborne noise include construction, maintenance, repair, and remediation activities, operations at production facilities, flaring excess gas, and drilling operations. These activities could disturb polar bears near the noise sources; however, polar bears have approached to within 100 m (328 ft) of some of these noise sources in the Canadian Beaufort Sea during winter (Stirling 1988), and in late fall and early winter small number of bears are observed regularly within the production infra-structure of Prudhoe Bay and the satellite oilfields (USFWS unpubl. data). Offshore production islands, such as the Northstar production facility, could potentially attract polar bears. Such offshore facilities could potentially increase the rate of human/bear encounters, which could result in the harassment or fatality of a bear. Employee training and company policies have been effective at reducing and avoiding such encounters (see Section 6).

Mobile Sources

On-ice seismic exploration may have various effects on polar bears. Although the reaction of bears to human disturbance is highly variable, denning female polar bears with nursing cubs typically are most sensitive to human disturbance. A female bear fitted with a satellite collar was monitored during on-ice vibroseis exploration in 1998 (Amstrup and Gardner 1989). The female and her two cubs remained in their den when vibroseis operations passed within 1 km (0.6 mi) of the den. While this bear left her den early during the season, it was not possible to correlate her early departure with these activities. However, after leaving the den, the female moved a short distance to the southeast, which might indicate some avoidance of the exploration activities (Amstrup and Gardner 1989). Blix and Lentfer (1992) studied the propagation of sounds and vibrations from various human activities into artificial bear dens. They concluded that only seismic testing activities less than 100 m (328 ft) from a den produced noise significantly louder than ambient levels inside the den. .

Although very unlikely, it is possible on-ice vehicle traffic from seismic exploration could physically run-over an unidentified polar bear den. Most dens around the oilfield are located and monitored by USFWS. The oil and gas industry communicates with the USFWS to determine the location of activities relative to known dens. However, there is the possibility that an undocumented den may be encountered during exploration activities. If an undocumented den is identified, communication between industry and the USFWS combined with the implementation of mitigation measures will minimize disturbance.

Vessel Traffic

Vessel traffic, including ice-breaking, appears to have little impact on polar bears (Brueggeman et al. 1991, Fay et al. 1984). Fay et al. (1986) stated that, "Some of the bears in the Chukchi Sea are notoriously unconcerned by ships and tend to occur in some numbers in the vicinity of the shipping lanes." Also, Stirling (1988) noted that: "At every site where wildlife sightings were recorded, polar bears approached drillships or artificial islands." During seismic exploration, shallow hazards surveys, and other vessel-based work supporting the oil and gas industry, a few polar bears are regularly encountered during summer with little or no interaction (Coltrane 2001). It is unlikely that polar bears would threaten the safety of humans aboard a moving vessel. Under most circumstances, vessels avoid close contact with polar bears. Therefore, although vessel traffic could have short-term behavioral impacts on individual polar bears, it should have no impact on the population.

Vehicle and Aircraft Traffic

It is widely reported that polar bears typically run away for a brief period when an aircraft approaches at low altitude, but when subjected to similar noise levels from stationary sources bears usually do not run away (Amstrup 1993). Amstrup (1993) recorded responses of four denned polar bears to aircraft disturbance. Reactions among bears varied from momentarily fleeing the den site, to fleeing and then wandering extensively to another den site, to no apparent immediate reaction. Other anecdotal information suggests the altitude, type of flight (i.e., single fly-by or repeated overflights), and previous experience with aircraft overflights may cause different behavioral responses by polar bears. Generally, bears are more likely to react to a low-flying aircraft than one at high altitude and one that flies directly over the bear than one that is far to the side. However, polar bears on islands near the Kaktovik airport during late August to late September often do not respond to overflights at 30-60 m (100-200 ft) by a variety of different types of landing aircraft (W. Koski, LGL Limited pers. comm.). These bears have apparently become habituated to frequent overflights not been directed at them. In other circumstances, single low-level overflights may elicit a moderate to severe response by a polar bear (Moulton and Williams 2000), and repeated overflights usually cause bears to flee the area. Industry policy (See Section 6) prohibits low altitude overflights of polar bears except during the permitted research activities.

Extended exertion resulting from helicopter overflights could potentially result in gastric dilatation and volvulus or other stress-related conditions in bears (Amstrup and Nielsen 1989). In extreme situations these conditions could cause the death of bears (see following section on Human/Polar Bear Encounters). It is unlikely that bears would run for extended periods from vehicles, such as trucks, snow machines, tracked vehicles, etc., because they are generally quieter than aircraft and move much slower;; however, bears may avoid areas where there is vehicular traffic. Amstrup (1993) observed that sometimes bears emerge or abandon dens on ice or shorelines when on-ice traffic passes within a few hundred meters, while other bears continue to occupy dens when wheeled or tracked vehicles pass – sometimes repeatedly- with in a few hundred meters. Overall, vehicle and aircraft traffic, seismic exploration, and other industrial support activities may temporarily affect bears in the vicinity, but should have no more than a negligible impact on the population.

Physical Obstructions

There is little chance that production facilities would act as physical barriers to polar bear movements. Most facilities are located onshore where polar bears are found infrequently. The offshore production facilities, causeways and coastal facilities are most likely to be approached by polar bears. The Endicott Causeway and West Dock facilities have the greatest potential to interfere with polar bear movements because they extend continuously from the coastline to the offshore facility. However, polar bears have little or no fear of man-made structures (Stirling 1988) and can easily climb and cross gravel roads and causeways, and bears have frequently been observed crossing existing roads and causeways in the Prudhoe Bay oilfields. Offshore production facilities, such as the Northstar Development, may be approached by polar bears, but due to their layout (i.e., continuous sheet pile walls around the perimeter) the bears have limited access to the facility itself. This situation may present a small scale, local obstruction to the bears' movement, but also minimizes the likelihood of a harmful encounter for the bear at the facility.

Human/Polar Bear Encounters

Encounters with humans can cause harassment or (rarely) death of polar bears. Unlike most mammals, polar bears typically do not fear humans and are extremely curious. Consequently, polar bear encounters sometimes culminate in a bear being killed to protect human life (Stenhouse et al. 1988; Stirling 1988). A study looking at polar bear/human encounters in the Canadian Northwest Territories found most of the bears were subadult males (Stenhouse et al. 1988). Polar bears are most likely to encounter humans during the ice-covered season, when both humans and bears are on the land-fast ice and adjacent coastline. For example, in 1990, a polar bear was killed at the Stinson well location on the west side of Camden Bay. Precautions were taken to avoid such a bear/person encounter, including both helicopter and on ice surveillance prior to the incident. A warning shot was fired with the female stalking bear less than 20 ft away. This did not deter the bear and it had to be destroyed to protect human life. Another incident that was not related to the oil and gas industry occurred in 1993, when a polar bear was killed when it entered the Oliktok Distant Early Warning line station and attacked a person in the building (North Slope Borough 1993). This attack demonstrates the potential for such encounters if proper bear awareness is not implemented. Polar bears can also come in contact with humans along the coast or on islands, particularly near locations where subsistence whalers haul bowhead whales on shore to butcher them.

Encounters with humans could indirectly cause physiological impacts, potentially resulting in bear deaths. In June 1987, a large adult male polar bear was found dead on a barrier island north of Prudhoe Bay. The cause of death was determined to be gastric dilatation-volvulus (GVD; Amstrup and Nielsen 1989). GVD is typically caused by excessive eating or drinking followed by excessive exertion, which results in a sudden venous return from the stomach and spleen (Orton and Muir 1983) leading to severe local edema. The usual outcomes include systemic shock and rapid death. Polar bears may be particularly susceptible to GVD due to their large body size, deep chest, and large stomach, as well as their disposition to periodic gorging on food and water (Amstrup and Nielsen 1989). If a polar bear/human encounter causes the hazing and subsequent fleeing of the bear, it is possible the bear may become susceptible to GVD. Therefore, rare anthropogenic disturbances could cause GVD or other stress related conditions that could impact the health of individual polar bears.

The development of future offshore production facilities could potentially increase polar bear/human encounters. In addition, if bears encounter these facilities more frequently, they may habituate to them and remain around them for longer periods of time than currently. Employee training programs are designed to educate field personnel about the dangers of bear encounters and to implement safety procedures in the event of a bear sighting. Personnel are instructed to leave an area where bears are seen. If it is not possible to leave, in most cases bears can be frightened away using pyrotechnics or aircraft. However, if human life is threatened and the above efforts are not successful, a lethal self-defense take may be necessary. The numbers of bears frightened away from production facilities are expected to be low and the resulting impact are expected to be short-term and to have no more than a negligible impact on polar bear populations.

Accidental Oil Spills

The accidental discharge of oil into the environment could potentially impact polar bears. Operational spills may occur during transfer of fuel, refueling, handling of lubricants and liquid products, and general maintenance of equipment. These spills are projected to be small in quantity, commonly involving <1 to 50 barrels of spilled oil per incident. Furthermore, fueling crews are trained to handle operational spills. Thus, such spills will not pose a significant threat to polar bears. Production related spills could occur at any production facility or pipeline connecting wells to the TAPS.

Effects of Oil on Polar Bears

Polar bears may be impacted by external contact with oil and/or ingestion of oil. Polar bears could contact spilled oil in the water, on ice, or on land. External contact with oil could foul fur, irritate skin and eyes, and cause severe inflammation of the nasal passages. Effects on experimentally oiled bears (where bears have been forced to remain in oil for prolonged periods of time) have included acute inflammation of the nasal passages, marked epidermal responses, anemia, anorexia, biochemical changes indicative of stress, renal impairment, and death (Engelhardt 1981; Øritsland et al. 1981). In experimental oiling, many effects did not become evident until several weeks after exposure to oil (Engelhardt 1981). It is possible that heavily oiled bears could die.

External Oiling

Oiling could cause significant thermoregulatory problems by reducing the insulation value of the pelt (Øritsland et al. 1981; Hurst and Øritsland 1982; Hurst et al. 1982). Polar bears rely on their fur as well as their layer of blubber for thermal insulation (Irving 1972; Frisch et al. 1974). Experiments on live polar bears and pelts showed thermal conductance of the fur increased significantly after oiling, and oiled bears showed increased metabolic rates and elevated skin temperatures (Irving 1972; Frisch et al. 1974). Irritation or damage to the skin by oil may further contribute to impaired thermoregulation. Furthermore, an oiled bear would probably ingest oil while grooming to restore the insulation value of the oiled fur (Øritsland et al. 1981). Derocher and Stirling (1991) observed a bear in Cape Churchill, Manitoba with lubricating oil matted into its fur on parts of its head, neck and shoulders. The bear was re-sighted two months later with substantial hair loss in the contaminated areas. Four years later, the bear was recaptured and no skin or hair damage was detectable, which suggests in some instances fur and skin damaged by oiling is only temporary.

Petroleum hydrocarbons can also be particularly irritating or destructive to eyes and mucous membranes, and repeated exposure could have detrimental consequences to polar bears. In studies by Geraci and Smith (1976), ringed seals quickly showed signs of eye irritation after being immersed in water covered by crude oil. This progressed to severe inflammation and corneal erosions during the 24-hour experiment. When the animals were returned to uncontaminated water, the eye condition resolved within 3-4 days. Geraci and Smith (1976) stated this reaction should be expected in any marine mammal, including polar bears.

Ingestion of Oil

Oil ingestion by polar bears through consumption of contaminated prey and by grooming or nursing could have pathological effects, depending on the amount of oil ingested and the individual's physiological state. Death would be likely if a large amount of oil were ingested or if volatile components of oil were aspirated into the lungs. Ingestion of sub-lethal amounts of oil can have various physiological effects on a polar bear, depending on whether the animal is able to excrete and/or detoxify the hydrocarbons.

The consumption of crude oil, particularly the lighter fractions, could be toxic to a wide variety of mammals (Coale 1947; Gerarde 1959; Narasimhan and Ganla 1967). Small doses, when inhaled, can cause acute fatal pneumonia. Larger quantities, as much as 140 times the aspirated dose (Gerarde 1964), can be tolerated if the oil remains in the gastrointestinal tract, but this too can be harmful. Petroleum hydrocarbons irritate or destroy epithelial cells lining the stomach and intestine, and thereby affect motility, digestion and absorption (Narasimhan and Ganla 1967; Anon. 1979; 1980a-d;).

In fish and mammals, ingested hydrocarbons are metabolized by liver enzyme systems and then excreted. These enzymes are present in all mammals (Gillette et al. 1972) and have been demonstrated in whale and dolphin species (Geraci and St. Aubin 1982). Concurrently, despite the activity of detoxifying enzymes, some fuel oil fractions are not readily removed by kidneys or liver, and accumulate in tissues, especially those with a high fat content. Hydrocarbon residues stored in blubber and fat generally would be of little consequence to the mammal, but can be released when fat stores are drawn upon during fasting or nursing.

Considerable specific information is available on the effects of ingested crude oil on polar bears (Engelhardt 1981; Øritsland et al. 1981). Experimentally oiled bears ingested much oil through grooming. Much of it was eliminated by vomiting and in the feces, but some was absorbed and later found in body fluids and tissues (Engelhardt 1981). Two of the three bears that were experimentally oiled died, and the third bear would have died if not for extensive veterinary care. The death was caused by failure of the kidneys (acute renal insufficiency) from oil ingestion. However, numerous other factors probably contributed to death. These other factors included suppression of lymphoid activity, failing liver function, a disorder in red blood cell formation, and ulcers in the gastrointestinal tract. Polar bears are curious animals and are attracted to new smells and unfamiliar objects. In October 1989, a sub-adult polar bear drank four liters of hydraulic oil in Churchill, Manitoba (Derocher and Stirling 1991). While the bear's fate is unknown, it is assumed to have died due to known pathological effects of ingesting crude oil (Øritsland et al. 1981). There is other anecdotal information that wild polar bears occasionally seek out and consume motor oil and grease (Engelhardt 1983 *in* Richardson et al. 1989).

Inhalation of Vapors

It is likely that polar bears swimming in or walking adjacent to an oil spill will inhale petroleum vapors. Numerous reports detail the effects of such substances on terrestrial mammals, and Geraci and St. Aubin (various studies) used this information to identify possible hazards to marine species.

Inhalation of highly concentrated vapors, such as gasoline in excess of 10,000 ppm, is typically fatal (Machle 1941). At lower concentrations, up to 1,000 ppm, humans and laboratory animals can develop inflammation, hemorrhaging and congestion of the lungs (Nau et al. 1966; Rector et al. 1966; Valpey et al. 1978). Yet such damage to the respiratory system is not consistently associated with exposure to vapors (Carpenter et al. 1975, 1976, 1978). The central nervous system also can be affected, with symptoms ranging from hallucinations (Tolan and Lingl 1964) to convulsions, coma and death (Machle 1941; Ainsworth 1960; Wang and Irons 1961).

Geraci and St. Aubin (1982) studied the effects of vapor concentration and duration of exposure on the type and severity of damage. The effects were graded into four broad categories: (a) death due to destruction of lung and nervous tissue, (b) disorders of the central nervous system, (c) irritation of mucous membranes, and (d) no effect. It was assumed the consequences of the given set of exposure conditions would be identical for marine mammals as they are for other mammals. In the natural setting, low molecular weight compounds dissipate within hours, leaving longer chain hydrocarbon fractions in individual concentrations of 20 ppm or less.

Øritsland et al. (1981) reported on the effects of vapor inhalation on polar bears. Their report indicated inhalation of hydrocarbons from unweathered crude oil in an confined space may have been a factor in the death of two of three polar bears exposed to oil in their experiments. Given the effects of diffusion, dispersion and winds on an open ocean spill, it is likely that harmful concentrations of vapors would rapidly dissipate and be short lived. Following an oil spill, most light hydrocarbons would evaporate within a few days to a week and inhalation would not seriously threaten individual polar bears or the population.

Indirect Effects of Oil on Polar Bears

The ringed seal is the polar bear's principal prey (Larsen 1985). A local reduction in ringed seal numbers from direct or indirect effects of oil could temporarily affect the local distribution of polar bears. A reduction in seal density caused by contact with spilled oil could cause polar bears to avoid using a particular hunting area. Also, seals dying from an oil spill could be scavenged by polar bears, thus increasing the bears' exposure to hydrocarbons. Seals, walruses, and beluga whales feed opportunistically over a broad area on a variety of available food organisms enabling them to move away from oiled areas to other areas of prey abundance. Breeding ringed seals remaining in local areas during the pupping season may be an exception, but any reduction in food organisms (Arctic cod and epibenthic crustaceans) would probably persist for no more than one season due to rapid recruitment of these food organisms (USDOI 1987).

Detection and Avoidance of Oil by Polar Bears

Polar bears have keen eyesight and an extremely well developed sense of smell. These attributes would seem to make a polar bear capable of detecting and avoiding oil. Some indication of their ability to detect unweathered crude oil can be gleaned from a laboratory study on three captive bears (Øritsland et al. 1981; St. Aubin 1990). The animals were coaxed individually along a passageway leading to a small pool containing 7,000 liters (1850 gallons) of seawater covered with a 1-cm (0.4 in) surface slick of unweathered crude oil. None of the bears entered the pool voluntarily, but all three investigated its oil-covered surface. As the bears stretched over the pool to reach seal blubber suspended inaccessibly from the top of the cage, the door was closed behind them, forcing them into the water. The bears made deliberate attempts to escape, and were able to do so to some extent by supporting themselves on the cage bars surrounding the pool; they continued attempting to grab the bait. When the cage door was opened after 15-50 minutes, the bears left the pool immediately. These brief observations make it clear that bears can detect oil and at least initially would not voluntarily enter oiled water. Once covered by oil, these bears showed no obvious aversion to it. They actively ingested oil during grooming.

In the event of an oil spill, it is likely that any polar bears approaching the oil spill area would be intentionally hazed by the emergency response personnel from the area to prevent serious injuries to the bear. Deliberate hazing and possible avoidance of the oil spill area by bears due to high levels of human activity and traffic should minimize the number of bears potentially exposed to spilled product.

Production Wastes and Other Hazardous Materials

Some hazardous substances are used during oil production activities. If spilled near a facility they would be hazardous to polar bears if ingested. They include well treatment fluids and hazardous chemicals. These substances, if spilled would most likely be spilled on land in areas where polar bears would be unlikely to encounter them. Furthermore if spilled in the water, the material would be diluted below concentrations fatal to bears if ingested. If spilled on land or ice oil and gas industry procedures require immediate clean up. In April 1988, a dead polar bear was found on Leavitt Island, approximately 9.3 km (5 n mi) northeast of Oliktok Point (Amstrup et al. 1989). The cause of death was from poisoning by a mixture of unknown origin that included ethylene glycol and Rhodamine B dye.

Actual Impacts on Polar Bears

Actual impacts on polar bears by the oil and gas industry during the past 30 years have been minimal. Polar bears have been encountered at or near coastal and offshore production facilities, or along roads and causeways linking these facilities to the mainland. Polar bears have been encountered near the seawater treatment plant at Oliktok Point, at West Dock, and at Endicott and Northstar Islands. During this time only 2 polar bear deaths have occurred from oil and gas activities. In winter 1968-1969, an industry employee on the Alaskan North Slope shot and killed a polar bear (Brooks et al. 1971) in defense of life. In 1990 a female polar bear was killed when it approached workers unloading rolligons at ARCO's Stinson (exploration) drill site on the west side of Camden Bay. To date, no polar bears have been killed due to encounters associated with current production and exploration activities in the North Slope area (from Northeast NPR-A to BP's Badami field) Alpine and Kuparuk are not part of Prudhoe

Bay area, and none in the last 15 years outside of these operations on the North Slope. It is likely that the implementation of bear avoidance procedures, environmental alerts, and employee training by the industry has helped raise the awareness of employees about the importance of bear avoidance to the safety of both personnel and the bears.

The majority of actual impacts resulted from direct human/bear encounters. During 2004, three Intentional Take Authorizations were issued to the oil and gas industry, the same as in 2003. These authorizations allow companies to legally deter polar bears from industry activities. The oil and gas industry reported 89 polar bear sightings involving 113 individual bears. Seventy four sightings were of single bears and 15 sightings consisted of family groups. Offshore oil facilities, Northstar and Endicott, accounted for 63% of all polar bear sightings, 42% and 21% respectively. Fifty-nine percent (n=53) of polar bear sightings consisted of observations of polar bears traveling through or resting near the monitored areas without a perceived reaction to human presence. Forty-one percent (n=36) of polar bear sightings involved Level B harassment, where bears were deterred from industrial areas. (Schliebe et al., 2005).

3(D). ANTICIPATED IMPACT ON SUBSISTENCE

The anticipated impact of the activity on the availability of the species or stocks for subsistence uses.

Subsistence Species Synopsis

Subsistence hunting is an integral way of life to rural, northern Alaska communities. The subsistence harvest provides food, clothing, and materials that are used to produce arts and crafts. Walrus meat is often consumed, and the ivory is used to manufacture traditional arts and crafts (USDOI 1990). Polar bears are primarily hunted for their fur, which is used to manufacture cold weather gear; however, their meat is also consumed (USDOI 1990). While a part of the annual subsistence harvest of most rural communities on the North Slope of Alaska, walruses and polar bears are not considered to be as significant of a food source to the local people compared to bowhead whales, seals, caribou, and fish..

Pacific Walrus (Odobenus rosmarus divergens)

The Pacific walrus has cultural and subsistence significance to native Alaskans, but is not considered a primary food source for North Slope residents. Walruses are harvested by a few Alaskan communities in the southern Beaufort Sea along the northern coast of Alaska, including Barrow, Nuiqsut, and (rarely) Kaktovik. Small numbers of walruses migrate through the area annually and are harvested seasonally (Braund et al. 1989). Current harvest estimates (including those killed in fisheries) do not exceed estimated recruitment levels (USDOC 2000a). The Pacific walrus population appears to be stable or even increasing (USDOC 2000a).

Polar Bear (Ursus maritimus)

Historically, polar bears have been killed for subsistence, handicrafts and recreation. Based on skins shipped from Alaska, an average of 120 polar bears were taken annually by natives between 1925 and 1953. Trophy hunting from aircraft was initiated in the 1950's, and as a result, the annual harvest rate by natives and sport hunters more than doubled to an average of 260 polar bears each year between 1961-1972 (Amstrup et al. 1986; Schliebe et al., 1995). The MMPA exempted only native Alaskans from the prohibition on taking and allowed a harvest of all marine mammals for subsistence purposes. After 1972, the annual subsistence harvest of polar bears ranged from 29-181 between 1973 and 1984 each year (Amstrup et al. 1986). Over the past decade (1990-2001), the total number of harvested polar bears has ranged between 38-123 animals each year. Since 1972, the ban on commercial sale of polar bear hides drastically diminished the intensity of the harvest. Harvest from the Chukchi/Bering seas stock accounted for 68% (mean =75) of the annual Alaska kill during this period (USFWS 2004). The number of unreported kills since 1980 to the present is thought to be negligible. The pursuit of polar bears continues to play an important role in Inupiat communities where they utilize parts of the bears to make traditional handicrafts and clothing (Nelson 1981).

Subsistence Harvests by Community

Kaktovik

Kaktovik located on Barter Island, is 90 miles west of the Canadian border and 278 miles southeast of Barrow. The village is on the northern edge of the 20.3 million acre Arctic National Wildlife Refuge, primarily harvests bowhead whales, caribou, and fish, which comprise approximately 63%, 11%, and 13% of the total annual harvest (by edible pounds), respectively (USDOI 2001). Other marine mammal species comprise a very small percentage of the overall harvest.

Walrus

Pacific walruses rarely occur near Kaktovik and thus are rarely harvested. However, boat crews hunting for other marine mammal species occasionally harvest walruses opportunistically in July and August. Kaktovik hunters did not harvest a walrus from 2000-2004 (Table 6).

Polar Bear

Polar bears are primarily harvested during fall and winter on the pack ice and along open leads. Compared to other North Slope communities, the overall harvest of polar bears is relatively low. The polar bear harvest in Kaktovik from 2000 2004 averaged 2.4 polar bears per year (Table 7).

Nuiqsut

Nuiqsut is located 15 to 18 miles south of the Nechelik Channel entrance, which is the head of the Colville River at the Beaufort Sea, and 136 miles southeast of Barrow. .Nuiqsut is an inland community that primarily relies on caribou and fish for its subsistence harvests (by edible pounds 58% and 30%, respectively). The use of marine mammals, such as the polar bears and walruses, for subsistence is relatively low (USDOI 2001).

Walrus

Pacific walruses are occasionally harvested during the open-water season from June to early October. The entire Beaufort Sea coast, from Cape Halkett to Anderson Point, has been used to hunt walruses, but walruses are seldom encountered for harvest. In the past five years (2000 - 2004), no walruses have been harvested by Nuiqsut hunters (Table 6).

Polar Bear

Most polar bear hunting occurs from September through April. Compared to other North Slope communities off the Alaskan Beaufort Sea, the overall harvest of polar bears is lower than Barrow, but higher than Kaktovik. The annual polar bear harvest for Nuiqsut from 2000 to 2004 averaged 2 bears (Table 7).

Barrow

Barrow is the economic, transportation and administrative center for the North Slope Borough. Located on the Chukchi Sea coast, Barrow is the northernmost community in the US. The majority of the annual subsistence harvest by edible pounds for Barrow is composed of caribou and bowhead whales (22 % and 39%, respectively; USDOI 2001). Walruses comprise approximately 9% of the annual harvest (by edible pounds), and polar bear accounts for approximately 2.2% of the annual subsistence harvest (by edible pounds) for Barrow (USDOI 2001).

<u>Walrus</u>

Barrow residents hunt walruses from boats. The timing and seasonality of hunting greatly depends on ice conditions. Most walrus hunting occurs from June through September, and peaks in August, when the land fast ice breaks up and hunters can access the walruses by boat as they migrate north on the retreating pack ice (USDOI 1990). The average annual walrus harvest for Barrow from 2000 to 2004 was 31.8 animals (Table 6).

<u>Polar Bear</u>

Barrow residents hunt polar bears on the sea ice or along leads from October to June. In 1989, 2.2% of the total subsistence harvest (by edible pounds) for Barrow was composed of polar bears (USDOI 2001). The polar bear harvest for Barrow from 2000-2004 averaged 15.6 animals /year (Table 7). Barrow often has the highest number of polar bear takes on the North Slope.

Wainwright

Wainwright is located on the coastline of the Chukchi Sea about 72 miles southwest of Barrow. It is the third largest village on the North Slope, with a population of 584 people. The people of Wainwright are Inupiat Eskimos who rely on subsistence hunting based primarily on whales and caribou.

<u>Walrus</u>

Wainwright residents hunt in the Chukchi Sea for walrus from June through August for food and ivory use. Wainwright hunters are extremely successful and have consistently harvested more walruses than any other subsistence community on the North Slope averaging 62.2 animals/year for the last five years, 2000-2004 (Table 6).

<u>Polar Bear</u>

Most polar bear hunting occurs in early spring and late fall during whaling season in the Chukchi Sea area. Compared to Barrow, Wainwright has the second highest take of polar bear on the North Slope. The annual polar bear harvest for Wainwright averaged 4.4 bears from 2000 - 2004 (Table 7).

Point Lay

Point Lay is located on the Chukchi Sea Coast, protected from the open ocean by the Kasugaluk Lagoon and is 152 miles southwest of Barrow. The deeply indented shoreline prevents effective bowhead whaling and the village has never fully participated in the whaling culture. The village's traditional hunt of beluga whales is similar to the bowhead whaling culture in other North Slope villages.

<u>Walrus</u>

Point Lay residents for the last five years, 2000-2004, have only averaged 6.2 walrus taken/year. Generally Point Lay residents' hunt less often than thee nearby communities of Point Hope and Wainwright; also USFWS officials suggest that tagging may be under-reported (Table 6).

Polar Bear

Only two polar bears have been tagged and reported from Point Lay from 2000 to 2004 for an average animal/year of 0.4. Compared to polar bears tagged in Wainwright (4.4 animals /year) and Point Hope (7.8 animals/year) this number is noticeably low and believed to be under-reported (Table 7).

Point Hope

Point Hope is located near the end of a triangular spit which juts 15 miles into the Chukchi Sea about 248 miles southwest of Barrow. This peninsula is one of the longest continually inhabited areas in North America. Some of the earliest residents came to the peninsula for bowhead whaling some 2,000 years ago after crossing the Siberian land bridge.

Walrus

Point Hope residents also hunt in the Chukchi Sea for walrus and their annual animal take/year averages to 11 animals for the years of 2000 to 2004. Point Hope resident's reporting and hunting success is nearly double of Pont Lay. (Table 6).

Polar Bear

Polar Bear takes in the Chukchi Sea area are reported as takes in defense of life or property or for their fur compared to subsistence. Point Hope harvested 7.8 polar bears for the last five years (2000-20004) with a Chukchi Sea region high of 12 in 2001 (Table 7).

Table 6. Native Subsistence walrus harvest estimates by year and village.

	Calendar Year					
Village	***88-99***[a]	***2000***	***2001***	***2002***	***2003***	***2004***
Kaktovik	1	0	0	0	0	0
Barrow	228	19	36	39	51	14
Nuiqsut	0	0	0	0	0	0
Wainwright	508	36	93	118	29	35
Point Lay	31	6	3	10	10	2
Point Hope	36	6	2	15	12	20
North Slope Total[b]	804	67	134	182	102	71

[a] Data based on seasonal-year (30 June – 1 July)
[b] Totals are not corrected for walruses struck and lost

USFWS 2004 data

TABLE 7. Estimates of Alaska subsistence harvest for polar bear by year and village.

	Calendar Year					
Village	*88-99*	*2000*	*2001*	*2002*	*2003*	*2004*
Kaktovik	17	0	1	4	3	4
Barrow	215	12	16	26	21	3
Nuiqsut	15	4	1	2	2	1
Wainwright	74	3	9	4	4	2
Point Lay	18	1	0	1	0	0
Point Hope	132	5	12	8	9	5
North Slope Total	471	25	39	45	39	15

USFWS 2004 data

Summary

Activities described by the Petitioner are expected to have no more than a negligible impact on the availability of polar bears and walrus for subsistence harvest. Polar bears are hunted primarily during the ice-covered period, and the proposed activities are expected to have a negligible impact on the distribution, movement, and numbers of polar bears in this area. Walruses are primarily hunted during the open-water period, and the proposed oil and gas activities are also expected to have a negligible impact on the distribution, movement, and numbers of walruses in the region. Regular communication between the industry and native communities will further reduce the likelihood of interference with subsistence harvest.

4. ANTICIPATED IMPACT ON HABITAT

The anticipated impact of the activity upon the habitat of the marine mammal populations and the likelihood of restoration of the affected habitat.

Habitats that are important to walruses or polar bears during the year can be identified in the region of activity. These habitats include:

- Offshore pack ice edge in summer for walruses
- Offshore pack ice edge in summer and winter for polar bears
- Landfast ice for polar bears during winter and early spring
- Coastal habitat for denning polar bears

Offshore Pack Ice

The offshore pack ice is important habitat for both walruses and polar bears. Pack ice is a highly dynamic habitat; it is constantly in motion, driven by the wind and currents. Pack ice zones are characterized by open leads and pressure ridges, resulting from the dynamic state of the ice (Wadhams 2000).

Moderate numbers of walruses depend on the pack ice edge near Barrow for feeding and resting habitat. Noise and visual stimuli from vessel and aircraft traffic could make the habitat temporarily unsuitable for walruses. Once the vessels or aircraft passes, the habitat would again be suitable. Thus the alteration would be short term (at most a few hours) and the habitat would be completely restored once the source of the disturbance has passed.

Polar bears are year-round residents on the pack ice of the Beaufort and Chukchi Sea (Frame 1969; Amstrup 1995; Amstrup 2000). They spend most of their time in or along open leads that parallel the coast out to approximately 200 km (124 mi) offshore (Amstrup and DeMaster 1988). In addition to being important seal hunting habitat for polar bears, the offshore pack ice is important denning habitat. Approximately half of the denning in the Beaufort Sea region of Alaska and Northwest Canada is on offshore pack ice (Amstrup 2000). Although not much is currently known about polar bear dens in the Chukchi Sea, an August 2000 survey found the greatest concentration of bears seen concurred in an area along the southern edge of the ice, approximately 96 to 160 km (m) northwest of Barrow. The majority of polar bear sightings have indicated that polar bears have a tendency to congregate along the edge during the fall when the ice begins to form and move south, where the ice was less consolidated and seal and walrus sightings were more common. Vessel and aircraft traffic is not expected to impact offshore pack ice denning habitat. Most, if any, habitat disturbance would be short-term as discussed in previous sections. The possibility of oil contamination of walrus or polar bear habitat, although very low, does exist. Small spills are cleaned up immediately and pose little threat to habitat. The probability of a large spill occurring is small. The impact of a large spill would depend on the time of year, environmental conditions, the magnitude of the spill, the origin of the spill, and the success of clean-up efforts. If a large spill occurred in the open-water season, within 24 hours the majority of the oil would evaporate or disperse, leaving nothing but a patchy film on the water surface (Andersen et al. 1999). The remainder of the oil would be cleaned up, would evaporate, or would disperse through the water column due to wind and wave action. If a large spill occurred in the ice-covered season, the majority of the spill would become incorporated into the growing ice, to be released later during spring-melt, at which time it could be cleaned up. If a large oil spill occurs and reaches the pack ice, small amounts of pollutants could be distributed over a large area (Wadhams 2000). However, it is highly unlikely that a large oil spill would reach the pack ice. This type of spill would have to occur in the fall, when there is a considerable amount of open water. Oil traveling under moving pack ice could create a trail of oil patches on the underside of ice floes, and could eventually be incorporated into the ice from underneath (Wadhams 2000). However, the possibility of a spill of this magnitude is small, and the amount of habitat significantly contaminated would also be small relative to the available habitat.

Landfast Ice

Polar bears in the Beaufort and Chukchi Seas use nearshore areas, but rarely venture onto the land (Amstrup 2000). Bears move into nearshore areas to forage in October, during freeze-up when nearshore ice is available. Landfast ice can be used as hunting habitat by female polar bears with cubs to avoid the large dominant males that remain on the offshore pack ice. Areas of landfast ice adjacent to present offshore production facilities, including the Northstar Development, the Salt Water Treatment Plant on the West Dock Causeway, and the Endicott production island, are marginal hunting habitat, due to their low seal densities. Furthermore, these facilities do not impact the fast ice habitat used by ringed seals adjacent to them (Williams et al. 2001; 2002).

Small operational oil spills on the ice, such as from a leaking vehicle, are immediately cleaned up, and should not impact nearshore landfast ice habitat. Although a highly unlikely event, a larger oil spill from offshore production facilities could occur in the nearshore landfast ice zone. Oil spilled under landfast ice would not be as widespread as oil under pack ice, due to the stability of the ice (Wadhams 2000). It is possible the oil would have only local effects. In addition, response to such a spill would be immediate, and the cleanup effort would be extensive and thorough. Due to the low probability of a large spill and the relatively small area of impact compared to the extensive polar bear distribution on the landfast ice, the impact of an oil spill on the habitat would be temporary and relatively insignificant.

Coastal Habitat

Between 1981 and 1992, approximately 50% of polar bear dens located in the Beaufort Sea region of northern Alaska and northwestern Canada were on land (Amstrup and Gardner 1994; Amstrup 2000). Within the coastal region, polar bears prefer "bank" habitat, located along coastal shorelines, lake shores, and rivers (Amstrup and Durner 1998; Durner et al. 2001). These habitats are typified by a steep slope and a height ranging from 1.3 to 34 m (4.3 to 112 ft), with water or relatively level ground below the slope, and relatively level ground above. Bank habitat is relatively uncommon along the coast of northern Alaska. Some of the most important terrestrial denning habitat along the Beaufort Sea coast of Alaska is in the ANWR (Gardner et al. 1998). Maternal polar bear dens have occurred on the barrier islands and the mainland coast of the project area. In the Beaufort Sea, it appears that female polar bears do not exhibit fidelity to den sites (i.e., geographic regions); rather polar bears tend to be faithful to the substrates of their previous dens (i.e., pack ice or land; Amstrup 2000). Coastal polar bear dens may be more vulnerable to human-caused disturbances; however, any impact of human activities on coastal denning habitat could be mitigated by temporal and spatial avoidance of occupied dens. Currently, any industry activities within 1.6 km (1 mi) of known den sites must be discussed with the USFWS prior to initiating such activities. Operational oil spills may occur at or near production facilities on shore at any time of year. These spills are likely to be very small and involve less than one to a few barrels of oil. Existing cleanup procedures and waste holding practices provide adequate protection to minimize any impacts to habitat.

5. ANTICIPATED IMPACT OF LOSS OR MODIFICATION OF HABITAT

The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved.

The previous Section (IV) identified several possible losses or modifications to polar bear or walrus habitat that could result from oil and gas exploration or production activities in the proposed region of activity. In all cases, the potential modification involved small areas of habitat that are part of extensive areas used by these species, thereby representing a small proportion of the total utilized available habitat. Consequently, the activities would have negligible impact on polar bear and walrus habitat and no impact on polar bear and walrus populations.

6. MITIGATION MEASURES

The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and where relevant, on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.

To mitigate potential impacts to polar bears and walruses, all exploration, development, and production activities are coordinated with state, federal, and local regulatory agencies.

Pacific Walrus (*Odobenus rosmarus divergens*)

Aircraft Traffic

To minimize the potential for disturbance created by aircraft traffic [see Section 3(3)], aircraft must maintain minimum altitudes of 305 m (1,000 ft) ASL (except during takeoff and landings). Pilots are also instructed to avoid flying over marine mammals and are prohibited from making close approaches except when stipulated in a permit. Most flights are in nearshore areas where walruses are not normally found. Sightings of walrus are recorded and reported to the relevant authorities. Regularly traveled aircraft corridors are negotiated between the industry and appropriate agencies to minimize impacts to sensitive areas or species.

Vessel Traffic

All vessel traffic will divert around walruses wherever practical, avoid haulout areas and make every effort to avoid disturbing the animals. Close approaches to walrus are prohibited. There are no known or traditional walrus haul out areas in the activity area. Sightings will be recorded and reported to the relevant authorities. Most vessel traffic is not anticipated to be in preferred walrus habitat (i.e., the pack ice edge), thus further avoiding potential impacts.

Seismic Exploration and Stationary Sources

Walruses are not typically found near open water seismic exploration or stationary noise sources (Northstar or Endicott). However, if walruses are seen near seismic operations efforts will be made to ensure they are not injured. All open-water seismic activities will be conducted with trained marine mammal observers on board who ensure no activities are conducted when marine mammals are sighted within designated safety radii. If animals are sighted at close range (i.e., within the designated pinniped safety radius), seismic activities will be suspended until the animal(s) have left the safety radius or the vessel has moved away from the animal. Sightings will be recorded and reported to the relevant authorities.

Accidental Oil Spills

In order to reduce the impact of oil spills, industry maintains oil spill cleanup equipment and response services through its own facilities and through the industry cooperative, Alaska Clean Seas (ACS). Since the proposed region of activity is not a primary habitat for the walrus, the potential impact of an oil spill on the walrus population is no more than negligible. In the unlikely event that a spill does occur, regardless of size, it will be cleaned up as much as possible, thus reducing potential effects. The cleanup activities may displace walruses from the immediate vicinity of the spill, thereby reducing their exposure to oil or injury. In addition, hazing may also be authorized by the emergency response command during the cleanup activities to ensure marine mammals do not approach areas where injury could occur from cleanup equipment or contact with this spilled oil.

Subsistence Use of the Pacific Walrus

Local native groups will be consulted to ensure the proposed activities do not interfere, in any significant way, with subsistence hunting of the Pacific walrus. The numbers of walruses taken by subsistence hunters in northern Alaska are relatively small (see Section 3D), with the majority of walruses hunted by communities southwest of Barrow. In addition to current activities east of Barrow, industry proposed activities covered under this petition could also occur southwest of Barrow, but a no more than a negligible effect on subsistence harvests is expected.

Polar Bears (*Ursus maritimus*)

A polar bear interaction plan (see Appendix A) with a request for a Letter of Authorization is submitted to the USFWS for all industrial activities and operations. The polar bear interaction plan provides the basis for minimizing polar bear encounters through personnel control, lighting, snow clearance, garbage control, agency communication, site clearance, and site-specific safety briefings for polar bear awareness. The specific details of each plan get revised based on the current knowledge of polar bear locations and the activities to be conducted. Possible attractants for polar bears are defined and measures to minimize these attractants are identified in each plan.

For over five years industry has funded research in cooperation with the USFWS and the U.S. Geological Survey-Biological Resources Division (USGS-BRD), a series of studies conducted to help minimize and understand potential human-caused disturbances on polar bears. A pilot study was conducted to examine the feasibility of verifying heat signatures identified as potential polar bear located in dens during Forward Looking Infra Red (FLIR) aerial surveys. Trained dogs were used to find polar bears in their dens by scent. This technique appears promising and may help industry identify active polar bear dens from naturally occurring heat sources on the ground or ice so to avoid them during industrial activity. Currently, mitigation measures are being reviewed to further understand the effectiveness of these measures to minimize human caused impacts to polar bears, specifically denning females.

As part of a remediation project on Flaxman Island in August 2000, noise and vibration levels of industrial activities were recorded to determine received levels in artificial dens. Activities measured included: heavy equipment operation, gravel hauling and vehicular and aircraft traffic. In addition, a polar bear behavioral study was conducted to monitor behavior as they emerged from their dens.

Aircraft Traffic

To minimize the disturbance caused by aircraft traffic, flights over potential polar bear habitat will maintain minimum altitudes of 305 m (1,000 ft) ASL where possible (except during takeoff and landings). Overflights of known den locations will be avoided whenever possible. Regularly traveled aircraft corridors will be negotiated between the industry and appropriate agencies to minimize impacts to wildlife, sensitive habitats, polar bear dens or areas of known bear concentrations.

Vehicle Traffic

Currently, industrial activities avoid all known polar bear dens by 1.6 km (1 mi), unless authorized by the USFWS. Snow clearance along roads and pads prevents build-up of snow drifts and maintains visibility so bears can be sighted and safe distances can be maintained from bears. The use of FLIR imagery to initially locate potential dens, polar bear denning habitat maps (Durner et al. 2001), and radio/satellite tracking of bears (Amstrup 1995) will help locate bears, their dens, and determine their proximity to industry activities. In December 2004, USFWS personnel used the FLIR to identify any potential bear dens along CPAI's proposed ice roads in the Colville River delta and northeast NPRA.

The oil and gas industry works closely with the USFWS and USGS-BRD to minimize impacts of oil and gas activities on polar bears. Numerous studies in recent years have attempted to measure industrial impacts on various groups of the bear population. In one study, Blix and Lentfer (1992) investigated industrial noise and vibration levels received at artificial dens to simulate potential disturbance of denning female bears. They recorded common industrial sounds from seismic activities, ice road traffic, exploration activities, and helicopter noise on land and sea ice. Blix and Lentfer (1992) concluded that the type of snow where polar bears den absorbs sound very well. Industrial sounds were received at higher than normal background levels in the dens only when the source sounds were within 100 m or less. Based on Blix and Lentfer (1992), received noise levels from general oil and gas activities at dens from a distance of 1.6 km (1.0 mi) away would be well below normal ambient conditions and not detectable by polar bears. The snow also absorbed vibrations effectively and they concluded that denning bears would not likely feel man-made vibrations unless the industrial equipment was very close. More recently, industry sponsored a similar study investigating received levels of industrial noise and vibrations at artificial dens to supplement the findings of Blix and Lentfer (1992) and measure new activities during a site remediation project (i.e., vehicle traffic on the ice road, removal of contaminated soils using heavy equipment, blasting a well casing to facilitate its removal, and helicopter overflights; LGL and Jasco unpubl data). The results have not been analyzed, but they will be used to further mitigate impacts of industrial noises on polar bears.

Vessel Traffic

Polar bears typically remain on the retreating ice in summer and would not be near major vessel activity. If polar bears are encountered on or near the ice, efforts will be taken by vessels to maintain a safe distance from the bear when ever possible.

Seismic Exploration

Precautions will be taken to avoid seismic exploration near known dens. To avoid all known, active polar bear dens, a 1.6 km (1.0 mi) separation distance will be maintained, unless changes are authorized by USFWS. The use of polar bear denning habitat maps (Durner et al. 2001) and radio/satellite tracking of bears (Amstrup 1995) will help to locate bears relative to industry activities and to mitigate impacts on bears.

Human/Polar Bear Encounters

Human/polar bear encounters will be mitigated through proper oilfield management, personnel training, awareness programs, and polar bear interaction plans (see Appendix A). Garbage and waste disposal policies presently implemented will help reduce potential polar bear attractants at all industry sites, including oilfield facilities and remote sites. Employees will follow approved procedures if they encounter a polar bear. Polar bear sighting reports will be completed for each sighting (see Appendix A). In addition, during certain activities, such as remote field operations, trained personnel may be employed to monitor for polar bears in the area around the camp and to monitor known polar bear dens near areas of industrial activity for bear activity.

Accidental Oil Spills

In order to reduce the impact of an oil spill, industry will maintain both oil spill cleanup equipment and response services through its individual facilities and through the industry cooperative, ACS. In the unlikely event of a spill, it will be cleaned up immediately, to the maximum extent possible (and in consultation with federal and state regulatory agencies), to minimize the potential impact on polar bears.

Production Wastes and Hazardous Materials

Treatment fluids and any hazardous chemicals will be stored or kept in appropriate containers or within containment areas to prevent their release in the environment. In the unlikely event one of these fluids is spilled or released, the Petitioner will maintain proper cleanup equipment and response services through it own facilities. Any spill or release, regardless of size, will be immediately cleaned up to the maximum extent possible, thereby minimizing the potential impact on polar bears.

Subsistence Use of Polar Bears

Summer activities are not expected to impact polar bear subsistence harvest, since bears are not hunted during this season. However, during winter and early spring, polar bears are located closer to shore and are taken for subsistence. Even though polar bears are found closer to the proposed activities during these times, they are not found in high densities. Therefore, these activities would have no more than a negligible impact on subsistence hunting.

7. MONITORING AND REPORTING

Suggested means of accomplishing the necessary monitoring and reporting which will result in increased knowledge of the species through an analysis of the level of taking or impacts and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity.

As demonstrated above, the Petitioner seeks incidental take authorization in connection with a wide variety of activities at many locations. The scope of coverage sought, coupled with the low probability that polar bears and walruses will be encountered and/or affected by those activities, makes it problematic to propose and implement an applicable monitoring program for the wide variety of activities. It is proposed that each applicant requesting a Letter of Authorization work in cooperation with the USFWS to develop an appropriate monitoring program for their activities based on the location and proximity to known habitat used by these two species.

When conducting studies to monitor distribution or reactions of animals to production, development and exploration activities, the researchers have objectives to: (a) identify the numbers of animals by species, as well as age/size and sex encountered by the authorized activities (Swartz and Hofman 1991); (b) coordinate with any related on-going studies; (c) collect data comparable to previous related data on the same species; and (d) submit copies of raw data to appropriate government agencies to be included in existing government databases for those species.

In the event of a marine mammal sighting by workers during industrial operations and activities, the Petitioner and their proxies will be responsible for implementing procedures for minimizing impacts to polar bears and Pacific walruses and to report all marine mammal sightings. Currently, a polar bear sighting form is filled out for all sightings, and is the single monitoring system for tracking industry related polar bear interactions. A similar form is completed for walrus sightings. Sightings will be reported to the appropriate Federal and State agencies in a timely fashion and annual reports will be submitted summarizing sightings of marine mammals covered by these regulations.

Community meetings and consultation with local native groups occurs to ensure that proposed activities will not interfere, in any significant way, with subsistence hunting. A Plan of Cooperation has been submitted to the U.S. Fish & Wildlife Service for this purpose. This year, ConocoPhillips staff met with the Kuukpik Subsistence Oversite Panel (KSOP) of Nuiqsut to discuss any issues or concerns. With the current system in place, no significant concerns have arisen from subsistence hunters and local residents.

8. COORDINATION OF RESEARCH EFFORTS

Suggested means of learning of, encouraging, and coordinating research opportunities, plans and activities relating to reducing such incidental taking from such specified activities, and evaluating its effects.

Given the low probability that activities discussed here will have significant impacts on the environment, and the limited temporal extent of any impact to habitat, the proposed activities are not expected to have any significant effects on walruses and polar bears. As noted in response to Section VII, industry will coordinate closely with the USFWS, any other federal agencies, the State of Alaska, native communities, and their own consultants concerning measures to minimize the impacts of all activities. Monitoring improvements, such as those described in Section 6, could help limit human-caused impacts to polar bears.

III. CONCLUSIONS

Two species of marine mammals under the jurisdiction of the USFWS are found in the Alaskan Beaufort and Chukchi Seas. The polar bear is relatively common in the area. While primarily associated with the offshore pack ice, some polar bears may occur in the nearshore areas during the ice-covered season and near Barrow, Cross Island and Kaktovik during late summer. The Pacific walrus is rare in nearshore waters, but they do occur in limited concentrations in the pack ice off the coast of Barrow during summer also along west coast.

AOGA is requesting regulations to authorize small takes of polar bears and walruses incidental to oil and gas exploration, development and production activities in the Chukchi and Beaufort Seas, as defined under the MMPA. AOGA is requesting non-lethal incidental take during planned, lawful activities.

The potential impact of oil and gas exploration, development and production activities involve acoustic and non-acoustic effects. Acoustic effects could result from sounds produced by activities, such as heavy equipment operation on the ice, seismic exploration activities, aircraft and vessel traffic, and operation of production facilities. The presence of structures and personnel and the unlikely event of an oil spill or wastes are potential sources of non-acoustic impacts.

Walrus responses to the proposed activities may vary among individuals. However, in general, responses are expected to be limited to short-term displacement from the activity source. Walruses are typically associated with offshore pack ice and it is highly unlikely that traffic will occur in these areas or disturb more than a few walruses. The impact of an oil spill on walruses could be lethal to heavily oiled animals. However, the overall impacts to the walrus population will be negligible due to the low probability of a large oil spill occurring and the small number of walruses likely to contact the oil.

Responses of polar bears to the proposed activities should be primarily short-term and limited to small numbers of polar bears. Individual polar bears are expected to have varied reactions to activities. It is possible denning females with cubs could be disturbed by human activities during winter. Being aware of potential den habitat and known den sites will continue to help industry mitigate these effects. The development of offshore production facilities could potentially increase the number of human/polar bear encounters, but the development and implementation of polar bear interaction plans will help mitigate effects. The unlikely event of a large oil spill could potentially be lethal to heavily oiled bears. However, the overall impacts to the polar bear population will be negligible due to the low probability of a large oil spill occurring, the small number of polar bears likely to contact the oil, and measures taken during the course of oil response activities. Polar bears might be encountered near Cross Island and Kaktovik during late summer, but avoidance of these areas during late summer will minimize interactions with bears.

The scope of coverage sought, coupled with the low numbers of polar bears and walruses will be encountered and/or affected by those activities, makes it virtually impossible to propose a single monitoring program applicable to all operations. Rather, it is recommended that each applicant requesting a LOA work in cooperation with the USFWS and other interested parties to develop an appropriate monitoring program for the activities, locations and information needs of the proposed activity.

For the reasons set forth above and in the record of the rule-making proceedings underlying this petition for regulations, it is apparent that the proposed oil and gas exploration, development, and production activities in arctic waters of the United States will have no greater than a negligible impact on walrus and polar bear populations. Additionally, there will be no unmitigable adverse impacts on the availability of these species for subsistence uses due to the proposed industrial activities. Accordingly, AOGA requests the USFWS promulgate regulations allowing small takes of walruses and polar bears incidental to oil and gas exploration, development, and production activities in the arctic waters and nearshore areas of the United States between 30 March 2006 and 30 March 2011.